An Analysis of Turkish Prospective Teachers' Perception of Constructivist View of Learning and Teaching

Öğretmen Adaylarının Yapılandırmacı Öğrenme ve Öğretim Anlayışına İlişkin Algılarının Analizi

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Abstract

The present study investigated prospective teachers' perception of constructivist view of learning and teaching. A case study design was adopted in the study. Elementary and Science prospective teachers (4th grade) participated (n=226) in the study. After having provided a caricature that represented the transmission view of teaching and learning prospective teachers were asked to make a caricature to represent the constructivist view of learning and teaching. They were also required to provide an explanation for their drawings. The drawing and its explanation were analysed together ideographically. The results of this analysis showed that the majority of the prospective teachers' described the constructivist view where the learner actively constructs the knowledge. Five major elements were detected in their perception. These were; learner's role, teacher's role, philosophy of constructivist view, instructional materials and learner's acquirements. Teacher and learner's role existed in all of the prospective teachers' drawing. Yet, the role of the teacher and the learner seem to differ in nature depending on the prospective teacher's perception of the constructivist view and preference of its brands as cognitive or socio-cultural.

Keywords: Constructivism; caricature; prospective teachers

Öz

Bu çalışmada, öğretmen adaylarının yapılandırmacı öğrenme ve öğretme anlayışını nasıl algıladıkları araştırılmıştır. Araştırma, bir vaka incelemesi olarak dizayn edilmiştir. Sınıf Öğretmenliği ve Kimya Öğretmenliği son sınıf öğretmen adayları (n=226) araştırmanın çalışma grubunu oluşturmuştur. Öğretmen adaylarına davranışçı anlayışı simgeleyen bir karikatür verilmiş ve onlardan yapılandırmacı öğrenme ve öğretme anlayışını simgeleyen bir karikatür çizmeleri istenmiştir. Ayrıca öğretmen adaylarından çizdikleri karikatürü bir kez de yazılı olarak açıklamaları istenmiştir. Araştırmada hem karikatürler hem de açıklamaları analize tabi tutulmuştur. Araştırma sonuçları, öğretmen adaylarının büyük bölümünün yapılandırmacı öğrenmeyi, öğrenenin bilgiyi aktif olarak yapılandırdığı bir süreç olarak gördüğünü ortaya koymaktadır. Karikatürler ve açıklamalarında yapılandırmacılığa ilişkin beş ana boyut ortaya çıkmıştır. Bunlar; yapılandırmacılık bağlamında öğrenenin rolü, öğretmenin rolü, yapılandırmacı öğrenmenin felsefi boyutu, eğitim materyallerinin kullanımı ile öğrenenin elde ettiği kazanımlar/beceriler boyutlarıdır. Öğretmen ve öğrenenin rollerine ilişkin boyutlar, karikatürlerin büyük bölümünde vurgulanmıştır. Buna karşılık yapılandırmacı öğrenmede öğretmen ve öğrenenin rollerinin, öğretmen adayının sahip olduğu yapılandırmacılık anlayışına göre (sözgelimi "bilişsel yapılandırmacılık" ya da "sosyokültürel yapılandırmacılık" gibi) değiştiği ortaya çıkmıştır.

Anahtar Sözcükler: Yapılandırmacılık, karikatür, öğretmen adayları.

Introduction

Constructivism has been the underpinning philosophy for many current reform efforts in education (Tobin & Tippens, 1993). Educational reform in Turkey launched in 2004 has emphasized the constructivist instructional approaches (Ministry of Education, 2004). The curriculum and instruction both at elementary and secondary level were designed in the line of this new philosophy.

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Textbooks were re-written and existing assessment techniques were replaced by performance assessment methods. In similar manner, the teacher training programs have been re-designed so as to encourage conceptual change in student teachers' views of learning and teaching from transmission to the constructivist one. In this line, the content of the teacher training program was revised as new courses such as learning theories, teaching strategies, curriculum planning, developmental psychology, assessment and evaluation techniques were included in the program. During their training program, student-centred instructional approaches that encourage students to construct their own knowledge have been started to be introduced to and modelled for prospective teachers.

Research results indicated that educational change become effective if the students' perceptions are also changed accordingly (Lawness & Richardson, 2002; Segers & Dochy, 2001). Teacher-centred approaches have been the prevailing teaching method in Turkey for many years. Students are usually viewed as the passive recipients of knowledge transmitted by the teacher. Thus, it would not be surprising if prospective teachers hold such positivist teaching and learning views or prefer teacher-centered teaching methods. This premise seems to be supported by the empirical studies conducted (Meral & Çolak, 2009; Saban, 2003; Yılmaz-Tüzün & Topçu, 2008). Researchers agree that teachers' conceptions about teaching and learning are influenced by their earlier educational experiences as students (Pajares, 1992; Bramald et al., 1995). In that case, even modeling the constructivist atmosphere might be limited in changing prospective teachers' views. At the age of an epistemological change, there is a need to find out prospective teachers' perception of constructivist view of learning and teaching. This is because the way prospective teachers prepare themselves for teaching practice depends on how they perceive teaching. When they perceive teaching as passing knowledge onto the students, with implicit assumption that learning occurs simply receiving the knowledge, prospective teachers will possibly explain principles, give examples and solve problems to their students.

