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SCIENCE CURRICULUM FROM THE PERSPECTIVES OF TURKISH TEACHERS: PROBLEMS ENCOUNTERED AND SUGGESTIONS FOR SOLUTIONS[i]

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Abstract:
The purpose of this research is to identify the problems that teachers have experienced during the implementation of the science curriculum and their suggestions for solution to these problems. In the research, survey model has been used among the descriptive research methods in which quantitative and qualitative data have been used together. The sample of the research consists of science teachers (n=208) and classroom teachers who deliver science courses (n=104) in Manisa province. A questionnaire form and a semi-structured interview form developed by the researchers have been used as data collection tools. For quantitative data, percentage and frequency values have been analysed and for qualitative data, content analysis have been performed. As a result of the analyses the problems encountered in the implementation of the curriculum have been examined in three different categories namely; teacher-related problems, curriculum-related problems and other problems. According to the results of the questionnaire, most of the teachers think that they confront with problems because they do not see themselves sufficient in terms of designing/evaluating a project, designing an experiment and creating an activity. In terms of the program, the majority of teachers think that they encounter with problems as there is not enough information about the implementation of the inquiry-based learning approach and not enough examples and

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explanations for the learning outcomes. In addition, nearly half of the teachers state that they have problems with the use of alternative assessment tools and techniques in the program. Regarding other problems; the insufficient content of the course book, lack of materials, lack of adequate support from parents, and technological inadequacies are among the problems most of the teachers have experienced. Similarly, when the results of interviews have been examined; materials, laboratories, and the inadequacy of the course book are among the most frequently mentioned problems. When the survey results of teachers' suggestions for solution have been examined; putting more emphasis on teachers' views in the process of curriculum development, revision of curricula of education faculties oriented to the changes in curriculum, preparation of flexible curricula according to students' needs, improvement of technological infrastructure of schools and classes, preparation of guidebooks for teachers, raising the knowledge levels of parents about the instruction program, providing an in-service training for designing experiments/projects are among the most frequently selected recommendations from teachers. When the interview results have been examined, it has been seen that most of the suggestions are about increasing the number and quality of in-service trainings and increasing the quality of laboratory and material facilities and textbooks. Since the newly announced science curriculum will be gradually implemented as of 2017-2018 academic year, it is expected that the results of the study will contribute to the field in terms of the problems and solution suggestions for the current curriculum, the program development and update studies, the contents of in-service trainings and comparison of the curricula.

Keywords: science education, curriculum, science course curriculum, teachers' views, problems and solutions

1. Introduction

As a result of the breakthroughs in the fields of science and technology, many countries are striving to raise qualified individuals who are able to adapt to the changes and developments in these areas. Qualified individuals are the ones who are investigating, questioning, and suggesting solutions to the problems they confront (İşman & Eskicumalı, 2003). In order for countries to be able to create a qualified manpower, it is of utmost importance that effective science teaching is carried out in schools starting from primary education. The aim of science education, which is an important part of individuals' educational experiences, is to prepare people for an eligible and quality life in the 21st century (Millar & Osborne, 1998). According to Kaptan (1999); researching,

understanding, discovering, imagining, generating new knowledge, developing attitudes, and utilization of scientific knowledge are the main purposes of science education and an individual who has received science education acquires the ability to practice them in real life. Through science course, students learn about the contributions of science to technological developments, acquire the habit of thinking scientifically and independently, and use the knowledge they have acquired in daily life (Topsakal, 1999). Therefore, it is important that people receive a certain level of science education so that they can understand, interpret and solve problems that they confront in their lives (Solomon, 1993).

Given the link between science and scientific-technological developments, it has been seen that science related subjects are altering very quickly and therefore many studies have been conducted to keep science education up to date, and to raise its level. Teaching science in a qualified way and educating qualified individuals in this sense is primarily provided by the Ministry of National Education (MoNE). In order to educate the individuals who can adapt to the progress and developments, it is necessary to pay attention to updating the curricula in parallel with these developments (Yıldırım, Şensoy, Karatepe & Yalçın, 2006). In this context, it has been seen that in recent years a number of changes have been made by the MoNE on teaching programs, and one of these programs is science teaching programs.

Through the Science Education Curriculum in 2000, Science and Technology Curriculum in 2004, Science Curriculum in 2013 and newly announced Science Curriculum in 2017, it has been aimed to increase the quality of science education in Turkey. Therefore, many researchers have studied the strengths and weaknesses of the curricula and have carried out studies that include views on the implementation of them. In particular, it is possible to find out more research studies conducted on the Science and Technology Curriculum. In these studies, which are usually carried out by taking teacher opinions; making students more active in comparison to the past (Şeker, 2007), acquiring them more skills (Bağdatlı, 2005), directing students to investigate and making them like science lessons (Buluş Kırıkkaya, 2009), putting the learner in the center and give an opportunity to the students to explore (Tüysüz & Aydın, 2009) are among the positive opinions towards the Science and Technology Course Curriculum. However, to launch the science course in the third grade (Duban, 2016; Yıldırım, Güngör & Akgün, 2015), the appropriateness of learning outcomes according to age and level, the integration of the program with everyday life (Ünişen & Kaya, 2015) and the increased applicability of the program (Çıray, Küçükyılmaz & Trust, 2015) are emphasized as positive aspects of the Science Course Curriculum.

