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An Investigation of Science and Technology Teachers' Views on the 5th Grade Science Course

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This study was conducted to explore the science and technology teachers' views on the implementation of 5th grade science course. Open-ended questions were used as a data collection tool. The study sample consisted of 28 science and technology teachers working in Erzurum in 2012-2013 education year. The data gathered were analysed via content analysis method. According to the results obtained from the open-ended questions, a great majority of science and technology teachers who participated in the study stated that they supported science and technology teachers who were teaching this course and therefore students' performance at science courses would enhance more. On the other hand, some science and technology teachers considered the disadvantages which they would encounter while teaching at the 4th grade science course. The reasons for the disadvantages were that they would have difficulties in targeting their instruction to the level of the students and also they would encounter much bigger problems when compared to other upper grades.

Introduction

The purpose of science course is to raise individuals who can examine the events encountered in daily life using cause and effect relation, think and build logical relations between the events (Çepni and Çil, 2012; Çepni and Çil, 2009; Çepni and *et al,* 2003). Science teaching is carried out within social studies course and science course. These courses enable students to develop their curiosity to explore their environment and thus becoming familiar with the knowledge about science in their immediate environment and the ways to obtain this knowledge (Kaptan, 1999). Students who take a science course for the first time develop attitudes towards science activities and the subjects which affect their attitudes towards the science courses which they are going to study later (Hamurcu and *et al,* 2001). This situation increases the importance of science courses in the first level of primary education. The studies conducted in our country revealed that classroom teachers had many problems while teaching science courses, they did not feel themselves qualified in the field of science, they did not do most of the experiments in science courses, and classroom teachers must be given seminars on physical sciences (Arslan, 2000, Koç and Bayraktar, 2013).

In addition to this, it was discovered in the researches that classroom teachers had important misconceptions about science subjects. (Kruger et al, 1992; Sökmen and et al, 2000; Kaptan

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and Korkmaz, 2001; Schulte, 2001; Çepni et al 2003, Akpınar and et al, 2012).It is also reported that misconceptions which students acquire about science subjects in primary education would be difficult to correct in their later learning life (Çepni et al. 2003). Classroom teachers indicated that they could not teach the 4th and 5th grade science courses properly, the courses which they took in the field of science during their pre-service training were not enough for them to teach the 4th and 5th grade science courses as specified in the curriculum, they lacked laboratory field knowledge, because they had to deal with different fields, they did not want to spare time to study science, and most importantly, they were not interested in science very much (Çepni et al,2003). Moreover, although science is intertwined with life, it is perceived as a course which is difficult and needs to be memorized by the students (Eke, 2013). Its reasons are that these courses have been taught on theoretical basis beginning in the primary school and elementary school and their relation with the daily life and environment is not achieved (Eke 2013). In order to correct this situation, integrating science with technology and daily life intends to reconstruct science curriculum. In order to materialize this, the name of the science course was changed to science and technology course in our country. In 2004, Primary Education Science Course Curriculum became Primary Education Science and Technology Course Curriculum. Although the goals and objectives in education and teaching have been specified very well and functional course subjects have been chosen and organized, it is not possible to actualize the expected result if the teachers are not trained very well (Duman, 1990). Due to the changing conditions and increasing needs, an eight year compulsory education ended in 2012-2013 education year to increase the number of educated individuals in the society and to catch up with the average duration of education in the world. Therefore, an important change was made and the new education system of 4+4+4 has been implemented. It can be stated that our education system has undergone a radical change period to adapt to the world with the new implementation. However, this period of change must be evaluated with regard to an understanding of scientific curriculum evaluation(Bay et al. 2013).Kazu and Eroğlu (2012) tried to determine the views of the faculty members towards the model in their study called "Determination of Views of Education Faculty Members of a 12 Year Compulsory Education". In the study, it was discovered that faculty members did not have enough information about the 12 year compulsory education. In addition, it was revealed that faculty members reached the information related to the 12 year compulsory interrupted education via the Internet and mass media. The knowledge level and information sources of faculty members of Education Faculty which has a very important role in training teachers indicate that this issue has not been discussed in the academic filed in detail (Bay et al, 2013).