Educators seem to agree that teachers' epistemological beliefs and perceptions of teaching and learning are important in predicting their preferences, decisions and classroom practices (Brown, 2004; Chan & Elliott, 2004; Pajares, 1992; Richardson, 1996; Winterbottom et al., 2008). However, empirical studies produce conflicting evidence on this. Several studies indicated that beliefs and perceptions are reflected by the classroom practice (Crawford, 2007; Demirbolat, 2006; Hashweh, 1996; Stipek et al., 2001). On the other hand, there are studies indicated some sort of mismatch between beliefs and practice (Boz & Uzuntiryaki, 2006; Eren, 2010; Uzuntiryaki et al., 2010; Wilcox-Herzog, 2002). The mismatch seems to be on the side of the epistemological beliefs regarding the constructivist view. Not all prospective teachers who believed constructivist view of learning apply constructivist teaching in their classes (Moss & Kaufman, 2003). Uzuntiryaki et al. (2010) found that Turkish prospective teachers who possess weak or moderate constructivist belief applied traditional teaching strategies in their classes. Eren (2010) reported that Turkish prospective teachers valued constructivist teaching more than they practiced. The relationship seems to exist between prospective teachers' beliefs and their actions when the traditional view of learning and teaching is concerned. On the contrary, the same association appears to be lack regarding the constructivist view.

Having realized this situation a large body of research has concentrated its efforts on the perception of learning environments (Johnson & McClure, 2004; Tsai, 1998). After the renovations aforementioned towards the constructivist view studies were also conducted to find out students' perceptions of the constructivist learning environment (Tenenbaum et al., 2001; Johnson & McClure, 2004). Some of these studies were also focused on teachers/prospective teachers' perception of learning environment (Chan, 2003; Cheng et al., 2009; Eren, 2009). In these studies, the epistemological views or perception of constructivist learning environments is determined on the basis of their tendency to agree with the statements provided via a survey composed of usually 5-point Likert scale items (Aldridge et al., 2000; Saban, 2003; Johnson & McClure, 2004; Işıkoğlu et al., 2009; Eren, 2010; Aypay, 2010). There are few exceptions to this (Boz & Uzuntiryaki, 2006). Asking prospective teachers to explain the constructivist view in their own terms and make a drawing to show how they visualize the constructivist view might produce a more detailed picture of their perception. Therefore, the present study aimed to find out how prospective teachers perceive the constructivist

view of learning and teaching and how compatible it is with the epistemological foundations of constructivism. The study also aimed to uncover their reasoning behind the image held for constructivist view. The research questions of the present study can be stated as;

1. How do Turkish prospective teachers perceive the constructivist view of learning?
2. Which features supported the prospective teachers' view of constructivist teaching?
3. Do prospective teachers' subject areas make a difference in conceptualizing the constructivist view of learning?

Methodology

Based on the constructivist epistemology, case study as a qualitative research design was adopted in the present study. Purposeful sampling was used in selecting the contributors of the case studies. Two case studies were conducted in which two groups of the prospective teachers formed the sample of the study. The elementary prospective teachers (n= 101) formed the first case study whereas the second case consisted of the science prospective teachers (n= 125). The strategy used in choosing purposefully selected cases was extreme or deviant case sampling (Patton, 1987) as the selection of participants for the case studies was carried out in a way that they had different discipline background. Elementary teacher training involves both social studies and science subject areas whereas science involves only the science subject area. The study conducted with 4th grade prospective teachers (n= 226), 137 of whom were female students and the rest 89 were male students. The reason for choosing senior students was that they completed all the courses which would help them to develop a perspective about the constructivist view of learning and teaching.

Having completed their general pedagogy and teaching method courses, during their examination period, both groups of the prospective teachers were provided a caricature that visualises the transmission view of learning and teaching (Figure 1). They were then asked to make a drawing/caricature to represent the constructivist view of learning and teaching. They were also required to explain their drawings as detailed as they could. They did not feel time constraints as the exam was ended when they handed in their exam papers. These exam papers provided the main data for the study.
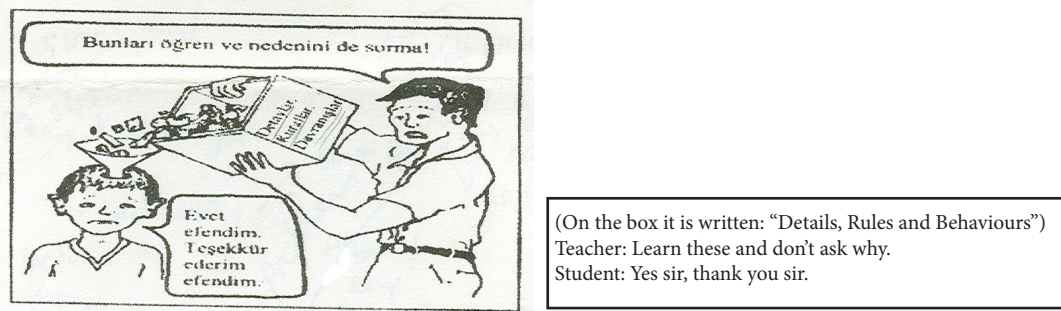

(On the box it is written: "Details, Rules and Behaviours")
Teacher: Learn these and don't ask why.
Student: Yes sir, thank you sir.

Figure 1. The caricature presented to the prospective teachers together with its translation (Taken from: A. Saban (2004, p. 166)

Document analysis was benefited in the research since the data is composed of the prospective teachers' drawings and written responses as exam papers. The caricatures drawn and its verbal explanations were examined together for a fuller picture of the prospective teachers' perceptions of the constructivist learning and teaching. In cases of failure in mapping their views or suspicious of the category constructed in coding they were asked to explain their drawing and written responses.

