Pre-Service Elementary Teachers' Views on Concept Cartoons: A Sample from Turkey

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Abstract: This study investigated pre-service elementary teachers' views on concept cartoons by using mixed research method, such as questionnaires and interviews. Sample was comprised of 40 freshmen students enrolled in Elementary Teaching department at a small university in northeastern Turkey in spring of 2008. Data were gathered in six weeks. Questionnaires were analyzed using quantitative methods, such as frequency and percentage and interviews were analyzed using descriptive analysis. Results suggest using concept cartoons in instruction rescues students from boring traditional lecturing, helps teachers improve their instruction and align it with the constructivist learning theory, makes the lecture more interesting and entertaining and students become more actively involved in the lecture. Moreover, concept cartoons create discussion environment where student can improve their critical thinking skills and influence in positive way students' attitudes towards the lesson in particular and school in general and may have an important role in improving students' academic achievement.

Key words: Constructivist learning theory · Concept cartoons · Students' views

INTRODUCTION

In constructivist learning theory, knowledge is constructed individually by every learner. Students do not accumulate all the knowledge that is presented to them as it is. In this learning individual's prior knowledge, individual capabilities and learning environments are very important [1, 2]. The teacher in constructivist learning plays the role of a guide and helps students connect their prior knowledge with the new information they are learning. Students play active role in the learning process and as such should be actively involved in the learning and construct knowledge by using hands on activities [3]. An appropriate learning and teaching environment should be created in order to make students actively involved in the learning process, help them question and assimilate the new information and construct their own knowledge. Thus, it is important that proper learning materials are prepared and used for a meaningful learning to occur and for students to be actively involved in the learning process [4-6]. One of these learning materials are concept cartoons.

Concept cartoons are a new approach to teaching, learning and assessing in science, created by Keogh and Naylor [7]. They feature cartoon-style drawings showing different characters arguing about an everyday situation, are designed to intrigue, to provoke discussion and to stimulate scientific thinking and may not have a single "right answer" [7]. A typical concept cartoon has the following features; visual representation of scientific ideas; minimal text in dialogue form; alternative viewpoints on the situation; scientific ideas are applied in everyday situations; the scientifically acceptable viewpoint is included in the alternatives; the alternatives are given equal status [7].

Concept cartoons can be prepared as posters or as work sheets that can be distributed to students in a classroom [8]. However, as an alternative, it is also possible to prepare concept cartoons in computer environment. Content of computer supported concept cartoons is similar to regular ones and include a topic around which different characters argue. Characters inside concept cartoons might be moving or still pictures and they can include some musical background. Concept

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cartoons designed in computer environment can be projected on a wall or blackboard so that all the students can see them. When the cartoons are first projected, different characters appear, however, their thoughts on a certain subject are not presented and students can only see the characters and the empty talking balloons over their heads. Teacher starts the lecture by asking students their thoughts on the topic appearing on the screen. In this way, without been able to see characters thoughts on the topic, students' prior knowledge on the topic can be examined. Later students can see characters' thoughts on the topic by scrolling over and clicking with the mouse one by one on the characters where each character's thought appear on the talking balloons. One of the opinions on the talking balloons should be close to the right answer explaining the concept and the others might be different misconceptions about the concept. After explaining the characters and their opinions, the teacher can ask students with which characters' views they agree and why they agree with that view. Students start explaining with which character they agree and why. Students can see whether characters' thoughts on the topic are true or false by scrolling over and clicking with the mouse on the talking balloons and another window appears which explain why the opinion is true or false. In this way, the teacher can see where students hold misconceptions and create a class environment where student can freely express their opinions.

Kabapinar [8] summarized the characteristics that science cartoon should have:

- Science concepts should be presented by linking them with every day events. In this way, students can see the relationship between science concepts and every day life and science concepts can be applied to every age and every grade level.
- Alternative thinking ways and misconceptions presented in balloons in concept cartoons should be chosen from research that investigates students thinking. This will increase validity and believability of alternative thinking.
- Scientific thinking methods should be also presented in concept cartoons.
- Concepts presented in balloons should be short and understandable for students. This is especially important for elementary students' reading and understanding ability of concept cartoons.
- Concepts presented in the balloons should have similarity in their meaning and must be believable.

