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Views of Elementary Education Students Related To Science and Technology Teaching Process

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Abstract

In this study, it was aimed to determine the views of elementary education students related to the science and technology teaching process. The research was carried out with totally 182 students studying at 3 elementary education schools providing training for students in a province in Turkey. In this research in which has survey model descriptive qualities, views of students were collected through a semi-structured form including 4 questions. The first two questions of the interview form were for teaching method, technique and strategies the students like and prefer, the third question was for the experiments conducted during the process, and the fourth question was for the individual and/or group works. The data obtained from the student views were coded, and their descriptive statistics such as percentage and frequency were calculated. According to the research result, it was determined that the elementary education students enjoyed mostly of the method and techniques performed within the scope of science lesson as experimentation, teaching through Vitamin Program (Turkish e-teaching program), presentation, problem solving, taking the subject notes to a notebook and lecture method. The most common of the method, technique and strategies the students want to be actualized during the science teaching process were experimentation, technology-aided teaching, activities out of classroom (in nature) and more joyful methods and techniques according to the order of participation. Furthermore, most of the students shared the troubles they feel from not experimenting, as they required. Whereas most of the students mentioned that they preferred working in groups during the activities and experimentations they carried out within the scope of science lesson, there were also the ones who mentioned that they preferred working individually or in groups.

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Keywords: Science and Technology Education, Students' Views, Teaching Process, Teaching Methods;

1. Introduction

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The research program into children's scientific reasoning that has emerged over the last 20 years has focused on domain-specific knowledge schemes in the context of children's learning of science (Driver et al., 1994). The aim of the science courses is to educate individuals of the most basic scientific literacy (AAAS, 1990; NRC, 1996; Moss, Abramsand & Robb, 2001; MEB, 2005; McDonald, 2010). In national and international education programs are highlighted such as how to use features that are research, and scientific literate-query, critical-thinking, problem-solving and decision-making skills, life-long learning to be an individual and for maintain the sense of wonder about the environment and world of science and technology and to maintain the necessary skills, attitudes, values, understanding, and with information on how to, as the individual and the social scientific information for its intended purpose and the scientific critical thinking skills (AAAS, 1990; MEB, 2005). Science education programs envisage an active role for students that research, monitors, experienced, discussing, problem solvers, like a scientist, to uncover and evaluate the information needed for such activities which constitute their own cognitive structure through activities (Driver, Guesne & Tiberghien, 1985; Akınoğlu, 2008; ERG, 2008;). Cognitive approach is student-based. Therefore it recommends that student-centered teaching methods. While the project method, role play method, tour-observation method, discussion method and problem solving are more emphasised on such methods; the classic presentation, question and answer, such as teacher-centric methods are less emphasised.

To make a decision on teaching strategies and learning conditions, it is necessary to focus on firstly students' previous knowledge and life, interests, learning styles, development levels and program (Taşpınar & Atıcı, 2002). In teaching-learning process, approaches, which will contribute to designing and planning of training events that are developing students' different aspects and answering to different learning ways, should be used (Demirel et al., 2008) Using of events, which enable to attend students' research, inquiry, problem-solving and decision-making process, are recommended. Also, it is stressed that "doing-thinking" learning events are important and cooperative learning strategies should be used as necessary. It is observed that from time to time people exploit multiple intelligence theory for development of events (ERG, 2008). For example; project development is basically a long, complex and demanding process. It requires students' high level thinking skills, such as creativity, inquiry, communication and scientific process skills. Project works are relied on planned research, examination and observation. Projects also pave the way for the attainment of report preparation and presentation skills (Akınoğlu, 2008). Elementary science needs to engage students in inquiry in which students support claims with evidence, construct arguments, and consider alternative explanations (McNeill, 2011). Also Engaging in scientific argumentation assists students in constructing meaningful science concepts and in understanding how scientists develop knowledge of the natural World (NSTA, 1998; MEB, 2005). For this reason learning science in the laboratory with special attention to scholarship associated with models of learning, argumentation and the scientific justification of assertions, students' attitudes (Freedman, 1997), conditions for effective learning, students' perceptions of the learning environment, social interaction, and differences in learning styles and cognitive abilities (Hofstein & Lunetta, 2004).

Students' learning environment and teaching process should be taken into consideration on behalf of bring students in such a dense and complex skill, behaviour and attitude. Students perform better and have more positive attitudes toward the subject taught when they perceive the classroom environment positively. Also these positive attitudes have very beneficial effects on interest and learning (den Brok et al., 2006; Hofstein & Lunetta, 2004) when students perceived that they are capable, and they think the conceptual change tasks are worthwhile to participate in, and their learning goal is to gain competence, then students will be willing to make a sustained effort and be engaged in making conceptual change (Tuan, Chin & Shieh, 2005).