In analysing the data gathered content analyses was used. The analysis was started by assigning a code to the elements of visual and verbal source of data as long as it represents a theme or issue of relevance to the research questions. The present study intended to develop theory regarding the prospective teachers' perception of the constructivist view and the influence, if any, of subject areas on their perception. Therefore, inductive content analysis was used in the study. In generating categories inductively from the data, the constant comparative method (Glaser & Strauss, 1967) was applied. To this end, each piece of data assigned to a category was compared with each of those already assigned to that category, in order to fully understand the theoretical properties of the category. A particular text/visual was assigned to more than one single category depending on the elements it involved. The list of coding categories generated were increased and changed within the course of the analysis as new categories emerge inductively (Miles & Huberman, 1994). The coding proceeded and the coding scheme was not emerged as in the final form till all the data was coded. The prospective teachers' responses were then classified and organized according to the codes in the final form of the coding scheme. To ensure the consistency of coding, a coding manual (Weber, 1990) was developed which consists of category names, definitions or rules for assigning codes, and examples. This coding manual was given to a second coder with a group of prospective teachers' responses, already coded by the researcher. When sufficient consistency was achieved, all the data was coded via coding scheme. Having coded all the data at hand, themes were identified from the codes generated.

Categories were based on the study by Kabapınar (2010). These were "Constructivist features", "Positivist features" and "Mixed view". The pictures and related written responses which involved some sort of knowledge transmission from teacher to student via explanations about concepts or things to be done by the teacher were coded as positivist view. The responses where guidance of the teacher in helping students to acquire or construct knowledge was visualised via picture or written explanations were taken as a sign of constructivist view. Those which had elements of both view were coded as mixed view. Similar categories were also detected by the other studies (Levitt, 2001; Boz & Uzuntiryaki, 2006). Yet, in these studies the term "intermediate" was used to define the perception involving the features of both traditional and constructivist views.

Subjectivity and occasionality exist among the assumptions on which qualitative studies are based. Thus, it is not possible to expect a qualitative study to obtain the same results from similar groups (i.e. reliability). In other words, the measurements might change depending on the individuals and situations. Also it is natural that the researcher might involve their own interpretations and perspectives while analyzing the data. Therefore it will not be possible for the researcher to test and define the reliability of the assessment tool in quantitative research. However, educators mention that there are some precautions that can be taken to assist the reliability of the research (Patton, 1990; Miles & Huberman, 1994; Huck & Cormier, 1996). According to them, if the steps of the study are reported clearly in a detailed way the external reliability will increase, and the internal reliability will increase if it is shown that the results are not shaped according to the researcher's opinions or preferences. For example, use of variety in the data analysis process, and presenting some of the findings in their original form (i.e. scanned responses) can be considered as important issues in the context of internal reliability.

In this regard, in order to maintain the external reliability, all the steps of the research are presented in full detail. For maintaining the internal reliability, quotations from the prospective teachers' written answers are presented. Additionally, a second researcher was involved in the study for triangulation purposes. The prospective teachers' drawings and written responses were first coded by the researcher, and later by a second researcher. The consistency between the two codings (number of answers coded the same in both steps/total coding number) was found to be 87%. This high percentage is a sign that the researcher does not involve personal perspective in analyzing the research data and hence internal reliability (i.e. inter-coder reliability) is maintained.

Findings

The prospective teachers' visual and verbal responses to constructivist view of learning and teaching were initially analysed under two main categories as; constructivist or positivist view. Having completed this initial analysis, the prospective teachers' drawings and written responses were further examined so as to find out which kind of reasoning they used to support their image of constructivist view of teaching. The results of each analysis are presented in the following section.

1. Turkish prospective teachers' image of constructivist view

In this initial analysis visual and verbal data were examined in terms of features of constructivist and positivist view. These two categories were presented together with the number of the cases in Table 1.

The main categories used in the analysis

Category	Elementary n	Science n	Total	
			n	%
Constructivist features	97	110	207	91.6
Positivist features	1	7	8	3.5
Mixed	-	4	4	1.8
No response	3	4	7	3.1
Total	101	125	226	100

According to Table 1, 207 (% 91.6) prospective teachers' drawings referred to the features of the constructivist theory of learning and teaching while 8 of the participants' drawings and explanations involved the positivist features. Some science prospective teachers (n=4) appear to be in between. They provided explanations that included features of both view. As an example, one of the prospective teacher described learning in terms of constructivist view. Yet, s(he) drew teacher in explaining things. Or as it happens in another prospective teacher, teaching was described in constructivist in nature where students were depicted as actively involved during teaching. Yet, in the same picture learning was depicted receiving the knowledge and repeating it afterwards. A small number of the prospective teachers (n= 7) did not reply the question. One of the caricatures which showed positivist features is presented below together with its translation.

Prospective Teacher 93 (Science)
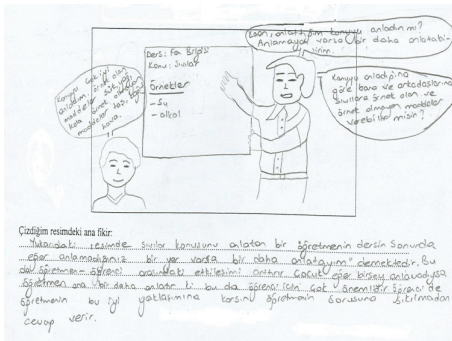
Dialogue in the picture;

Teacher: Kaan, have you understood what I am trying to explain? Has everybody understood? If not, I can explain one more time.