There are a lot of studies in the literature investigating concept cartoons' effect on education. Duralp [9] in his study of middle school social science teaching found that students who were taught using concept cartoon as an instructional method were more successful than students who were taught using traditional instructional methods. Ozalp [4] found that using concept cartoon in science teaching improves students' success, retention ability and attitudes toward science in positive way as compared to traditional lecturing method. Ustun [10] revealed that concept cartoons increase learning in writing class. Balim, Inel and Evrekli [6] found that concept cartoons help students question their prior knowledge with the new knowledge they encounter. Similar results are found in studies by Keogh, Naylor and Wilson [7], Keogh and Naylor [11], Ekici, Ekici and Aydin [12]. Kabapinar [8] found that concept cartoons help create discussion environment in the classroom that reveal students misconceptions. However, there are very few studies in Turkey that look at educators' views on the usefulness of computer based concept cartoons in instruction. The aim of this research is to contribute to these few studies and more specifically to investigate pre-service elementary teachers' views on computer based concept cartoons.

Method: This study used mixed research method, such as questionnaire and interviews. A cross-sectional survey design was used to determine pre-service elementary teachers' views on concept cartoons. Cross-sectional survey research designs "are procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people in order to describe the attitudes, opinions, behaviors, or characteristics of the population" [13]. In this study the sample was 40 (20 female and 20 male) freshmen pre-service elementary teachers who were taking Computer-II course in spring semester of 2008 in the school of education at a small university in northeastern Turkey.

Semi-structured interviews were used to further elucidate participants' views on concept cartoons and compare these views with the survey data for validity purposes.

Data collection: Data was collected through administering a survey instrument developed by the researchers, named "Survey Determining Views on Concept Cartoons" and conducting semi-structured interviews.

Survey Determining Views on Concept Cartoons (SDVCC): Survey determining views on concept cartoons was divided into two parts; the first part consisted of questions concerning demographic information such as, gender, age, high school type and family income, the second part of the questionnaire included attributions on the future teachers' views on concept cartoons that consisted of 37 questions Later, these 37 items were converted to Likert type survey instrument with statements such as, "Strongly Disagree=1", "Disagree=2", "Undecided=3", "Agree=4", "Strongly Agree=5"

The items in 37-item questionnaire were analyzed with basic component techniques and varimax rotation to determine the spread of the items on five factors; Advantages of Using Concept Cartoons in Education (AUCCE), Disadvantages of Using Concept Cartoons in Education (DUCCE), Appreciation of Concept Cartoons (ACC), Concept Cartoons' Excitement Level (CCEL) and Designing of Concept Cartoons (DCC) and to decide, which items were suitable to stay in the questionnaire. Items over 0.4 factor value were accepted as appropriate to stay in the questionnaire and therefore, items numbered 5, 6, 12, 14, 15, 16, 28, 32 and 36 that were under 0.4 factor value were deleted. The remaining 28 items' factor values were ranging between 0.448 and 0.915. Thus, the survey instrument was reduced to 28 items. Factor analysis revealed that all the measures showed high internal reliability (Cronbach's $\alpha > 0.92$).

Semi-structured Interviews: The study used semi-structured interview guides, as recommended by Bogdan and Biklen [14], in order to "get the subjects to freely express their thoughts around particular topics" (p.3). In this study this topic was prospective elementary teachers' views on concept cartoons. In-depth/open-ended nature of interviews, as Bogdan and Biklen [14] write, "allows the subjects to answer from their own frame of reference rather than from one structured by prearranged questions" (p.3). Three main questions were used during the interviews, however, participants were also asked probing questions when it was necessary. Probing questions such as: Can you elaborate more on the issue? How exactly is that? What do you mean by that? Can you explain? The three main questions were as follows:

- What are the advantages of concept cartoons?
- What are the disadvantages of concept cartoons?
- Would you consider using concept cartoons in your teaching when you become a teacher?

Separate individual interviews were conducted in different times and in one session with 20 of the participants and who were chosen by random sampling. All the interviews were recorded on a digital voice recorder and later they transcripted.

Data Analysis: Data collected through the survey instrument and through the semi-structured interviews were analyses separately.

Survey Data Analysis: Data collected through the survey was analyzed using SPSS 11.5 software. Mean, standard deviation and percentages for variables were calculated. Range of agreement with the statements on the survey was determined by using the $(n-1)/n$ formula and after calculation the interval width of the range between 1 through 5 was calculated as 0.8. The ranges for the statements in the survey are shown in Table 1.