Students' views or understandings of these practices may be different in their everyday lives compared to science, yet still impact their ability to successfully engage in these practices in the science classroom (McNeill, 2011). When students perceive valuable and meaningful learning tasks, they will actively engage in the learning tasks, using active learning strategies to integrate their existing knowledge with new experience (Tuan, Chin & Shieh, 2005). It is thought that in the sense of science and technology education, taking into consideration of students' choices in teaching process and expectations of methods and events about courses are very important for providing necessary learning states and doing an effective science and technology teaching. So, in research, elementary school students' views about teaching process of science and technology course were received as primary resources about subject.

1.1 The problem of research

What are the views of elementary school students related to the teaching process is carried out in the context of the science and technology course?

2. Research Method

2.1. Research model

This research is a research with descriptive attributes and the Survey model that tried to determine the views of elementary school students in respect of the teaching process performed in science and technology class. In this context, the views of students were collected through semi-structured interview form.

2.2. Participants

Research was carried out with total 182 students from 3 elementary schools which were giving education in Burdur in 2010-2011 spring-school year. The participants consisted of 83 female and 99 male students. In addition, 52 students in 6^{th} grade, 57 in 7^{th} grade, 73 in 8^{th} grade were training.

2.3. Data collection tool

Elementary education students' views, in relation to science and technology course education process, were determined through a semi-structured form which was consisting of 4 questions. First 2 questions of interview form were the questions about teaching method, technique and strategy, which students preferred and liked 3. Question was the question about experiment, carrying out in process, 4. Question was the question about individual and/or group works.

2.4. Data analysis

SPSS 16 statistical package program was used in analysis of the research data. Data from student's views were encoded; descriptive statistics like percentage and frequency were calculated.

3. Results

3.1. Methods which students preferred within applied teaching methods in science courses

The question of "Which of the teaching methods used in science and technology courses do you like more? " was asked to students for determining which of the methods are more adopted by students within encountered methods in the process of teaching; and was received a reply. Each one of the methods in students' answers is coded and 12 codes have been detected. The results of the descriptive analysis of the students' favourite methods used in science class were given on Table 1.

Table 1.The results of the descriptive analysis from the students' favorite methods of teaching methods applied in class

Method	f	%	$\overline{X}$	Sd
1. Problem solving	27	14,8	,1484	,35643
2. Lecture method	20	11,0	,1099	,31362
3. Experimentation	60	33,0	,3297	,47139
4. Presentation	29	15,9	,1593	,36700
5. Taking note	21	11,5	,1154	,32037
6. Smart Board	2	1,1	,0110	,10454
7. Teacher's Drawing on Board	3	1,6	,0165	,12768
8. Visuality	7	3,8	,0385	,19284
9. Argumentation	1	,5	,0055	,07412
10. Vitamin (e-teaching)	32	17,6	,1758	,38172
11. Individual learning	1	,5	,0055	,07412
12. Teaching with Game/play	1	,5	,0055	,07412

As it seen in Table 1., the most favorite methods of among the 182 student which applied methods in the course are *experimentation method* (f:60), *MEB Vitamin (e-teaching)* (f:32), *presentation method* (f:29), *problem solving* (f:27), *taking the subject notes* (f:21) and *lecture method* (f:20). Besides, at least emphasised methods among students are *argumentation* (f:1), self-study (f:1), *teaching with game* (f:1), *using of smart board* (f:2), *teacher's drawings on board* (f:3) and *teaching with visual material* (f:7).

3.2. The views of students, in terms of the implementation of the desired situation in the science class and methods

The question of "How do you imagine the processing of a Science and Technology lesson?" to determine for which methods students want more to learn science, was searched. Each one of the methods and situations in students' answers is coded and 17 codes have been detected. The results of descriptive analysis relation to science lesson that the students' dreams, were given on Table 3.

Table 2.The results of descriptive analysis, relation to the students' preferred situation and teaching methods

Method	f	%	$\overline{X}$	Sd
1. Opinion Share	4	2,2	,0220	,14702
2. In nature-out of class teaching	14	7,7	,0769	,26720
3. Laboratory-Experimentation	85	46,7	,4670	,50029
4. Technology use	22	12,1	,1209	,32689
5. Question-Answer	5	2,7	,0275	,16391
6. Argumentation Platform	1	0,5	,0055	,07412
7. Student's Drawing on Board	3	1,6	,0165	,12768
8. Funny Classroom Environment	14	7,7	,0769	,26720
9. Visual materials and Images	9	4,9	,0495	,21740
10. As we teached in lesson (vitamin, test..)	8	4,4	,0440	,20556
11. Design of class	4	2,2	,0220	,14702
12. Lecture method	3	1,6	,0165	,12768
13. Vitamin (e-teaching)	8	4,4	,0440	,20556
14. Teaching with activities	3	1,6	,0165	,12768
15. Silent training	3	1,6	,0165	,12768
16. I don't want	1	0,5	,0055	,07412
17. Examples about life	2	1,1	,0110	,10454