Student: I understand the concept very well. Milk and oil are examples of liquids; but stone, paper and air are not liquids.

Explanation: At the end of the instruction, teacher asks if there is anything that could not be understood by students. She/he offers to explain the same thing one more time in case anybody could not get the point. This enhances teacher-student interaction. If the child did not understand something well, then the teacher explains it one more time and this is very important for the student. As a result of this warm approach, student answer teacher's question without being bored.

The teacher in the caricature explains concepts; provide examples and controls whether students' receive the knowledge. As can be noted from the caricature and its accompanying explanation, the prospective teacher is visualising constructivist teacher as a person who explains

concepts, provides examples to define the phenomena and verbalise the reasoning need to be done. In other words, teacher as a source of knowledge transmits it to students. Similar positivist features exist in other 7 prospective teachers' visual and verbal responses. Even though they were informed about constructivist view and prepared constructivist teaching schemes as their projects during their teaching method courses, they still imagined constructivist teacher as an authority who provides knowledge. It is also noteworthy that this positivist group consists of the science prospective teachers mainly (7 out of 8) as compared to the elementary prospective teachers. This difference might stem from a range of reasons such as lack of knowledge, the resistance to change the existing view of learning and teaching from transmission to constructivist view or the subject areas. Unfortunately, it is not possible to spot the reason in the line of the data at hand.

2. Underlying reasoning that made up the prospective teachers' image of constructivist view

On examination of the prospective teachers' visual and verbal responses, different features were uncovered. It seems that these features made up the prospective teachers' reasoning concerning their image of constructivist view. The results of this analysis are presented in Table 2. Note that total number of responses in Table 2 exceeds the number of the prospective teachers as their responses were coded more than one depending on the elements they emphasised.

Table 2.

Features that made up the prospective teachers' image of constructivist view

Features of constructivist view	Elementary n=101	Science n=125	Total n=226
Teacher's role	212	291	503
Students' role	188	183	371
Philosophy of constructivist view	4	62	66
Instructional materials	12	38	50
Learner's acquirements	24	16	40
Total	440	590	1030

Upon detailed examination, it became clear that the prospective teachers' caricatures and accompanying explanations involved five basic features of constructivist view. These are features related to learners' role, teacher's role, the philosophy of constructivist view, instructional materials and learner's acquirements. According to Table 2, the most favourable feature of constructivist view of learning and teaching was teachers' role since all the prospective teachers describe the role of the constructivist teacher in their responses. In describing teacher's role they used more than one feature of the teacher. Therefore, the frequency of teachers' role (n=503) exceeds the total number of the prospective teachers (n=226). Second favourable feature aired by the prospective teachers was students' role (n=371). From Table 2, it seems that regardless of their subject areas both groups of the prospective teachers focused upon the two characters of the constructivist learning environment.

According to Table 2, the philosophy of constructivist view, instructional materials and learners' acquirements are relatively less favourable. Even though the frequencies of these features are similar (n= 66, 50, 40) in range, the distribution of the prospective teachers to these features appear to vary in nature. This difference is quite apparent for the philosophy of the constructivist view. The majority of the prospective teachers (n= 62 out of 66) who stated the feature of the philosophy are science student teachers. Similarly, the majority of the prospective teachers (n=38 out of 50) who mentioned instructional materials are science student teachers. This situation turns into opposite as far as the feature of learners' acquirements is concerned. The number of the elementary prospective teachers (n=24) who emphasised this feature is more than those of the science prospective teachers (n=16).

3. The prospective teachers' perception of the constructivist view in relation to the teacher's role

Table 3 indicates the ways in which the prospective teachers perceive the constructivist teacher role.

Table 3.

The frequencies of the features of the constructivist view in relation to teacher's role

The Features of Constructivist view in relation to teacher's role w	Elementary (n=101)	Science (n=125)	Total (n= 226)
Being a guide/facilitator/mediator/tutor/student-centered	37	65	102
Posing students problems that encourage them search for solution	30	41	71
Appreciating/using students prior/existing experiences	25	35	60
Do not transmit/present the knowledge to be learnt directly	34	25	59
Organizing learning environment to meet students' needs	13	31	44
Presenting conceptual conflicts/ambiguities /dilemmas	12	27	39
Knowing the importance of/encouraging teacher-student/ social interaction	1	12	13
Making connections between knowledge to be learnt and real life issues	8	4	12
Being aware that students interpret the same phenomenon/event/concept differently due to the differences in their prior experiences/ideas	6	5	11
Encouraging students to express themselves freely	6	4	10
Making students aware of different viewpoints about the phenomena/concept	8	2	10
Arise students' curiosity and develop their scientific/discovery skills	7	6	13
Being aware of the importance of peer learning	0	7	7
Creating learning environments that support skill-acquisition	4	2	6
Revealing and respecting students' differences	6	0	6
Total	197	266	463

As can be seen from Table 3, teacher's role is described as "a guide/facilitator/mediator in the classroom" by the majority of the prospective teachers (n=102). However, the guidance seem to vary in nature as some describes it as organising activities for students to discover and search for solutions whereas to some suggesting different ways and leaving students to choose his own way is guidance. The below excerpt taken from one of the prospective teachers' caricature illustrates the role of constructivist teacher as a guide.