In terms of the problems related to the curricula; lack of ability of teachers to use of student-centered activities, lack of course time for activities (Özdemir, 2006), the necessity of in-service trainings (Akamca, Hamurcu & Günay, 2006; Boyacı, 2010; Erdoğan, 2007, İzci, Özden & Tekin, 2008), inadequacy of infrastructure (Aydın, 2007), inadequacy of materials (Yangın, 2007), inefficient use of assessment and evaluation tools and inadequacy of materials (Unayağyol, 2008) and shortage of time (Toraman & Alcı, 2013) are among the main problems that have been determined as the main issues in terms of the Science and Technology Course Curriculum. In terms of the Science Course Curriculum; lack of sample implementations for the teaching-learning processes, lack of sample activities related to assessment (Çıray, Küçükyılmaz & Güven, 2015), time constraints for activities and alternative assessment-evaluation processes, indifference of parents, laboratory and material problems, (Akıncı, Uzun & Kışoğlu, 2015) and difficulties that teachers confront in practice as they are not familiar with the curriculum (Toraman & Alcı, 2013) are among the negative opinions stated by the teachers.

As the curriculum is one of the basic elements of the education and training process, curriculum development studies need to be done carefully and meticulously. During the development process, it is very important to take the opinions of the teachers who are directly responsible for the implementation of the programs (Schremer, 1991; Varış, 1998). Positive and negative feedbacks about the program after implementing the curriculum is of importance in order to correct the points that are seen as inadequate in the program. In this context, it is important to be able to identify teachers' view, thoughts and problems faced by them since they are the actual implementer of the curriculum. Therefore, it is inevitable to identify problems that are among the important factors affecting the implementation of teachers (Schremer, 1991).

In this study, it has been aimed to obtain the opinions of the teachers about the problems encountered during the implementation of the Science Course Curriculum (MoNE, 2013) and the solutions for these problems. When the related research studies have been examined; it has been seen that there are fewer studies related to the Science Course Curriculum in comparison to the other curricula including large sample groups and involving qualitative and quantitative data together. Since the newly announced curriculum is going to be implemented gradually in the 2017-2018 academic year, the results of this research study on the problems and solution suggestions for the current curriculum has an importance in terms of curriculum development studies, content of in-service trainings and comparison of the programs.

2. Methods

In this study, which aims to identify the problems encountered by teachers during the implementation of the 2013 Science Course Curriculum and their opinions on the solution of these problems, a survey model of descriptive research methods has been used. Survey research data are collected by asking various questions on a sample representing the population and by producing various statistics by obtaining quantitative data on the cases and events (Fowler, 1993). In this study, the teachers' views have been tried to be described by the data obtained through the questionnaire and through the semi-structured interviews.

2.1 Population and Sampling

According to Fraenkel and Wallen (1996), the population, which the researcher aims to generalize yet which is difficult to reach, is defined as "target population", and the population that the researcher can reach and generalize is defined as "accessible population". 646 science teachers and 2,000 classroom teachers (who deliver science courses) working in the province of Manisa in the 2015-2016 academic year have been constituted the accessible population of the study. A total of 312 teachers, including 208 science teachers and 104 classroom teachers have been reached by using a cluster sampling method. In addition, semi-structured interviews have been conducted with 27 teachers who were randomly selected and volunteered among the teachers.

The information about graduate department, gender, years of experience, education status and branches of the teachers from which the research data have been obtained are presented in Table 1.

Table 1: Teachers' Demographic Characteristics

		Frequency (f)	**Percentage (%)**
Graduate Department	Faculty of Education	267	85,6
	Faculty of Arts and Science	4	1.3
	Other	41	13.1
Gender	Female	165	52.9
	Male	147	47.1
Years of Experience	0-5 years	91	29.2
	6-10 years	55	17.6
	11-15 years	76	24.4
	16-20 years	35	11.2
	over 20 years	55	17.6
Education Status	Junior Specialist	55	17.6

	Bachelor	235	75.3
	Master	22	7.1
Branch	Science Teacher	208	66.7
	Classroom Teacher	104	33.3

When Table 1 has been examined, it has been seen that the majority of the teachers are graduates of Education Faculties and have a bachelor's degree. Number of the male and female teachers is close to each other. Almost half of teachers have 0-10 years of teaching experience and others have more than 10 years of teaching experience. One-third of the group is classroom teachers whereas two-thirds of them are science teachers.

2.2 Data Collection Tools

In this study, a questionnaire form and a semi-structured interview form have been used to identify teachers' opinions. In this regard, it has been aimed to determine the problems that teachers confront in regards to curriculum and the suggestions for solutions of these problems.

