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Opinions of teacher candidates about the use of concept cartoon in science and technology teaching courses

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Abstract

In this study, it was aimed to determine the opinions of teacher candidates about the use of concept cartoons in science courses. For this purpose, Konya Necmettin Erbakan University Ahmet Kelesoglu Faculty of Education Classroom Teaching Department 3th grade students were informed about the concept cartoons, science courses were taught by doing activities for four weeks and at the end of this intervention, the interviews were held to determine the opinions of teacher candidates about concept cartoons. Then, twenty students were selected randomly from the sample group who has participated in the study. The analyses of data obtained from the interviews were done through the use of descriptive analyses. As a result, most of the teacher candidates told that they saw the concept cartoons before ; all of the teacher candidates concept cartoons should be used in science and technology teaching, concept cartoons were useful in many respects to them and students; and as they believed the cartoons had a positive-impact on their learning.

Keywords: Science and technology teaching, concept cartoons, constructivist approach.

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1. Introduction

Science and technology education plays an important role for the future of any society. Therefore, in developed countries, continuing efforts to improve the quality of science and technology education are in progress. In this context, science and technology education program in our country was reorganized within the framework of the curriculum reform in 2004 by the Republic of Turkey, Ministry of Education, Board of Education and Discipline (MEB, 2004).

The content of science curriculum includes concepts, principles and generalizations, theories and laws of nature. Concepts are the basic building blocks. Concepts are categories used to group similar objects, people, events, ideas, and processes (Kaptan, 1999). Teaching of concept in science and technology classes is of primary importance. Studies related to science education revealed that pupils in elementary schools had various misconceptions on science related issues and topics.

In teaching concepts determining and applying appropriate methods are important. Students'& observations of the environment on their own and the inability to integrate their observation results with concepts presented in the classes, will lead to formation of concepts that can't be accepted by the scientific community (Koksal, 2006). In order to determine the conceptual development of the students, their beliefs and opinions should to be taken into consideration and misconceptions identified. It is highlighted that students background knowledge is of utmost importance in making sense of new information or interactions as each student forms his/her own concepts and knowledge based on personal ability and experience (Driver & Easley, 1978).

In order to correct misconceptions students should be enabled to face their misconceptions by creating a futile environment for debating with each other. Using a scientific approach and restructuring models students should be encouraged to restructure and assimilate the necessary knowledge (Gunes, 2012). Another way of correcting misconceptions is the use of "concept cartoons". Concept cartoons are visual aids making the discussion of ideas related to daily life scientific events with cartoon-style characters possible (Balim, Inel & Evrekli, 2008). It is usually the discussion of three or more characters on a certain topic expressed in form of pictures. In this discussion each character defends a different idea. One of the ideas presented in the discussion is the scientifically accurate idea, others are not scientifically correct but represent the notions specific to the students (Akamca, Ozyilmaz & Hamurcu, 2009).

Studies made in recent years show that concept cartoons are employed as educational materials in teaching science. Concept cartoons have spread rapidly and became a unique teaching and learning approach applied in various settings.

The problem of this study is determined as "What are the views of prospective teachers on the use of concept cartoons in Science and Technology Courses?"

2. Method

2.1. Research Group

The research group of the present study consists of the 3rd grade students enrolled at Konya Necmettin Erbakan University, Ahmet Kelesoglu Faculty of Education, Primary School Teacher Education Department. (n = 20). In the present study, first information about concept cartoons was provided and classes conducted using concept cartoon applications. Then, at the end of the procedure, in order to determine student opinions about the use of concept cartoons open-ended questions were asked.

2.2. Research Design

In the present study, in order to determine students' views on the concept cartoons semi-structured interviews, among the qualitative research techniques, were employed. Interviews are among the most commonly used data collection tools in qualitative studies (Karasar, 2006). In the

semi-structured interview, consisting of questions that allow individuals to provide responses freely, some part of the interview are structured and some parts are not (Erkus, 2005).

2.3. Data Collection Tools

2.3.1. Interview Questions

In order to determine prospective primary school teachers views on the use of concept cartoons in science and technology classes a semi structures interview form consisting of five open ended questions was prepared. In order to validate the content of the questions in the semi-structured interview form, expert opinion was referred to. In line with the opinions of the experts, changes were made in the questions and thus interview questions finalized. 20 students, selected on a voluntary basis, took part in the in-depth interviews. In the evaluation stage of the interview questions, some statements of the students and some basic points in these statements were analyzed considering their frequencies and percentages. Besides the researcher, students' responses were coded by two science and technology education experts and thus researchers diversified.