Prospective Teacher 67 (Elementary)
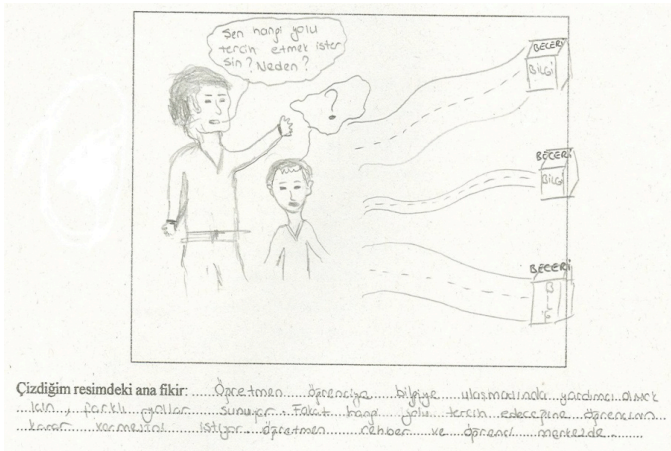
Dialogue in the picture;

Knowledge and Skills are written on the each boxes

Teacher: Which one do you prefer? And why?

Student (thinking): ?

Explanation: Teacher suggests student different ways in order to help him to construct his own knowledge. Yet, he (teacher) wants the student to choose his own way. The teacher is a guide and the student is at the centre in the constructivist approach.

This prospective teacher seems to visualise the guidance as suggesting different ways to students to help them construct their own knowledge and acquire skills targeted. S(he) thought that the teacher asks students to choose their own way, rather than suggesting/posing his/her way.

From Table 3, the second favourable feature of constructivist teachers is "posing students problems that encourage them search for solution" which was stated by 71 prospective teachers. The third favourable feature of the constructivist teacher on which both groups of the prospective teachers (n=60) agreed was that constructivist teacher needs to appreciate and use students prior/existing experiences. This feature is explained variously. To some, teaching needs to be planned according to these prior ideas, others do not talk instructional planning much. Rather, they stated that teaching needs to start with these ideas. Among this group some thought that at the outset of teaching teacher should ask questions to uncover students' pre-instructional ideas whereas the other prospective teachers did not provide further explanation.

Similar number of the prospective teachers in both groups (34 and 25) stated that constructivist teacher does not transmit knowledge to students directly. They seem to imagine constructivist teacher who provides students different ways/methods to help them construct knowledge. Other features of the constructivist teacher described by both groups in similar frequencies are included; "Being aware that students interpret the same phenomenon/event/concept differently due to the differences in their prior experiences/ideas" (n= 11), "Encouraging students to express themselves freely" (n= 10), "Creating learning environments that support skill-acquisition" (n= 6) and "Arise students' curiosity and develop their scientific/discovery skills" (n=13).

On examination of Table 3, it becomes apparent that both groups of the prospective teachers visualize constructivist teacher as a guide in helping students to construct knowledge by organizing the learning environment. However, they seem to differentiate in describing the organization of the learning environment. The science prospective teachers visualize teacher to organize learning environments where students interact with their peers (n= 7), communicate with their teacher (n=12) freely and where conceptual conflicts/ambiguities /dilemmas are presented (n= 27). On the other hand, the elementary prospective teachers appear to visualize the constructivist teacher focusing his/her effort on differences. In other words, they think that teacher reveals and respects students' differences (n=6) and makes them aware of different viewpoints (n= 8). It is expected that the notion of alternative views comes to the fore in the elementary prospective teachers' image of constructivist teacher since their subject area involves social studies where multiple realities, different viewpoints and value judgements are crucially important. Thus, it is possible to say that subject area might make a difference in conceptualizing the constructivist view.

4. The prospective teachers' perception of the constructivist view in relation to the students' role

Table 4 illustrates features of the constructivist view in relation to student's role emphasised by the prospective teachers.

Table 4.

The frequencies of the features of the constructivist view in relation to student's role

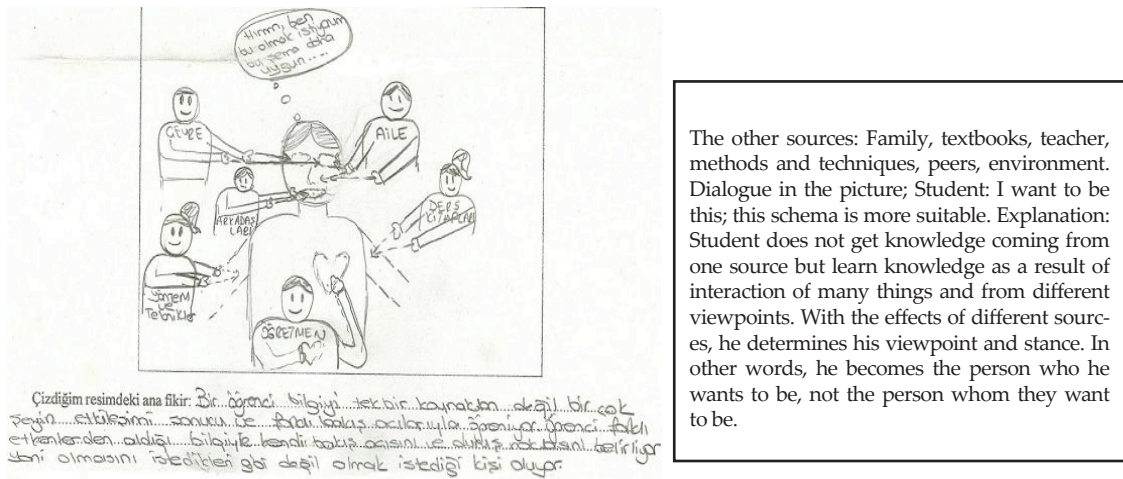| The Features of Constructivist view in relation to students' role	Elementary (n=101)	Science (n=125)	Total (n= 226)
Constructing/discovering knowledge	50	58	108
Learning by doing/being active/self-directed learning	21	40	61
Producing assumptions, ideas/making predictions etc.	21	33	54
Arriving at conclusions/value judgements by themselves	26	23	49
Learning by making inquiry	19	7	26
Having options among the alternatives	18	3	21
Bearing the responsibility of their learning	6	6	12
Using different sources to construct knowledge (internet)	8	2	10
Gaining experience in process as little researcher/scientist	2	8	10
Recognizing/grasping that there are different viewpoints	5	1	6
Knowing that their viewpoints are important	5	0	5
Interpreting knowledge/sources	4	0	4
Asking questions	4	0	4
Total	188	183	371