The aim of the study conducted by Akpınar, Yıldırım and Karahan (2012) is to evaluate teaching 5th grade science courses by the specialist subject teachers with regard to pre-service science teachers and classroom teachers. It was concluded in the research that pre-service science teachers had less misconceptions than classroom teachers. Koç and Bayraktar (2013) tried to detect the classroom teachers' views on doing experiments in primary education Science and Technology course. The findings revealed that classroom teachers could not do the experiments embedded in science course and they stated that a seminar must be given on this issue. When the literature was analysed, what drew attention was that the results caused by the science and technology teachers while teaching science course were not examined. So, this study aimed at exploring the views of science and technology teachers teaching 5th grade science course in primary education towards the implementation in order to fill this deficiency. In line with these purposes, this study sought answers to the research questions given below:

1. Do you approve science and technology teachers' teaching 5th grade science and technology courses in place of classroom teachers? Please explain why you think so.

2. What do you think about the timing of this implementation?

3. Do you believe that 5th grade students' achievement at science course will increase? Why?

4. While teaching science course, are there any subjects or conditions which you have difficulty in explaining?

5. Do you want science and technology teachers to teach the 4th grade science and technology course? Please give your reasons.

6. In your opinion, did the change in the name of the course to Science Course in the 5th grades have an effect on the course content? How?

7. How are the 5th grade students affected with these changes? What do you think?

Method

The Research Model

Instrumental case study was used in the study. This method provides an opportunity to look at in-depth aspect of the issue in a short time. The most important advantage of this method is that it gives an opportunity to concentrate on a particular situation of the problem (Çepni, 2007). This method focuses on a particular quality of a case and gives a chance to use different data collection tools together (Cohen and Manion, 1994).

The Sampling

The sampling of the study was composed of 28 science and technology teachers working in Erzurum in 2012-2013 education year. The teachers who participated in the study were chosen among the schools located in the city centre of Erzurum via simple random sampling so that they could be reached. Two of these teachers are doing PhD in the field of science education and also the interviews were carried out with these teachers.

Data Collection Tools

Open-ended questions and interviews were used in the study as data collection tools. Open-ended questions were developed to detect science and technology teachers' views on their teaching in the 5th grades. The preliminary questionnaire consisted of nine questions and it was developed via examining the relevant literature. The number of questions in the questionnaire was dropped to seven questions in line with the views of the two faculty members and two science and technology teachers. The final version of the questionnaire consisted of six open ended questions. The questions in the questionnaire were asked to the two teachers doing PhD in the field of science education as an interview. The time allotted to the questionnaire and the interviews was considered to take 25 minutes on average. As the questions in the open-ended questionnaire were presented in the findings section of the study, they were not given in this section.

Data Collection and Analysis

The open-ended question forms were distributed to the science and technology teachers working in the schools in the centre of Erzurum and they were given 25 minutes to fill them. The qualitative data obtained from the open-ended questions were exposed to content analysis. Three researchers examined the teachers' questionnaire data and created the themes and codes collaboratively. Moreover, two science and technology teachers were interviewed. During the analysis disagreements were discussed and a consensus was achieved. Depending on the themes and codes, frequency and percentage for each opinion were given. Necessary explanations and interpretations related to the teachers' opinions were made below the tables.

Findings

Question 1. Do you approve science and technology teachers' teaching 5th grade science and technology courses in place of classroom teachers? Please explain why you think so.

Table 1. Analysis Results of the Participant's Responses to Question 1

Theme	Code	Frequency	Percentage
Specialist course teacher teaching the course	I approve it	25	96
	I partly approve it	1	4
Presentation of the course	Ineligible classroom teachers	6	15
	Actualizing specialization	7	17
	Implementing different teaching	1	2
	Presenting the subjects in detail	3	7
	Doing practical experiments	2	5
Features of the course	Courses with high amounts of contents	4	10
	Too many diverse subjects	2	5
	Too many activities and experiments	2	5
	Difficulty in teaching the course	2	5
Student's condition	Increasing student interest in the course	4	10
	Increasing student achievement	4	10
	Establishing the course on a good basis	2	5
Others	Enhancing attitudes towards the course	1	2
	Not being able to target instruction to the level of the students	1	2

In line with the data analysis and the information given by the teachers who were interviewed in Table 1, it was discovered from the presentation of the course, features of the course, student's condition and the information provided by the teachers who were interviewed that the teachers supported specialist subject teachers teaching the 5th grade science course (96% I approve it, 4% I partly approve it).

T1*: I approve it because the teachers who complete their undergraduate studies in science department learn the course more elaborately, they will enable the students to learn without forming misconceptions.*

T2*: Yes, I approve it because I believe that classroom teachers have distinct deficiencies belonging to science and technology, mathematics and other core courses. Most of the classroom teachers are not aware of these deficiencies; however, those who know them do not make an effort to remove them. Thus, it was viewed that the students begin the second level of primary education with these distinct deficiencies and misunderstandings in these core courses. That's why I think that this implementation will be beneficial.*

Question 2: "What do you think about the timing of this implementation?"