2.2.1 Science Course Curriculum Questionnaire Form

A questionnaire form has been prepared by taking the opinions of teachers and experts and considering the previous studies conducted such as Science and Technology Course Curriculum Questionnaire (Boyacı, 2010) and a scale for 2005 Science and Technology Course Curriculum (Özdemir, 2007). Science Course Curriculum Questionnaire form consists of four parts to determine the opinions of the teachers about the problems related to the curriculum and suggestions for solutions. The first three sections consist of five-point Likert-type items and the last section consists of suggestions for solutions that teachers can mark more than one option. In the first section, there are 9 items which include the problems related to the teachers, in the second section there are 7 items that contain the problems related to the curriculum, and in the third section there are 6 items including the other problems. In the fourth section, the teachers are required to mark the appropriate suggestions for solution and the in-service training subjects which they would want to receive prepared by examining the literature. The questionnaire was presented to 5 experts in that field and their opinions have been taken on the content validity and accuracy. After the arrangements were made according to expert opinions, questionnaires have been filled with 20 teachers and it has been examined whether the questions were understood in the same way by the teachers. After these studies, the questionnaire form has been finalized and implemented.

2.2.2 A Semi-Structured Interview Form Related to Science Course Curriculum

Semi-structured interviews has been conducted with 27 teachers in order to further understand the problems and obtain detailed information in addition to the data collected through the questionnaire form. Semi-structured interviews are advantageous in terms of elaboration and completion of answers given to a particular question (Çepni, 2009). The researcher asked the teachers to share their opinions about the problems they encounter during curriculum implementation and about the suggestions for solutions.

2.3 Data Analysis

The findings of the questionnaire have been analysed through the SPSS 21.0 program and the percentages and frequency values reflecting the opinions of the teachers about each item have been presented on the tables. In the second phase, semi-structured interviews have been transcribed. In terms of analysing the qualitative data, content analysis method has been applied. Content analysis is expressed as a technique in which some words in a text are systematically organized and interpreted in terms of concepts and categories (Büyüköztürk et al., 2014; Yıldırım & Şimşek, 2005). In this context, the interval and frequency values of the themes and codes obtained from the interviews have been calculated and presented in tables. Teachers' opinions have been directly reflected through the direct quotations from the answers given by the teachers.

3. Results

3.1 Findings Regarding the Problems Encountered during the Implementation of the Science Course Curriculum

In this section, findings of teachers' opinions on the problems encountered during the implementation of the curriculum have been presented. These findings have been examined in three parts such as problems related to the teachers, problems related to the curriculum and other problems.

3.1.1 Findings on Problems Related to Teachers

Table 2 shows the frequency (f) and percentage (%) values of the opinions about teacher-related problems encountered during the implementation of the curriculum.

Table 2: Frequency and percentage values of the opinions about teacher-related problems

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am having problems because I cannot fully understand the philosophy of the curriculum.	f	18	36	34	119	105
	%	5.8	11.5	10.9	38.1	33.7
2. I am having problems because I cannot integrate technology into the learning-teaching process	f	18	65	41	127	61
	%	5.8	20.8	13.1	40.7	19.6
3. I am having difficulties in using/developing scientific process skills	f	6	78	52	123	53
	%	1.9	25.0	16.7	39.4	17.0
4. I am having problems as I do not feel competent in project designing and assessment	f	69	129	41	56	17
	%	22.1	41.3	13.1	17.9	5.4
5. I am having problems as I do not feel competent in alternative assessment and evaluation methods	f	16	67	41	121	67
	%	5.1	21.5	13.1	38.8	21.5
6. I am having problems, as I do not feel competent in implementing the roles emphasized in the curriculum such as a guide or a facilitator etc.	f	16	57	29	135	75
	%	5.1	18.3	9.3	43.3	24.0
7. I am having problems as I do not feel competent in designing an experimental setup/activity.	f	88	107	35	60	22
	%	28.2	34.3	11.2	19.2	7.1
8. I am having problems as I do not feel competent in using/developing life skills	f	18	34	43	132	85
	%	5.8	10.9	13.8	42.3	27.2
9. I am having problems as I do not feel competent about creating learning environments (based on argumentation, cooperation etc.) emphasized in the curriculum.	f	6	72	28	139	67
	%	1.9	23.1	9.0	44.6	21.5

For the first item, it can be said that most of the teachers are of the opinion that they do not have problems related to understanding the philosophy of the curriculum as the total rates of answers “Disagree" and “Strongly Disagree" given to the statement "*I am having problems because I cannot fully understand the philosophy of the curriculum”* is 71.8%.

For the second item, it can be said that more than half of the teachers are of the opinion that they do not have problems in terms of integrating technology into the teaching and learning process as the total rates of answers “Disagree" and "Strongly Disagree” given to the statement “*I am having problems because I cannot integrate technology into the learning-teaching process*" is 60.3%.