Semi-Structured Interview Analysis: The first step taken in the analysis of the interviews was data organization procedures recommended by Bogdan and Biklen [14]. In organizing the data, the researcher revisited each interview and listened to each audiotape while reviewing the transcripts to ensure the accuracy of the data. Each participant's interview transcript was later analyzed according to data analysis procedures described by Bogdan and Biklen [14], which call for development of coding categories, mechanical sorting of the data and analysis of the data within each coding category. The initial codes were supplemented with emergent main categories and sub-codes [14]. In this study, a realist mode was used to represent the participants' perspectives through closely edited quotations and interpretations of those quotations [15, 13]. Thus, the researchers neither claim to be arbiters nor assess the right answers about concept cartoons, but rather the researchers let the participants share their views on concept cartoons. The results of the interview data are presented as a description of the emergent themes that were developed through the analysis of data. All participants in the study were given pseudonyms (such as: Participant 1, Participant 2 …) in order to keep their identity anonymous. The interview data were coded and collapsed into categories by the researches. The categories were then grouped and reduced to the following set of descriptions and themes:

- Advantages of concept cartoons
- Disadvantages of concept cartoons
- Using concept cartoons in teaching

Table 1: Ranges for the statements in the survey

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1.00-1.80	1.81-2.60	2.61-3.40	3.41-4.20	4.21-5.00

Table 2: Frequency and percentages of prospective teachers' views on concept cartoons

Factors	Attributions	Strongly Disagree f	%	Disagree f	%	Undecided f	%	Agree f	%	Strongly Agree f	%	x̄
Advantages of using concept cartoons in education (AUCCE)	8. Concept cartoons increase my academic success.	-	-	1	2,5	11	27,5	22	55	6	15	3,83
	10. Concept cartoons help me see the topics from different angles	-	-	1	2,5	2	5	24	60	13	32,5	4,22
	18. Concept cartoons make me more enthusiastic.	-	-	1	2,5	2	5	28	70	9	22,5	4,13
	20. Concept cartoons improve my critical thinking skill.	-	-	1	2,5	16	15	26	65	7	17,5	3,98
	22. Concept cartoons make learning more enjoyable.	-	-	-	-	1	2,5	21	52,5	18	45	4,43
	24. I see my misconceptions via concept cartoons.	-	-	1	2,5	2	5	18	45	19	47,5	4,38
	26. I gain new knowledge via concept cartoons.	-	-	1	2,5	7	17,5	26	65	6	15	3,93
	30. Designing concept cartoons increase my creativity.	1	2,5	1	2,5	3	7,5	13	32,5	22	55	4,35
	34. Learning via concept cartoons makes instruction more effective.	1	2,5	-	-	2	5	20	50	17	42,5	4,3
Disadvantages of using concept cartoons in education (DUCCE)	3. Retention of lessons that are taught with concept cartoons is not very high.	21	52,5	18	45	1	2,5	-	-	-	-	1,5
	21. Learning via concept cartoons is boring.	20	50	19	47,5	1	2,5	-	-	-	-	1,53
	23. Using concept cartoons reduce the quality of education.	22	55	16	40	1	2,5	-	-	1	2,5	1,55
	31. It is harder for me to learn with colored and animated concept cartoons.	21	52,5	18	45	-	-	1	2,5	-	-	1,53
	35. Using concept cartoons in instruction is a waste of time.	25	62,5	13	32,5	2	5	-	-	-	-	1,43
Appreciation of Concept Cartoons (ACC)	11. Instruction with concept cartoons doesn't affect my learning.	14	35	22	55	-	-	3	7,5	1	2,5	1,88
	13. There is no difference between instruction with concept cartoons and traditional method.	22	55	16	40	1	2,5	1	2,5	-	-	1,53
	17. Teaching with concept cartoons is unnecessary.	28	70	11	27,5	1	2,5	-	-	-	-	1,33
	19. I don't like teaching with concept cartoons.	19	47,5	19	47,5	-	-	2	5	-	-	1,63
	27. In my opinion concept cartoons are too superficial.	12	32	25	62,5	1	2,5	1	2,5	1	2,5	1,85
	33. Concept cartoons don't affect my learning performance.	9	22,5	21	52,5	6	15	4	10	-	-	2,13
	37. I don't think I will use concept cartoons in my professional life.	29	72,5	8	20	3	7,5	-	-	-	-	1,35
Concept Cartoons' Excitement Level (CCEL)	2. Teaching by using concept cartoons excites me.	2	5	-	-	4	10	10	25	24	60	4,35
	4. Concept cartoons inside a lesson attract my attention.	3	7,5	1	2,5	2	5	17	42,5	17	42,5	4,1
	7. Teaching by using concept cartoons don't attract me.	24	60	10	25	2	5	4	10	-	-	1,65
	9. Lessons with concept cartoons bore me.	19	47,5	18	45	2	5	1	2,5	-	-	1,63
	25. Textbooks that include concept cartoons don't interest me	16	40	20	50	3	7,5	1	2,5	-	-	1,73
Designing of Concept Cartoons (DCC)	1. Designing concept cartoons is difficult.	7	17,5	20	50	5	12,5	7	17,5	1	2,5	2,38
	29. Designing concept cartoons in computer environment is difficult.	6	15	12	30	8	20	9	22,5	5	12,5	2,88