2.3.2. Documents

Within the scope of the course, course related student made products were collected. Samples of student activities and presentations were documents relevant to the teaching and learning process prepared within the scope of the procedure. A detailed concept cartoons presentation, prepared by the researcher, was made in the class. Moreover, in all the subjects of a four week period, presentations and activities associated with the subjects and based on concept cartoons were employed.

3. Results

In this section, students' responses and percentage- frequency values of the students' responses given to the semi-structured interview questions prepared by researcher are presented. Moreover, multiple views present in students' responses were included in the analysis.

Table 1. Students responses and percentage and frequencies of the question "Have you ever encountered concept cartoons before this class? If your answer is yes, please state where? "

Codes	Expressions	*f*	%
No	-No I have not	4	20
Yes	-In Material Design Classes -Internet -Books and Journals – Lesson Plans -Kids' Journals -Sample Lessons	16	80

To the open ended question "Have you ever encountered concept cartoons before this class? If your answer is yes, please state where?" at a 20% rate prospective teachers have responded that they have not encountered ever before. The remaining 80% expressed that they have encountered with concept cartoons in material design classes, internet, books and journals, course books, kids' journals, and lesson presentations.

Table 2. Students responses, percentage and frequency values of the question "What did you think of when you saw samples of concept cartoons?"

Codes		Expressions	*f*	*%*
	-I thought that it would enable to see the topic form different perspectives.	-"I thought that I would have the chance to enable the students to perceive the same topic from different perspectives and correct issues that I have learned wrongly or deficiently."	1	4
	- I saw that it enabled a better comprehension of the topic.	-"It enables easier memorization and remembrance."	4	16
	-I compared it to drama.	-"When I saw the examples, I compared it to drama. I thought how I could make my students perform it."	1	4
Positive Feelings	-It is funny, amusing, and very creative. I have seen that teaching could be funny.	-"I thought it to be a very funny project. We enjoyed it very much." -"It is not only funny but also educative."	7	28
	-I saw that misconceptions could be corrected.	-"I believe that it will make misconceptions vanish."	5	20
	-I thought that it was colorful, interesting, funny, lasting, and useful.	-"I thought it would be very useful for children. Would make the topic lasting, lesson colorful, interesting…"	4	16
	-I saw that it was well incorporated with pictures.	-"Using pictures made me focus on the lesson."	1	4
	-I liked it very much.	-"I liked it very much as I like drawing cartoons and painting."	1	4
	-I thought that it should have been used in our classes as well.	-"Concept cartoons caught my attention. I said that it should have been used while we were in primary school."	1	4

To the open ended question "What did you think of when you saw samples of concept cartoons?" 100 % of the students have stated positive views. When they saw the concept cartoons samples, they considered them funny, amusing, and the lessons to be with concept cartoons enjoyable and lasting, catch students' attentions, make the students understand the topic better, correct misconceptions, compared them even to drama, and expressed that teaching with visuals would be better and funnier.

Table 3. Students responses, percentage and frequency values of the question "What are your views about the use of concept cartoons in science and technology education?"

	Codes	Expressions	f	%
Very useful and effective because	-Makes the concepts be understood/ Corrects misconceptions	-"Corrects misconceptions."	11	33.3
	-Funny/ interesting	-"Is important for the lesson and has a funny content. It is interesting and catches attention. As it is visual, it is useful."	10	30.3
	-Includes imagination /group discussion	-"Improves the imagination of the children. Useful for making the concepts be understood. Catches the attention of the child." -"Differing views in the group of students should be considered."	2	6.06
	-Makes abstract terms concrete	-"Can be used in abstract boring topics. Thus the lesson would be more interesting."	3	9.09
	-Is visual	-"Visualization is very important in Science and Technology Classes. As the concepts should be imagined, it should be used."	7	21.21

Regarding the open ended question "What are your views about the use of concept cartoons in science and technology education?" all the participants have remarked that it is very useful and effective. Related with concept cartoons 33.3% have stated that they are useful in making the concepts understood/misconceptions corrected, 30.3% funny/ interesting, 6.06% includes the usage of imagination /group discussion, 9.09% make abstract term concrete, and 21.21% are visual materials.

Table 4. Students' views, percentage and frequency values of the question "Was the use of concept cartoons in science and technology courses beneficial for you? Why?"