For the third item, it can be said that that more than half of the teachers are of the opinion that they do not have problems in terms of using scientific process skills as the total rates of answers “Disagree" and "Strongly Disagree” given to the statement "*I am having difficulties in using/developing scientific process skills”* is 56.4%.

For the fourth item, it can be said that that nearly two-thirds of the teachers are of the opinion that they have problems in terms of project designing and assessment as they do not feel competent as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems as I do not feel competent in project designing and assessment*" is 63.4%.

For the fifth item, it can be said that more than half of the teachers are of the opinion that they do not have problems in terms of their competencies in assessment and evaluation methods as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems as I do not feel competent in alternative assessment and evaluation methods*" is 60.3%.

For the sixth item, it can be said that more than two-thirds of the teachers are of the opinion that they do not have problems in terms of their competencies related to their roles as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems, as I do not feel competent in implementing the roles emphasized in the curriculum such as a guide or a facilitator etc."* is 68.3%.

For the seventh item, it can be said that nearly two-thirds of the teachers are of the opinion that they have problems as they do not feel competent in designing an experimental setup/activity as the total rate of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems as I do not feel competent in designing an experimental setup/activity*" is 63.4%.

For the eighth item it can be said that more than two-thirds of the teachers are of the opinion that they do not have problems in terms of using life skills as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems as I do not feel competent in using/developing life skills*" is 69.5%.

For the ninth item it can be said that nearly two-thirds of the teachers are of the opinion that they do not have problems in terms of creating necessary learning environments as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems as I do not feel competent about creating learning environments (based on problem, argumentation, cooperation etc.) emphasized in the curriculum*" is %66.1.

3.1.2 Findings on Problems Related to the Curriculum

Table 3 shows the frequency (f) and percentage (%) values of the opinions about curriculum-related problems encountered during the implementation of the curriculum.

Table 3: Frequency and percentage values of the opinions about curriculum-related problems

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am having problems because of the abundance of learning outcomes in the curriculum.	**f**	22	65	46	123	56
	%	7.1	20.8	14.7	39.4	17.9
2. I am having problems due to the lack of information related to the implementation of the inquiry-based learning approach.	**f**	78	78	36	90	30
	%	25.0	25.0	11.5	28.8	9.6
3. I am having problems due to the lack of examples and explanations related to the learning outcomes.	**f**	58	81	49	84	40
	%	18.6	26.0	15.7	26.9	12.8
4. I am having problems due to the implementation of the spiral curriculum.	**f**	20	40	48	151	53
	%	6.4	12.8	15.4	48.4	17.0
5. I am having problems related to the alternative assessment and evaluation methods (self-peer assessment, performance assessment etc.).	**f**	40	112	46	100	14
	%	12.8	35.9	14.7	32.1	4.5
6. I am having problems related to the "Science-Technology-Society-Environment" field (science-technology relation, nature of science etc.).	**f**	16	56	27	154	59
	%	5.1	17.9	8.7	49.4	18.9
7. I am having problems in providing learning outcomes related to affective domain (attitude, values, motivation, and responsibility).	**f**	16	70	32	136	58
	%	5.1	22.4	10.3	43.6	18.6

For the first item, it can be said that more than half of the teachers are of the opinion that they do not have problems in terms of the number of learning outcomes as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems because of the abundance of learning outcomes in the curriculum*" is 57.3%.

For the second item, it can be said that half of the teachers are of the opinion that they have problems in terms of lack of information about the implementation of the inquiry-based learning approach as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems due to the lack of information related to the implementation of the inquiry-based learning approach*" is 50%.

For the third item, it can be said that more teachers are of the opinion that they have problems in terms of lack of examples and explanations related to the learning outcomes as the total rates of answers "Agree" and "Strongly Agree" is 44.6% and "Neutral" is 15.7% given to the statement *"I am having problems due to the lack of examples and explanations related to the learning outcomes*"

For the fourth item, it can be said that nearly two-thirds of the teachers are of the opinion that they do not have problems in terms of using a spiral curriculum as the

total rates of answers "Disagree" and "Strongly Disagree" given to the statement *"I am having problems due to the implementation of the spiral curriculum"* is 65.4%.

For the fifth item, it can be said that more teachers are of the opinion that they have problems in terms of using alternative assessment and evaluation methods as the total rates of answers "Agree" and "Strongly Agree" is 48.7% and "Neutral is 14.7% given to the statement *"I am having problems related to the alternative assessment and evaluation methods (self-peer assessment, performance assessment etc.)"*

For the sixth item, it can be said that nearly two-thirds of the teachers are of the opinion that they do not have problems in terms of learning outcomes on "Science-Technology-Society-Environment" as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement *"I am having problems related to the "Science-Technology-Society-Environment"* field (science-technology relation, nature of science etc.) is 68.3%.

For the seventh item, it can be said that more than half of the teachers are of the opinion that they do not have problems in terms of the learning outcomes related to affective domain as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement *"I am having problems in providing learning outcomes related to affective domain (attitude, values, motivation, responsibility)"* is 62.2%.