Note: f refers to frequency and x̄ refers to mean score

Findings: Results are presented in two sub-headings depending on data collection methods.

Findings from the Survey: Findings from the survey representing prospective elementary teachers' views on concept cartoons are presented below in factor tables. Table 2 provides frequency and percentages of prospective teachers' views on concept cartoons.

Findings from the Interviews: Three interview questions were asked in order to find out the prospective teachers'

viewpoints on concept cartoons. Analysis of their views on the first question "According to you what are the advantages of concept cartoons?" are presented in Table 3. Frequencies show how many of the participants expressed views same or similar to the statements presented in Table 3.

Some views of the prospective teachers on this question are listed below:

"Concept cartoons help students see their misconceptions on the subject and help them learn the correct form of the knowledge." (Participant 24)

Table 3: Views on the advantages of concept cartoons

	Advantages of Concept Cartoons	f
1	They make lessons more enjoyable	18
2	Permanent learning occur because of their visual features	16
3	They are so effective on bringing out misconceptions	12
4	They help us learn the concepts in more enjoyable way	12
5	They encourage students to actively participate in the lesson	9
6	They help us see the concepts from different angels	8
7	Learning occurs more easily via concept cartoons	7
8	They increase the quality of education	6
9	They rescue students from boring traditional lecturing	5
10	Cartoons help in bringing out students' prior knowledge on the topic	4

Table 4: Views on the disadvantages of concept cartoons

	Disadvantages of Concept Cartoons	f
1	There aren't any disadvantages of concept cartoons.	15
2	Designing appropriate cartoons for the topics is very difficult.	5
3	Designing a cartoon is very time consuming	5
4	Teaching with concept cartoons makes the classroom management very difficult.	5
5	Cartoons may attract more attention than what is needed	5
6	Ideas argued by cartoon figures may not be clear enough	3
7	Students might think that ideas expressed in the cartoons are the only correct ones.	3
8	Learning via concept cartoons may take a long time.	3
9	Teaching every lecture via concept cartoons may in some point start to bore students.	3
10	Characters used in cartoons might influence students' answers.	2

Table 5: Using concept cartoons in professional life

	Using Concept Cartoons in Professional Life	f
1	I will use concept cartoons to attract students' attention.	17
2	I will use them to make lessons more efficient.	13
3	I will use them to make lessons more enjoyable.	10
4	I will use them to make students more actively involved in the lesson.	9
5	I will use them to teach the topics from different angles and viewpoints.	6
6	I will use them just in science classes.	6
7	I will use them to rescue students from a traditional lecturing.	5
8	I won't use cartoons because they bore students.	2
9	I will never use them.	2

"In a lesson with concept cartoon not only the cartoon figures discuss the topic, but also students in the classroom discuss the topic with each other. By giving them a discussion opportunity, students take an active role in the lesson." (Participant 4).

Analysis of prospective teachers' views on the second question "According to you what are the disadvantages of concept cartoons?" are presented in Table 4. Again, frequencies show how many participants expressed views same or similar to the statements presented in Table 4.

Some example views on this question are listed below:

"Designing concept cartoons is not only difficult but it is also very time consuming." (Participant 32).

"Concept cartoons might be perceived by students as an entertaining animated movie. This may turn the classroom into a movie theater and take students' attention away from the lecture. So they make lessons more enjoyable." (Participant 10).

Analysis of prospective teachers' views on the third question "Would you consider using concept cartoons in your professional life?" are presented in Table 5. Frequencies show how many participants expressed views same or similar to the statements presented in Table 5.

Below are few views on this question expressed by the participants:

"If conditions are possible in lessons, I will try to take advantage of concept cartoons. Because these types

of educational materials attract students' attention to the lesson and lessons become more enjoyable and effective for them." (Participant 28).