Table 2. Analysis Results of the Participant's Responses to Question 2

Theme	Code	Frequency	Percentage
Timing of the implementation	I approve it	7	27
	I don't approve it	1	4
	I partially approve	1	4
	A late decision	3	12
	Wrong planning	5	19
	Lack of infrastructure	5	19
	Carrying out pilot study	4	15

In line with the data analysis and the information given by the teachers who were interviewed in Table 2, it was discovered that 27% of the participants approved the timing of the implementation, 4% of them did not approve it, 4% partially approved it, 12% of theme thought that it was a late decision, 19% of them drew the attention on wrong planning, 19% of them mentioned the lack of infrastructure, and 15% of them stated that a pilot study had to be carried out.

The data presented below and obtained from the interviews carried out with the teachers seem to support the findings attained.

T1*. I approve it. However, because the implementation was materialized suddenly, it caused some troubles due to lack of some physical deficiencies.*

T2. *Even though timing is a bit late, it is convenient. But, I believe that the implementation would be better if it had begun with the compulsory primary education.*

Question 3. Do you believe that 5th grade students' achievement at science course will increase? Why?

Table 3. Analysis Results of the Participant's Responses to Question 3

Theme	Code	Frequency	Percentage
Increasing achievement	Student achievement will increase	26	100
Reasons for an increasing achievement	More content knowledge	11	42
	Concretizing the course much better	2	8

	Having the students concentrate on the course	1	4
	Different teaching practices	1	4
	Presenting subjects more in detail	1	4
	Having the students do practical experiments	4	15
	Make them enjoy the course	1	4
	Having better communication with the students	1	4
	Teaching basic knowledge better	2	8
	Raising curiosity with the students	1	4
	Removing students' adaptation problems	1	4

According to the data analysis and the information given by the teachers who were interviewed in Table 3, it is viewed that students' achievement at science course would increase (100%) via such an application. The most important reason is based on the view that specialist subject teachers have more content knowledge (42%).

The findings obtained from the interviews promote this situation.

T1. *Yes, because teaching science course in the best way will be actualized with the science teachers who improved themselves in this discipline.*

T2. *Success in science course will increase to a certain degree. However, I think that science and technology teachers teaching these courses need an in-service training about the curriculum and the content of the course.*

Question 4. While teaching science course, are there any subjects or conditions which you have difficulty in explaining?

Table 4. Analysis Results of the Participant's Responses to Question 4

Theme	Code	Frequency	Percentage
Difficulty in Explaining the Lesson	I have no difficulty in explaining the course	17	65
	I have difficulty in explaining the course to a certain degree	9	35
Positive Opinions	The subjects are quite simple	17	65
Negative Opinions	Not being able to target their instruction to the students' level	4	15
	Including abstract concepts	3	12
	Lack of reference books	2	7

According to the findings in Table 4, 65% of the teachers stated that they did not any difficulties while lecturing due to simple subjects, % 35 of them had difficulties such as not being able to target their instruction to the level of the students (15%), science course's

including abstract concepts (12%), and lack of reference books (7%). Moreover, it was discovered that the two teachers who were interviewed had difficulties in explaining the abstract concepts in science course.

T1. *Yes. Because concrete concepts used in daily life such as heat and temperature which particularly appears in science course is not used correctly, it takes some time to remove the existing misconceptions of the students.*

T2*. Yes, there are. These appear particularly in the units which include abstract concepts. To clarify, while explaining an even or trying to foster students' conceptual learning, we encounter these difficulties. .*

Question 5 Do you want science and technology teachers to teach the 4th grade science and technology course? Please give your reasons.

Table 5. Analysis Results of the Participant's Responses to Question 5

Theme	Code	Frequency	Percentage
Instruction by specialist subject teachers	I agree	8	31
	I don't agree	16	62
	Neutral	2	7
Positive Opinions	Actualizing specialization at the basic level	8	31
Negative Opinions	Not being able to target their instruction to the students' level	4	15
	Simple concepts existing at the basic level	9	35
	Not being able to communicate	1	4
	Behaving childishly	1	4
Others	I do not have an idea about the curriculum	1	4

In line with the data presented in Table 5, it is viewed that 31% of the teachers supported instruction of science course in the 4th grade by the science and technology teachers, 62% of them did not support and 7% of them were undecided about it. In addition, the two teachers who were interviewed remarked that because they believed that science concepts basically need to be taught correctly, specialist subject teachers must instruct the science course in the 4th grade. The teacher's views obtained from the interviews were given below.