As shown on Table 3,182 of students , in the science class the most implementation of the desired situation and teaching methods are; *laboratory-experimentation* (f:85), *technology use* (f:22), *teaching in nature-out of class* (f:14) and *funny classroom environment* (f:14). Besides, at least emphasised methods and situations among students in science class are; argumentation platform (f:1), go to the board as individual (f:3), Lecture method (f:3),teaching with activities (f:3) and *silent training environment* (f:3) and *examples about life* (f:2).

3.3. The students' views relation to laboratory method applied in science class

The question of "Do you like to experiments in the laboratory in science and technology class? " was asked to determine the students' views on the laboratory-experimentation method which is one of the most fundamental processes of science. While some students who liked to the laboratory method answered 'Yes', some of them answered 'No' among students. The results of frequency analysis relation to the enjoyment of the lessons of students' situation in the laboratory method are given on *Table 4*.

Table 3. Descriptive analysis results regarding students' request about laboratory method

Lab method request	f	%
Yes	175	96,2
No	7	3,8
Total	182	100

As it seen in Table 4., majority of students (% 96,2) like science courses by doing experiments in lab environment. In addition to this, students' responses intended for reason about whether students want or not, are gathered under 11 code sentences. In Table 5., descriptive analysis results are shared intended for each code.

Table 4. Descriptive analysis results regarding students' reasons to prefer laboratory method

Method	f	%	$\overline{X}$	Sd
1. Amusing	82	45,1	,4505	,49892
2. Use of equipment	3	1,6	,0165	,12768
3. Retention	41	22,5	,2253	,41892
4. Understandable/Didactic	22	12,1	,1209	,32689
5. Like/Nice	3	1,6	,0165	,12768
6. Visuality	18	9,9	,0989	,29935
7. Contribution to course	4	2,2	,0220	,14702
8. Exciting	1	0,5	,0055	,07412
9. Boring	3	1,6	,0165	,12768
10. Not being done	8	4,4	,0440	,20556
11. Dangerous	2	1,1	,0110	,10454

As shown on Table 5., 182 students' reasons for choosing lab method can be arranged as; being amusing (f:82), *retention* (f:41), being *understandable/didactic* (f:22) and *serving to visuality* (f:18). In addition, the least stressed on status and methods regarding reasons of preferring lab method between students in science courses are determined as being *exciting* (f:1), *using of equipment* (f:3), *like the lab method* (f:3) and *contributing to course* (f:4). Also, reasons of students who don't want, are stated as boring lab method, going to lesson was and being dangerous. At the same time, 8 students state that lab method isn't employed in their own science course.

3.4. Students' views about individual or group works in science course

The question; ''Do you like studying as individual or group work in science and technology course?'' is asked to students for determine students' views regarding studies, are being carried out in science teaching process and taken in to account the number of individual. Students answer as "group", "individual" and "both group and individual". On Table 6., results of frequency analysis are given regarding choices of handling science course according to the individual number of students.

Table 5. Results of frequency analysis regarding choices of handling science course according to the individual number of students

Choice of Handling science course	f	%
Group	119	65,4
Individual	47	25,8
Both group and individual	16	8,8
Total	182	100

It is observed in Table 6. that %65,4 of students prefer studying as group, %25,8 of students prefer studying as individual and %8,8 of students prefer studying both as group and as individual. Beside this, students' explanations about reasons of their responses were picked up under 12 code sentences. In table 7., descriptive analysis results are shared intended for each code.

Table 6. Descriptive analysis results about reasons of students' choices

Method		Group f	Individual f	Both f	Total f	Total %
1.	Pleasure/Funny	31	7	10	48	26,4
2.	Understandable/Didactic	13	14	2	29	15,9
3.	Over achievement	3	2	-	5	2,7
4.	Responsibility	3	-	-	3	1,6
5.	Sharing-cooperation	30	-	3	33	18,1

6.	Noisy	-	6	1	7	3,8
7.	Argumentation	13	-	-	13	7,1
8.	Understand in silent	-	3	-	3	1,6
9.	Produce an idea	15	2	-	17	9,3
10.	Self-assessment	-	1	1	2	1,1
11.	Abasement in group	-	1	-	1	0,5
12.	Nobody Works equally	-	6	-	6	3,3