Codes		Expressions	f	%
Was beneficial because...	Makes the lesson and topics be understood	-"It made me interested in the lesson and focus more on the lesson". -"Increased my knowledge." - "Was beneficial for misconceptions." - "Enabled me to make associations between concepts."	10	50
	Achieve savings	-"Was useful for productivity and achieve savings in the lessons." -"Makes the teacher save time."	2	10
	Uses for teaching	-"Is more useful in conducting the lesson." -"Can be used as a tool of testing and evaluation." -"Enables teaching while entertaining."	4	20
	Leads to Discussion	-"Improves the ability to discuss." -"Leads to the emergence of differing ideas."	2	10
	Contribution to profession	-"Is useful in our professional lives."	2	10

To the open ended question "Was the use of concept cartoons in science and technology courses beneficial for you? Why?" 50% of the prospective primary school teachers stated that it was useful for understanding the lesson and the topics, 10% for achieving savings, 10 % for developing

discussions, 10 % for contributions to the profession, and 20 % for conducting the classes. When they were asked to explain the underlying reasons of these benefits, they mentioned that concepts cartoons increased their knowledge, their interests and focus on the lesson, eliminated misconception, and provided links among the concepts. Moreover, they have also stated that concept cartoons have also contributions to teaching in the classes, improvised their skill of discussion, and have future contributions to their profession.

Table 5. Students' views, percentage and frequency values of the question "Do you find concept cartoons useful for the students? Why?"

Codes		Expressions	f	%
I consider it to be useful because... .	Leads to permanent learning	-"Constructs a schema in the mind and thus lead to permanency." -"Includes visual elements, it is more lasting." -"Contributes to the memorization by children." -"Leads to lasting learning without boring the children."	11	45.83
	It is interesting and funny	-"As it is more interesting." -"Makes the classes more enjoyable to children. Makes the concept learned become permanent in the memory."	7	29.17
	Enables a different perspective	-"Enables everybody to express their views." -"Enables awareness about different views." -"Catches students attention and makes them have a different perspective about the topic."	3	12.5
	Prevents confusion of concepts	-"Through visualization cartoon concepts enables the topics with potentially confusing concepts be better understood." -"Eliminates confusion of ideas and concepts. Makes the correct concept discovered among wrong ones."	3	12.5

To the open ended question "Do you find concept cartoons useful for the students? Why?", all teacher candidates stated it to be useful for the students. 45.83 % stated that it will result with permanent learning, 29.17% interesting and funny, and 12.5% enabling the students to have different perspectives and avoid forming misconceptions.

4. Discussion

The results obtained at the end of the process can be summarized as follows:

- Whereas, 20% of the student teachers stated that they had not encountered with concept cartoons before, 80%.stated that they already had.
- All teacher candidates expressed that they have had posit ive thoughts about concept cartoons when they have had first encountered.
- All prospective teachers mentioned that they always wanted concept cartoons to be used in science classes.
- All prospective teachers have stated that concept cartoons was useful for both themselves their and students in many ways.

In line with the results obtained, it can be stated that concept cartoons are visual tools of education increasing prospective teachers and students interest to the classes, their attention, makes

them comprehend the classes better, enables them to regard the same topic from different perspectives, in short developing the cognitive and sensory features In their study, Keogh and Naylor (2000) have explored students views on concept cartoons.

They stated in their research results that concept cartoons allow students to change their ideas, learn the thoughts of their friends, and enable these ideas to be discussed. Ekici, Ekici and Aydin's (2007) study reported that most of the participants stated positive views in the interviews made on concepts cartoons, a favor for concept cartoons, as these directed them for discussions.

In the study made by Izgi (2012), concept cartoons were defined as quite effective in determining misconceptions of teacher candidates and students and correcting them, enable active participation in the classes, are especially well suited for science and technology classes, make many science topics considered as difficult simple, and could be employed particularly at the beginning of the classes to catch students attention, in reinforcing the topic learnt, and at the final evaluation stage. Similar to the statements of teacher candidates, students also considered concept cartoons as quite amusing, interesting, and colorful. Furthermore, concept cartoons were particularly suitable for science and technology classes, encouraged them for research, enjoyed concept cartoons much more than plain lecture, and even demanded homework to be assigned in form of concept cartoons. In the study of Taskın (2014), students considered classes in which concept cartoons were used as amusing, expressed that the lesson was saved from boredom and considered them as beneficial.

The findings of the present study are in line with those of Keogh and Naylor (2000), Ekici, Ekici and Aydin (2007), Izgi (2012) and Taskin (2014).

5. Recommendations

- A similar study, to the present one made with primary school teacher candidates, can be conducted with actual primary school teacher. In depth analyses of actual primary school teachers' use of concept cartoons could be conducted.
- Visuals in the concept cartoons were considered as quite interesting by the students. In the analysis made, themes especially in analysis related to meaningful learning and permanent learing caught attention. Further research can be conducted on the impact of concept cartoons on retention.
- Primary School Teacher Candidates are to be educated in line with the most recent developments and enhancements in the field of science and technology education.

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