As can be seen from Table 4, the prospective teachers referred to a number of features of students in their drawings and explanations. The majority of the prospective teachers (108 out of 226) pointed out that students/pupils need to construct and/or discover knowledge. Some of these prospective teachers mentioned that new information is constructed whilst some used both construction and discovering of knowledge together. Discovery of knowledge appear to be a problematic term in epistemology. Discovery might be viewed not a suitable term to use instead of/or together with construction of knowledge. This is because it might impose an idea that reality/true knowledge is out there and could be discovered by the learner. Shortly, it might have its roots in the positivist epistemology rather than constructivist epistemology.

In the construction of the knowledge process, students should be active as stated by 61 prospective teachers. Being active means, according to 54 participants, producing assumptions/ideas, making predictions, testing hypothesis. To some (n=49) being active means arriving at conclusions or value judgements/viewpoints. The rest thought that learning by doing either involves making inquiry (n=26) or gaining experience in the process as little researchers/scientists (n= 10). In other words, learners will construct their own knowledge by being responsible for their learning. Table 4 indicated that not only the construction of knowledge was stated but also

the interpretation of knowledge was aired, albeit less frequently. Another feature emphasised by the prospective teachers was the notion of different viewpoints concerning the same issue/event. "Having options among the alternatives", "recognizing different viewpoints", "knowing that their viewpoints are important" are those mostly stated ones. As compared to knowledge construction process, these features seem to be less frequently aired by the prospective teachers.

In the line of the findings, it is possible to say that all of the prospective teachers that visualise the constructivist view as constructing knowledge regardless of their subject areas. However, they appear to support their perception by emphasising different features of the constructivist view. The science prospective teachers seem to base their image of the constructivist view by focusing on the notion that "learner actively constructs their knowledge". However, this notion seems not the only feature used by the elementary teachers to support their image of constructivist view. Additionally, they depend on the notion of alternative viewpoints by describing the role of learner as recognizing the importance of their view, different viewpoints and having options among the alternatives as one of the prospective teachers' drawing showed below.

Prospective Teacher 112 (Elementary)

The other sources: Family, textbooks, teacher, methods and techniques, peers, environment. Dialogue in the picture; Student: I want to be this; this schema is more suitable. Explanation: Student does not get knowledge coming from one source but learn knowledge as a result of interaction of many things and from different viewpoints. With the effects of different sources, he determines his viewpoint and stance. In other words, he becomes the person who he wants to be, not the person whom they want to be.

Thus, it is possible to say that the elementary and science teachers' perception of the constructivist view is similar as far as the process of knowledge construction is concerned but might differentiate on the role of the different perspectives in knowledge construction. This difference might stem from the subject areas of the prospective teachers as value judgments and different viewpoints can be less important where true/valid scientific knowledge is still taught by the science teachers

5. Prospective teachers' perception of the constructivist view in relation to its philosophy

Table 5 illustrates ideas emphasised by the prospective teachers concerning the philosophy of the constructivist view.

Table 5.

The frequencies of the features of the constructivist view concerning its philosophy

The Features of Constructivist view concerning its philosophy	Elementary (n=101)	Science (n=125)	Total (n= 226)
Knowledge is socially constructed/constructed by social communication/interaction	2	19	21
Knowledge is constructed through conceptual change/conflict	-	12	12
Students reach true scientific knowledge at the end of the teaching hour	1	9	10
Knowledge is subjective in nature/not objective	1	6	7
Knowledge is constructed via inquiry/students are little scientists	2	5	7
Knowledge is not out there to be seen/it is in the mind of the learner	4	2	6
Knowledge is reaching generalizations	-	3	3
Total	10	56	66

According to Table 5, a total of 66 student teachers stated their views regarding the philosophy of the constructivist view. The science prospective teachers (n= 56) were mentioned ideas related to the constructivist philosophy much more frequently than the elementary counterparts (n= 10). Regardless of their subject areas all prospective teachers stated their ideas about the nature of knowledge construction. The most frequently stated idea was that knowledge is socially constructed (n=21). Albeit put it differently, 19 science prospective teachers and 2 elementary prospective teachers stated this feature of the constructivist view. Some defined knowledge as "social communication" whereas to some "knowledge is social interaction". These prospective teachers might be seen as possessing Vygotskian perspective or more apparently focusing on social aspects of learning.