T1*.Yes, I do. Students learn science for the first time in the 4th grade. It will be more suitable for the specialist subject teachers to help students construct the concepts which appear in science course more correctly in their minds. Moreover, when students progress through upper grades, they will not have misconceptions.*

T2. *According to the latest Primary and Secondary School Science Curriculum published by Ministry of National Education (M.B.E)(2013), science course is started to be taught in the 3rd grade. Because of this, I believe that it will be more beneficial for the students to reach correct conceptual knowledge if science teachers begin to teach these courses in the 3rd or 4th grades.*

Question 6 In your opinion, did the change in the name of the course to Science Course in the 5th grades have an effect on the course content? How?

Table 6. Analysis Results of the Participant's Responses to Question 6

Theme	Code	Frequency	Percentage
Effect of the course name on the content	It does not have an effect	25	96
	It has an effect	1	4
Opinions	The name is not important, but the content	25	96
	The name must change because the concepts have become simple	1	4

According to the data presented in Table 6, 96% of the teachers stated that changing the name of science and technology course as science course wouldn't have an effect on the content of the course, but one teacher (4%) stated that because the concepts were simplified, the name of the course should be changed. The two teachers who were interviewed stated their views given below.

T1. *No, it didn't. There is no change in the content of the course.*

T2. *I don't think that it will have a significant effect on the content of the course.*

Question 7. How are the 5th grade students affected with these changes? What do you think?

Table 7. Analysis Results of the Participant's Responses to Question 7

Theme	Code	Frequency	Percentage
Students' condition of being affected	They are affected positively	11	33
	I have no idea	4	12
	They are partially affected positively	2	6
	There is no difference	1	3
Other Opinions			
Positive	Learning from a different teacher is interesting	3	9
	It enables them to have more satisfying knowledge	1	3
	It enables them to enter different teaching environments	1	3
	They communicate better	2	6
	Increasing confidence in the course	1	3
	Approach to being scientific	1	3
Negative	Having adaptation problems	4	12
	Some students are bored	1	3
	Not being ready in terms of age and behaviour	1	3

According to the data presented in Table 7, it is discovered that 60% of the teachers stated that students were positively affected by these changes, 6% stated that they were partially

affected positively, 12% of them had no idea, 3% said that there was no difference, and 18 % of those reported negative opinions. Moreover, the two teachers who were interviewed remarked that the change would have positive effects on the students.

T1. *I think that this change has caused a positive effect on the students because I believe that students will learn science course best from the specialist subject teachers.*

T2. *The 5th graders were positively affected by science and technology teachers' instruction in science course.*

Conclusion and Discussion

Since 2012-2013 education year an important change has been made by putting an end to the eight year compulsory education and the new education system of 4+4+4 has been implemented. With this implementation specialist subject teachers began to instruct the fifth graders' courses. The feedback which the teachers will give has gained importance throughout the instruction. Thus, the study aimed at detecting the science and technology teachers' views regarding the implementation of the 5th grade science course. The findings of the study revealed that a majority of science and technology teachers express approval of teaching 5th grade science course, classroom teachers are not qualified to explain science course, they are not ale to concretize the course efficiently, they do not do enough experiments, it is difficult to teach science course and science concepts must be constructed better at the beginning. This finding corresponds with the findings discovered by Arslan, 2000) and Karahan and et al, 2012. While a majority of science and technology teachers stated that timing was right, even it was too late for the implementation, some of them remarked that lack of infrastructure and not carrying out a pilot study was a disadvantage. This finding shows parallelism with the findings of Karadeniz (2012).

It was concluded that students' achievement at science course would increase due to such conditions as science and technology teachers' acquiring more content knowledge, presenting the subjects more elaborately, raising curiosity with the students, teaching basic knowledge better and using different teaching practises. This finding is compatible with the findings of the researches conducted by Çepni et al. (2003) and Karadeniz (2012).

A majority of science and technology teachers stated that it would not be suitable for them to teach the 4th grade science course due to the difficulty in targeting their instruction to the students' level, not being able to communicate, and simple science concepts in the 4th grade. This finding differs from the study conducted by Çepni et al. (2003). However, the two science and technology teachers who took part in the interviews stated that science concepts must be basically taught better so specialist subject teachers should teach the 4th grade science course. This finding is compatible with the findings of the study conducted by Çepni et al. (2003). Furthermore, some teachers and the teachers participating in the interview defined that they had difficulties in teaching some abstract concepts in science educations.

The following suggestions may be offered as a result of the study:

1. Classroom teachers' views on this implementation can be investigated.

2. Students and parents' views on this issue can be explored.

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