"Teaching via visual and audio materials is more effective than the traditional methods. I think, I will take advantage of concept cartoons to make lessons more enjoyable and interesting for students in my professional life. Also, concept cartoons help students retain the taught material longer than the traditional lecturing." (Participant 1).

DISCUSSION AND CONCLUSION

This study investigated pre-service elementary teachers' views on concept cartoons and tried to develop a survey instrument to measure these views. Data from statements in the survey that sought to explicate pre-service elementary teachers' views on the advantages of using concept cartoons in instruction revealed that incorporation of concept cartoons makes the lecture more interesting and exciting. Also these materials helps students seeing different instructional methods than a traditional lecturing, looking at topics from different angles that helps students see their misconceptions about topics and makes students more actively involved in the lecture. Almost all participants agreed with these statements on the survey instrument. These views also support the views expressed in the survey. These findings are in agreement with findings of others Keogh and Naylor [11], Kabapinar [8], Ekici, Ekici and Aydin [12], Balim, Inel and Evrekli [6] who also found that concept cartoons create discussion environment in the classroom, encourage students to be more attentive and actively involved with the lecture, reveal students misconceptions and help them develop alternative viewpoints on the situation and make the lecture more interesting and exciting.

Almost all of the participants disagreed with statements in the survey that sought to explicate pre-service elementary teachers' views on the disadvantages of using concept cartoons in instruction. Statements such as, using concept cartoons in lecture reduces the quality of instruction, I have hard time learning a lesson with colorful figures and computer animated cartoons, using concept cartoons in instruction is a waste of time. In the interviews most of the prospective elementary teachers said that they do not see any disadvantages of using concept cartoons in instruction. The few disadvantages pointed out by the participants were that it takes a lot of time to prepare concept cartoons that it is hard to prepare

them and using concept cartoons all the time during the lecture may cause some instructional problems. Few participants expressed the view that concept cartoons may cause some classroom management problems. Kabapinar [8] found that classroom management problems could be reduced by making sure that all the students are involved in the class discussion of the concept. Few participants, in their semi-structured interviews, said that "characters used in concept cartoons may affect students' answers". According to this view while choosing animal characters for concept cartoons is so important. It shouldn't be chosen characters that may cause mockery in the classroom.

According to Keogh and Naylor [11], concept cartoons could be used to improve reading [16], vocabulary [17], problem solving [18] and critical thinking [19] abilities of students in education. Results from this survey study reveal that majority of the prospective teachers think that concept cartoons improve academic success, improve critical thinking skills, affect in positive way the learning speed and provide non-threatening environment for learning new concepts. These results support the findings of the literature. Statements in the survey that investigate prospective elementary teachers' views on the value of concept cartoons and use of concept cartoons in their future instruction revealed that majority of the participants value concept cartoons and plan to use them in their future classrooms as learning tools.

Statements in the survey, which were assessing concept cartoons' excitement level, reveal that future elementary teachers agree with statements, such as instruction with concept cartoons excites me, I am more attentive to lecture that uses concept cartoons and disagree with statements, such as lessons with concept cartoons do not excite me, instruction with concept cartoons bores me. Similar results were found in the semi-structured interviews. Analysis of students interview statements reveal that they view the visual aspect of concept cartoons as very important in gaining students attention and making the lecture interesting and exciting for them. These results support the findings of others [11, 5, 8, 12, 6] who claim that concept cartoons helps students concentrate on the lecture and the visual aspects of the cartoons makes the lecture entertaining and exciting.

Literature suggests that concept cartoons should be prepared either as posters or as work sheets [8]. However, in this study prospective teachers were asked to design the concept cartoons in computer environment. Analysis

of prospective elementary teachers views on concept cartoon preparation reveal that in general designing concept cartoons is not that hard, however, they were undecided on designing concept cartoons on computer environment. This could be due to prospective teachers' lack of computer skills or lack of instruction on how to use computers for animation. Alternatively, if prospective teachers feel that they are uncomfortable designing concept cartoons on computers, they can be encouraged to prepare them as posters or as worksheets. However, they should be reminded that this may reduce the excitement level student experience when they see the concept cartoons as computer animations.

We can conclude that using concept cartoons in instruction rescues students from traditional lecturing, helps teachers improve their instruction approaches. Align it with the constructivist learning theory, makes the lecture more interesting and entertaining and students become more actively involved in the lecture, creates discussion environment where student can improve their critical thinking skills, influences in positive way students attitudes towards lesson in particular and school in general and may have an important role in improving students academic achievement.

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