The second favourable stated view on the other hand appear to involve Piagetian perspective as 12 science prospective teachers stated that 'knowledge is constructed through conceptual change or conceptual conflict'. They also drew caricatures to embody their ideas. One of the prospective teachers' drawings is presented below.
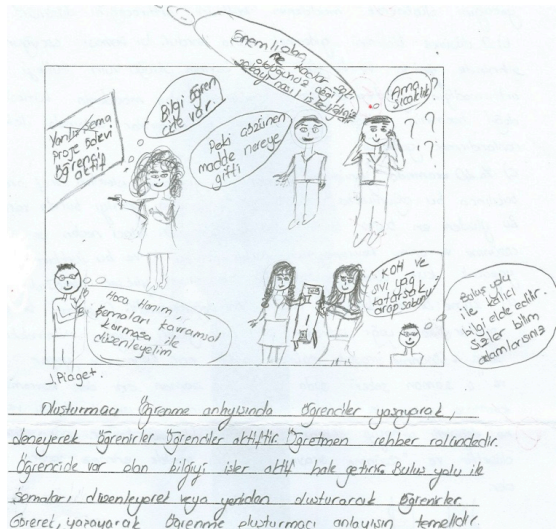
The callout at the start says It is not important how intelligent we are, how we use it is important.
Project: Students are active in learning
Dialogue in the picture;
Student 1 (thinking): knowledge has in the mind of the student
Teacher: Where is dissolved substance now?
Student 3 (questioning): What about temperature?
Girls are at left bottom corner: if we put potassium hydroxide and oil it is going to be..
J. Piaget is thinking at the right side bottom: Teacher, you need to accommodate schemata via conceptual conflict.
The man thinking at the left side bottom:
You are scientists.
Explanation beneath: Students do learn by doing and experimenting. They are active during learning. The teacher is a guide. S/he activates the knowledge students have already in their mind. Students accommodate their schemata or alternatively they reconstruct them via discovery. Learning by doing and observing is the heart of the constructivist view.

As can be seen from the drawing above, the prospective teacher drew Jean Piaget while suggesting the teacher to use conceptual conflict to help students accommodate their schemata. In fact, this is not

the only feature visualise in the drawing. A range of other features could be detected from the caricatures. According to these, the prospective teacher perceives "teacher as being aware that knowledge is in the mind of the learner prior to teaching", "she as a guide actives students' existing knowledge by posing questions or problems to solve". It is not wrong to say that this prospective teacher perceives learning as "changing/accommodating/constructing existing schemata" and thinks that "learning occurs via discovery".

Some science prospective teachers (n=3) described knowledge as reaching generalizations via inductive thinking. It seems that reason is the source of knowledge. Thus, this perception might be accepted as compatible with rationalism which characterises the constructivist orientation. Some prospective teachers 5 of whom were science thought that knowledge is constructed through inquiry, a process that involves experimentation, observation, drawing conclusion and reaching generalisations. They even stated the metaphor "students are little scientists". This perception involves characteristics of rationalism and constructivism. Some of the prospective teachers (n= 7) also stated that "knowledge is subjective in nature, not objective". They underlined difference in the learning outcome starting from different experience, view or schemata. Thus, this perception of the prospective teachers seems compatible with the epistemological foundation of constructivism.

Table 5 indicates that some of the prospective teachers focussed on the source of knowledge. A total of 10 prospective teachers thought that valid/true knowledge exists. This perception was common among the science prospective teachers (9 out of 10). They stated that students reach true scientific knowledge at the end of the teaching hour. It seems that these students perceive knowledge as reality that exists in the world. This perception might be viewed as an indication of positivist (objectivist) epistemological orientation rather than the constructivist one. Only one elementary prospective teacher appears to possess objectivist view. It might be possible to say that the subject area (science as compared to social sciences) makes a difference in prospective teachers' perspectives concerning the validity/uniqueness of the knowledge.

6. The prospective teachers' perception of the constructivist view in relation to instructional materials

In their written responses, some of the prospective teachers (n= 50) referred to the features of instructional materials designed in the line of the constructivist view. Two main features were proposed for teaching materials to be constructivist. The first of these which was proposed by the elementary prospective teachers mostly was helping students to construct their own knowledge rather than conveying the knowledge to students. This feature was aired by 10 elementary prospective teachers. Some of them (4 out of 10) underlined that textbooks should not be seen as the source of knowledge without suggesting how they should be designed. The rest 6 prospective teachers on the other hand described the role of the textbooks as facilitator for learning by presenting different sources, questions and viewpoints so that students could interpret each and come to their own conclusion.

The second feature proposed for textbooks or teaching materials was encouragement of students to make their own observations and inquiries rather than receiving the ready-made data. This feature was aired by 47 prospective teachers 36 of whom were the science prospective teachers. On examination of the science prospective teachers' written responses, it became clear that they stressed only one aspect of textbook design by emphasising experimentation. They however stated this differently. Posing questions which encourage students to test their ideas (8 out of 36), encouraging scientific investigations (7 out of 36) and presenting hypothesis for students to test (5 out of 36) were stated frequently. The elementary prospective teachers (n= 11) on the other hand seem to focus on two aspects of textbook design. Like their science counterparts, they also (5 out of 11) stated that textbooks should present problems/issues to motivate scientific inquiries involving observation and experimentation. The second aspect stressed by 6 elementary prospective teachers was the idea that textbooks need to be designed to present different views involving the controversial ones about the same social issue. Among these some also stressed the importance of helping students to examine different views and encouraging them to create their own perspective. It is interesting that the feature of textbook design as presenting different and opposing views seems to be less favourable aspect among the science prospective teachers. This

might be taken as an indication of the influence of the prospective teachers' subject areas over their perspective.