3.1.3 Findings on Other Problems

Table 4 shows the frequency (f) and percentage (%) values of teachers' opinions on other problems encountered during the implementation of the curriculum.

Table 4: Frequency and percentage values of the opinions about other problems

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am having problems due to the inadequate content of the course book.	f	66	123	42	73	8
	%	21,2	39,4	13,5	23,4	2,6
2. I am having problems due to the lack of materials and tools for designing and implementing activities	f	89	127	31	58	7
	%	28,5	40,7	9,9	18,6	2,2
3. I am having problems due to the absence of a teacher guideline	f	72	40	38	74	88
	%	23,1	12,8	12,2	23,7	28,2
4. I am having problems due to the lack of support from parents.	f	52	126	30	85	19
	%	16,7	40,4	9,6	27,2	6,1
5. I am having problems related to the inadequate technological infrastructure in the classrooms.	f	80	112	28	64	28
	%	25,6	35,9	9,0	20,5	9,0

6. I am having problems due to the insufficient in service training.	**f**	30	100	44	82	56
	%	9,6	32,1	14,1	26,3	17,9

For the first item, it can be said that more than half of the teachers are of the opinion that they have a problem due to the inadequate content of the course book as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems due to the inadequate content of the course book*" is 60.6%.

For the second item, it can be said that more than two-thirds of the teachers are of the opinion that they have a problem due to the lack of materials as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems due to the lack of materials and tools for designing and implementing activities*" is 69.2%.

For the third item, it can be said that more than half of the teachers are of the opinion that they do not have a problem in terms of the teacher guideline as the total rates of answers "Disagree" and "Strongly Disagree" given to the statement "*I am having problems due to the absence of a teacher guideline"* is 51.9%.

For the fourth item, it can be said that more than half of the teachers are of the opinion that they have a problem in terms of the relations with parents as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems due to the lack of support from parents*" is 57.1%.

For the fifth item, it can be said that more than half of the teachers are of the opinion that they have a problem in terms of the technological inadequacies as the total rates of answers "Agree" and "Strongly Agree" given to the statement "*I am having problems related to the inadequate technological infrastructure in the classrooms*" is 61.5%.

For the sixth item, it can be said that the number of teachers who have positive and negative opinions on in service training is close to each other as the total rates of answers "Agree" and "Strongly Agree" given to the statement "Agree" and "Strongly Agree" is 44.2% and "Neutral" is 14.1% given to the statement "*I am having problems due to the insufficient in service training*".

3.2 Findings Regarding the Suggestions for Solutions

In this section, the findings on the solution suggestions for the problems encountered by teachers during the implementation of the curriculum have been presented. The frequency and percentage values obtained from the analysis of the items marked by the teachers about suggestions have been presented in Table 5.

Table 5: Frequency and percentage values about suggestions for solutions

Suggestions for Solutions	f	%
More emphasis should be placed on teachers' views at every stage of the curriculum development.	285	91,3
Education Faculties should be updated frequently in line with the changes in the curriculum.	256	82,1
Flexible curricula should be prepared that can change according to the environmental factors and student needs.	243	77,9
Technological infrastructures of schools and classrooms should be improved.	227	72,8
Teacher guidelines should be prepared.	221	70,8
Parents' knowledge level about the curriculum should be increased.	202	64,7
Teachers should be given in-service training on designing experiments.	201	64,4
Curriculum should be updated constantly in line with the studies conducted.	195	62,5
Teachers should be given in-service training on designing projects.	188	60,3
Teachers should be given in-service training on integrating technology into education.	134	42,9
Teachers should be given in-service training on developing life skills.	130	41,7
Teachers should be given in-service training on inquiry-based learning.	127	40,7
The number of students should be reduced in classrooms.	109	34,9
Teachers should be given in-service training on scientific process skills.	93	29,8
Teachers should be given in-service training on nature of science.	75	24,0
Teachers should be given in-service training on argumentation.	53	17,0
Teachers should be given in-service training on alternative assessment methods.	52	16,7

As shown in Table 5, teachers chose the suggestions at some rates such as; attaching more importance to the teacher opinions at every step of curriculum development (91.1%), updating the Education Faculties frequently in line with the changes in the curriculum (82.1%), creating flexible curriculums that can change according to the environmental factors and student needs (77.9%), improving technological infrastructures of schools and classrooms (72.8%), preparation of teacher guidelines (70.8%), increasing the knowledge level of the parents about the curriculum (64.7%), updating the curriculum constantly in line with the studies conducted (62.5%), and reducing the number of students in the classrooms (34,9%).

In addition, topics of the in-service trainings teachers want to receive are listed as follows: designing experiments (64.4%), designing projects (60.3%), integrating technology into education (42.9%), developing life skills (41.7%), inquiry-based learning (40.7%), improving scientific process skills (29.8%), nature of science (24%), argumentation (17%), and alternative assessment-evaluation methods (16.7%).