As it is seen in Table 7., it is observed that the results of frequency analysis regarding choices of handling science course according to the individual number of students were gathered as 'group' ,as 'individual' and as ' both group and individual' under 3 titles. As a group, the more reasons which students prefer to science course were confirmed as; *getting pleasure, funny* (f:31), *sharing and cooperation* (f: 30), *producing an idea, performance* (f:15), *being understandable/didactic of course* (f:13) and *argumentation* (providing an debate environment or idea-exchange) (f:13).Whereas students who prefer to work as individual stated that was more *understandable/didactic* (f: 14), got pleasure like this (f:31) and understood better in *silent environment* (f:3). Also the students who preferred individual work, proposed the disadvantages of group work being *noisy* (f: 6) and *not being worked equally* (f:6). In addition, the students who also preferred both of the working condition stated that the two conditions may be *pleasurable* (f: 10).

3.5. The views of students about favorite topics in science course

The question; ''Which topics do you like most in science and technology course?'' is asked on behalf of to determine the topics which students like or find themselves more closely in science teaching process. Example of many subject areas, involved in science and technology curriculum, is given by students. In table 8., descriptive analysis results are given regarding subject area of science course which students state they like.

Table 7. Descriptive analysis results about science course subject areas which students like

Method	f	%	$\overline{X}$	Sd
1. Light and Sound	23	12,6	,1264	,33319
2. Force and Motion	14	7,7	,0769	,26720
3. Electricity	32	17,6	,1758	,38172
4. Planets	6	3,3	,0330	,17904
5. Structure of Matter	37	20,3	,2033	,40356
6. Systems in Our Body	17	9,3	,0934	,29180
7. Person and Environment	1	,5	,0055	,07412
8. The Livings and Energy	41	22,5	,2253	,41892
9. Sense Organs	1	0,5	,0055	,07412
10. All Topics	35	19,2	,1923	,39520

As shown on Table 8, subject areas, which 182 students state that they like most in science course, can be arranged as; *the living and energy* (f:41), *the structure of matter* (f:37), *all subjects* (f:35),*electricity* (f:32) and *light and sound* (f:23).When science subject area, which students love, is analysed, it is determined that they don't slump down into a certain area. Examples, about *the livings and life* (f:60), *matter and change* (f:37), *physical events* (f:69), *world and universe* (f:6)involved in Science and Technology Program Learning Domains , are given by students. Beside this, students emphasised that they like all topics, are forming almost one-fifth (%19,2) of group.

4. Conclusions and Suggestions

When the data, obtained from research, were evaluated, it was determined that elementary school students enjoy from teaching process practices commonly like carrying out an experiment, vitamin program (e-teaching), making presentation with projection, problem solving, writing topic on notebook regarding the method and techniques, which were carried out under science and technology course. In parallel with Aktepe and Aktepe's (2009) research, most common method, technique and strategy, which students wanted to be achieved in science teaching process,

can be listed according to attendance as carrying out an experimentation, technology- supported teaching, activities outside the classroom (in nature) and also teaching with funny method and techniques.

Also, majority of elementary school students like %96,2 stated they enjoyed doing experiment in science and technology courses. Again, some of these students thought that doing experiment was funny, some students thought they gained permanent information, some students thought it made the science course more understandable and others thought it was very important visually. Besides this, most of the students shared that they were uncomfortable about not being done enough experiment. While majority of elementary school students (%65,4) stated that they preferred to work in group during activities and experiment in science and technology course, %25,8 of them preferred individual working, %8,8 of them stated they preferred to work both ways. Positive views, as this work is more funny than working individually, the work becomes more understandable, occurring of sharing and solidarity actions, taking place the production of ideas, better understanding of the course, providing the exchange of ideas with argumentation, were shared by students, preferred working with group. Students who enjoy individual work stated that they understand better by working themselves. Also the students who preferred individual works, emphasised the negative situations like that group works are noisier and nobody works equally.

In addition, student' favorite science topics respectively was confirmed living and energy, the structure of matter, electricity, sound and light. In addition, most of the students stated that they enjoyed all matters taught in the science class. It should be considered that students preferred widely liked the lab work, funny and plenty of visually-activities, technology-supported and group works in science and technology course. In this regard, the teachers of Science and Technology should take decisions regarding to the decisions of teaching process by reaching consensus with students. Also teachers should apply to different and appropriate styles of teaching methods, techniques and strategies taking into account the individual characteristics of a wide variety of students (Fouts & Myers, 1992). Correspondingly, a Science and Technology teacher shouldn't continue the same style teaching during the school year, should provide to students the opportunity to show themselves in different activities.

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