7. The prospective teachers' perception of the constructivist view in relation to learners' acquirements

Table 6 illustrates learners' acquirements following constructivist view of teaching emphasised by the prospective teachers.

Table 6.

The frequencies of learners' acquirements following constructivist view of teaching

Learners' acquirements following constructivist teaching	Elementary (n=101)	Science (n=125)	Total (n= 226)
Meaningful learning/ conceptual understanding	2	3	5
Learning how to think	1	-	1
Long lasting learning	7	4	11
Having fun during learning	3	6	9
Increasing self-confidence	3	2	5
Not to be obedient to ideas offered	2	-	1
Preventing (students being aware of) stereotype mould thinking	2	-	2
Being open-minded	2	-	2
Creating (students having) world view/life philosophy	4	-	2
Total	24	16	40

As it can be seen from Table 6, 40 prospective teachers stated acquirements of learners following the constructivist teaching. A range of acquirements stated were related to the effects of the constructivist teaching on the nature of learning. Among these the most frequently stated one was long lasting learning (n=11). Another feature of learning acquirement which was stated by 5 prospective teachers was meaningful learning/conceptual understanding. Learning how to think was another acquirement stated by only one prospective teacher. One of the acquirements aired by the prospective teachers was related to motivating nature of the constructivist learning environment. These prospective teachers (n= 9) mentioned their state of motion as having fun during learning. . They stated that the constructivist teaching increases students' self-confidence. According to these 5 prospective teachers (n= 5), teaching based on the constructivist view appreciates students' ideas and regards the ideas offered by students even if they are incompatible with the scientific ones.

The rest of the acquirements concerned the nature of social skills gained by students. These prospective teachers stated that the constructivist teaching preventing stereotype mould thinking (n=2) and creating world view/life philosophy in students (n= 4). Thus, the constructivist teaching enables students to be aware and prepared of stereotype mould ideas and to have life philosophy. The other social skills believed to be acquired by students following the constructivist teaching were "being open-minded" (n=2) and "not to be obedient to ideas offered" (n=2). It is noteworthy to say that all these acquirements were stated by the elementary prospective teachers. Therefore, it is possible to say prospective teachers' subject areas make a difference in their ideas concerning the skills students acquire following the constructivist instruction.

Conclusion

The results of the present study lead to three major conclusions. First, the prospective teachers' perception involves both common and different elements of the constructivist view.

Regardless of their subject areas all prospective teachers' perception of the constructivist view involves common features related to learner. These were "constructing knowledge", "learning by doing", "producing ideas" and "arriving at conclusions by themselves". In similar manner, there were core ideas related to the image of the constructivist teacher such as "teacher as facilitator", "posing problems", "using students' prior experiences" and "organizing learning environments for students' needs". On the other hand, different features were detected in the prospective teachers' perception of the constructivist view. Even though they involved in the same training, they approached the notion differently. This difference might stem from the prospective teachers' preferences between these two versions of constructivism. As some of the prospective teachers based their image upon personal constructivist view of learning (Piaget, 1954) by visualising the constructivist teacher as presenter of conceptual conflicts in the class. According to these prospective teachers, knowledge is constructed through conceptual change or conceptual conflict. These prospective teachers emphasise conflicts, dilemmas and opposing views. Some on the other hand shifted towards the social constructivist perspective by paying attention to the importance of negotiation in the class. Expectedly, these prospective teachers stated that knowledge is constructed by social communication or social interaction. Yet, the meaning attached to the social interaction or communication is left to be unclear. The question of whether they think that learning starts on the social plan and does not occur otherwise or it is affected by the social environment but happens in any case was not replied in the line of the data obtained.

Second, the prospective teachers' subject areas were found to be influential over their image of the constructivist view. The elementary prospective teachers' image of the constructivist view involved teacher as focusing on students' differences, alternative viewpoints and opposing views whereas these features were not detected in the science prospective teachers' visualization. Another difference in perception of the two groups of the prospective teachers which is likely to be caused by their subject areas was related to the nature of knowledge. Some of the science prospective teachers thought that true/valid knowledge exists and could be reached by students via discovery or investigations. This positivist view of knowledge did not exist in the elementary prospective teachers' image. Previous studies produce evidence that teachers/prospective teachers' beliefs about constructivism varied by their teaching subjects. Rawitz & Snow (1998) found that elementary teachers were more constructivist than secondary school teachers. The same association between elementary and secondary school teachers' views was not detected by Işıkoğlu et al. (2009). However, they found that preschool teachers have more student-centered educational beliefs than for Turkish, Math and Social studies. Finally, the features determined from the prospective teachers' perception of the constructivist view appear to overlap with the key features of constructivist learning environment stated by the various researchers (Taylor et al., 1997; Tenenbaum et al., 2001). Tenenbaum et al. (2001) determined seven key features for a constructivist learning environment which are arguments, dilemmas, sharing ideas, materials targeted toward solution, concept investigation, meeting student needs and making meaning, real life examples. It is possible to say that these seven key features could be found in the Turkish prospective teachers' perception of the constructivist view. This finding is an important indication of effectiveness of the Turkish teacher training program. Having said that there are points need to be open up further to be certain for effectiveness of the program. Interviewing with the prospective teachers might be a solution in finding out the meaning they attached to terms that form their image. In this way for example it might be possible to see what it means "discovery of knowledge" through the eyes of the prospective teachers

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