3.3 Findings of Semi-Structured Interviews

In this section, frequency (f) and percentage (%) values of the results (see Table 6 and Table 7) obtained from the interviews conducted with 27 teachers were given. The real

names of the teachers have not been revealed. The interviewees were coded as K1, K2, K3, ... K27.

Table 6: Frequency and percentage values of the opinions about the problems encountered during the implementation of the curriculum

Theme	Codes	f	%
Problems encountered during the implementation of the curriculum	Inadequacy of laboratory and materials	15	55.5
	Insufficient content of the learning outcomes	12	44.4
	Inadequate course hours	9	33.3
	Problems due to course books	9	33.3
	Inconsistency of the curriculum with the central examinations	8	29.6
	Teachers' inadequacy of teaching methods and techniques	7	25.9
	Parents' lack of information about the curriculum	7	25.9
	Students' habits of taking information readily	6	22.2

As shown in Table 6, teachers are of the opinion that they have problems due to inadequacy of laboratory and materials at the rate of 55.5%. Teacher K3 commented that "*the order of the science classroom must be laboratory-based but our classrooms are regular ones. Our main problem is the lack of materials, we want to deliver the courses via experiments yet we do not have the necessary materials*." K11 stated that "*students' economic and social status also constitute a problem in terms of the materials*".

It has been determined that 44.4% of the teachers find the content of the learning outcomes insufficient. As teachers explain the problems they encounter during the implementation, a participant stated that "*although the curriculum is contributive, more information could be given to increase the life skills of the students through the learning outcomes. This curriculum does not provide sufficient information about this skills for instance. (K10)".*

Teachers stated that the teaching hours and books constitute a problem (at the rate of 33.3%). Regarding the inadequacy of course books, K12 expressed that "*course books are extremely insufficient in terms of the content, visuality and evaluation."*

The problem of inconsistency of the curriculum with the central examinations has been mentioned by teachers at the rate of 29.6%. Teacher (K5) expressed the problem he had experienced during the implementation; "*in the education system, evaluation of the examinations are result-oriented and demotivating the students."* Another participant stated that "*as our education system is based on tests and exams, we cannot make an assessment to observe the product. The project assignments that are given once a year remain at the level of simple homework prepared on a cardboard (K2)*". It has been seen that incompatibility of the central examination and the philosophy of the curriculum constitutes a problem for the teachers.

Teachers stated that they confront with problems about teaching methods/techniques and parents' lack of knowledge about the curriculum at the rate of 25.9%. One of the teachers (K6), expressed that "*I do not think that parents are sufficiently knowledgeable. They cannot guide their children as they are not sufficiently informed and cannot provide guidance as necessary*".

Teachers also stated (22.2%) that students are often accustomed to taking information directly from teachers without trying to search and understand. On this issue, Teacher K4 expressed that "*Children do not know how to make a research…Test assignments and summarization assignments are given to them and they are accustomed to testing procedures*".

Table 7: Frequency and percentage values of the teachers' suggestions about the problems encountered during the implementation of the curriculum

Theme	Codes	f	%
Suggested solutions	High quality in-service trainings	10	37.0
	Improved laboratory conditions and materials	8	29.6
	High quality course books	6	22.2
	Increased inspections	5	18.5
	More diligent teachers	3	11.1
	Increased course hours	3	11.1
	Preparation of teachers' guidebook	3	11.1
	More information on curriculum	2	7.4
	Decreased number of central examinations	2	7.4

During the interviews, teachers (37%) stated that the number and the quality of the in-service trainings should be increased. One of the teachers, (K4), said that "*science teachers must receive in-service trainings once a year in terms of designing experiments since they are forgotten easily*". Another teacher, (K7), stated that "*it is not possible for a teacher with an experience of 10 years, 15 years, and 20 years to continue without renewing his/her information. There are continuous training programs and the education technologies are constantly changing. Therefore, teachers need to renew themselves constantly. This is the responsibility of MoNE. The quality of in-service trainings needs to be increased*". K10 also said that "*the quality of in-service trainings given to teachers can be improved and practical in-service trainings on experiments and projects can be given. I participated in a lot of in-service trainings in my 10 years of professional life. The instructors are just giving theoretical information without any practice during the summer and that's all*".

Teachers (29.6%) stated that improving laboratory and material conditions could be a solution to the problems encountered in the implementations. While talking about the importance of in service trainings, K8 stated that "*it would be more beneficial if there*

are experiments and projects in the scope of in-service trainings, but besides these, we also need a learning environment and materials". Teachers (22.2%) emphasized that the quality of textbooks should be improved. Regarding course books, K10 expressed that "*I think that the course books are inadequate in content, and sometimes the information in the book is insufficient. In addition, the changes in the curriculum are not reflected in the course book*".

Moreover, teachers also stated that increased inspections (18.5%), more diligent teachers (11.1%), increased course hours (11.1%), preparation of teachers' guidebook (11.1%), more information on curriculum (7.4%), and decreased number of central examinations (7.4%) could be solutions for the problems confronted by the teachers. Unlike the common ideas, K2 made the following statements to indicate that teachers can also do something in this regard: "*better implementation of the curriculum depends on us, the teachers. We need to focus on student-centered education. As a result of my observations, some of my colleagues think it is unnecessary to do experiments although they have necessary materials and equipment. Therefore I believe that teachers should be trained properly*".

4. Discussion and Conclusion

According to the results of the questionnaire, it was determined that most of the teachers were experiencing problems since they considered themselves insufficient in subjects such as project designing, project evaluation, experimental setup design and creating activities while implementing the program. There are also a large number of teachers who think that they have problems because of the lack of adequate information on the application of the inquiry-based learning approach. Although they think they are inadequate and lack information, the majority of teachers had the opinion that they did not have a problem in understanding the philosophy of the program, developing scientific process skills, and creating emphasized learning environments in the program. It is possible to say that these findings are contradictory. Considering the literature, there are studies emphasizing that teachers have problems in the implementation process of the program since they do not know the program sufficiently (Tekbıyık & Akdeniz, 2008; Toraman & Alcı, 2013; Yıldırım, Güngör & Akgün, 2015). Similarly, Kara (2008) concluded in the study including the opinions of teachers on the curriculum of Science and Technology lesson that teachers did not have sufficient information about the program. Thus, inadequate information for curricula is among the common problems experienced by teachers in the previous and current programs.

In the interviews conducted, there are teachers stating that they had to use conventional methods due to reasons such as insufficient time, limited explanations

about methods and techniques, etc. It was determined in some of the studies conducted on the previous science program that teachers continue to use conventional methods and techniques (Şeker, 2007; Unayağyol, 2009). Therefore, it is possible to say that this problem is also among the common problems of science programs. Furthermore, the previously mentioned contradiction may occur since some teachers tend to continue teaching with the conventional approach. Although teachers find themselves insufficient and think that there is inadequate information, they may interpret the program as they are used to, or they may not have problems since they overcome the deficiencies with their own efforts.

Other areas in which information is considered to be provided insufficiently are; the implementation of an inquiry-based learning approach, the content of learning outcomes and the use of alternative assessment tools and techniques. In the literature, there are studies identifying the same deficiencies in this respect (Çıray, Küçükyılmaz & Güven, 2015; Eskicumalı, Demirtaş, Gür Erdoğan & Arslan, 2014).

Insufficient textbooks in terms of the content, inadequate materials and technological deficiencies are among the problems experienced by more than half of teachers. Similarly, considering the results of the interviews; insufficient materials, laboratories, contents of learning outcomes and textbooks are among the most frequently mentioned problems. There are similar results in the studies conducted to provide the opinions on the program and to determine the problems experienced in the implementation of the program (Akamca, Hamurcu & Günay, 2006; Akıncı, Uzun & Kışoğlu, 2015; Argun, 2002; Aydın, 2007; Bağdatlı, 2005; Buluş Kırıkkaya, 2009; Dağdeler & Arseven, 2015; Duban, 2016; Özdemir, 2006; Ünişen & Kaya, 2015; Tsai, 2003; Yıldırım, Güngör & Akgün, 2015).

The other problems revealed in the interviews conducted with teachers are insufficient in-service trainings, parents' lack of information about the program and central exams not compatible with the goals of the program. Upon examining the literature, it is observed that there are studies having similar results to these results (Aydın & Çakıroğlu 2010; Boyacı, 2010; Erdoğan, 2007; İzci, Özden & Tekin 2008; Özdemir, 2006).

When the results of the questionnaires for the solution suggestions of teachers are examined, it is observed that attaching more importance to the opinions of teachers during the program development process, revising the curricula of the faculties of education for changes in the programs, preparing flexible programs that can change according to the needs of students, developing technological infrastructure of schools and classrooms, preparing a guidebook for teachers, increasing the knowledge levels of parents in relation to the curriculum and providing in-service training on

experiment/project designing are among the most frequently selected suggestions of teachers. Considering the results of the interviews, most of the suggestions were to increase the number and quality of in-service trainings, opportunities for laboratories and equipment and the quality of textbooks. There are similar suggestions in the studies conducted on the program (Akıncı, Uzun & Kışoğlu, 2015; Çıray, Küçükyılmaz & Güven, 2015; Demirtaş, 2012; Duban, 2016; Evirgen, 2013). In their study; Yıldırım, Güngör and Akgün (2015) suggested to provide guidebooks and workbooks for inquiry-based learning approach, to improve classroom environments and laboratories, to provide necessary education according to students' different readiness levels and to provide in-service trainings on the use of laboratories.

It is possible to provide some suggestions to researchers and implementers in accordance with the opinions of teachers in relation to the problems they experience and solution suggestions during the implementation process of the science curriculum. Firstly, this study includes only the opinions of the teachers in Manisa province. A similar study can be conducted by taking the opinions of teachers working in different regions. Since the study includes only the opinions of teachers on the program, the opinions of other stakeholders (headmaster, student, parent, etc.) can also be taken. Moreover, implementation activities can be observed on-site by conducting qualitative studies to determine the problems experienced. Lastly, necessary arrangements and revisions can be performed by reviewing the contents of the program and in-service trainings in accordance with the results obtained.

References

1. Akamca G, Hamurcu H, Günay Y, 2006. Yeni ilköğretim fen ve teknoloji programına yönelik öğretmen görüşleri. Ulusal Sınıf Öğretmenliği Kongresi, 14-16 Nisan, Ankara (Bildiri Özetleri Kitabı)
2. Akıncı B, Uzun N, Kışoğlu M, 2015. Fen bilimleri öğretmenlerinin meslekte karşılaştıkları problemler ve fen öğretiminde yaşadıkları zorluklar. International Journal of Human Sciences 12(1): 1189-1215
3. Argun F, 2002. İlköğretim Program Hedeflerinin Gerçekleştirilmesinde, Program ve Materyal İlişkisi Üzerine Öğretmen Görüşlerinin Değerlendirilmesi. Yüksek Lisans Tezi, Celal Bayar Üniversitesi
4. Aydın Ö, 2007. Fen ve Teknoloji Dersi Öğretim Programına İlişkin Öğretmen Görüşleri (Kütahya İl Örneği). Yüksek Lisans Tezi, Eskişehir Osmangazi Üniversitesi

5. Aydın S, Çakıroğlu J, 2010. Teachers' views related to the new science and technology curriculum: Ankara case. Elementary Education Online 9(1): 301-315
6. Bağdatlı A, 2005. Değişen İlköğretim Programlarındaki 4. Sınıf Fen ve Teknoloji Dersinin Taslak Öğretim Programının, Öğrenci Başarısına Etkisi ve Sınıf Öğretmenlerinin Programa İlişkin Görüşlerinin Değerlendirilmesi. Yüksek Lisans Tezi, Mustafa Kemal Üniversitesi
7. Boyacı K, 2010. 2005 İlköğretim 6. 7. ve 8. Sınıf Fen ve Teknoloji Öğretim Programı, Programın Uygulanmasında Yaşanan Sorunlar ve Çözüm Önerilerine İlişkin Öğretmen Görüşleri. Yüksek Lisans, Çukurova Üniversitesi
8. Buluş Kırıkkaya E, 2009. İlköğretim okullarındaki fen öğretmenlerinin fen ve teknoloji programına ilişkin görüşleri. Türk Fen Eğitimi Dergisi 6(1): 133-148
9. Büyüköztürk Ş, Çakmak E, Akgün Ö, Karadeniz Ş, Demirel F, 2014. Bilimsel Araştırma Yöntemleri (10. Basım). Ankara: Pegem Akademi
10. Çepni S, 2009. Araştırma ve Proje Çalışmalarına Giriş (4. Baskı). Trabzon
11. Çıray F, Küçükyılmaz E A, Güven M, 2015. Ortaokullar için güncellenen fen bilimleri dersi öğretim programına yönelik öğretmen görüşleri. Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi 25, 31-56
12. Dağdeler İ, Arseven A, 2015. İlkokul öğretim programlarının uygulanmasında okul yöneticilerinin görev ve sorumluluklarına ilişkin okul yöneticilerinin ve öğretmenlerin görüşleri. Spring I 33 p: 185-205
13. Demirtaş Z, 2012. İlköğretim Fen ve Teknoloji Dersi Öğretim Programının Uygulanma Sürecinin Değerlendirilmesi. Doktora Tezi, Abant İzzet Baysal Üniversitesi
14. Duban N, 2016. Sınıf öğretmenlerinin ilkokul fen bilimleri dersi öğretim programına ilişkin görüşleri. Turkish Studies-International Periodical for The Languages, Literature and History of Turkish or Turkic 11(3): 981-994
15. Erdoğan M, 2007. Yeni geliştirilen 4. ve 5. sınıf fen ve teknoloji dersi öğretim programının analizi: nitel bir çalışma. Türk Eğitim Bilimleri Dergisi 5(2): 221-254.
16. Eskicumalı A, Demirtaş Z, Gür Erdoğan D, Arslan S, 2014. Fen ve teknoloji dersi öğretim programları ile yenilenen fen bilimleri dersi öğretim programlarının karşılaştırılması. International Journal of Human Sciences 11(1): 1077-1094
17. Evirgen E, 2013. İlköğretim Yedinci Sınıf Fen ve Teknoloji Dersi Öğretim Programının Değerlendirilmesi. Yüksek Lisans Tezi, Ege Üniversitesi
18. Fowler F J, 1993.Survey Research Methods (2. Baskı). Sage Publications, London, UK
19. Fraenkel J R, Wallen N E, 1996. How to Design and Evaluate Research (3th Edition). New York: Mc Graww-Hill

20. İşman A, Eskicumalı A, 2003. Öğretimde Planlama ve Değerlendirme (4. Baskı). Değişim Yayınları, Ankara.
21. İzci E, Özden M, Tekin A, 2008. Evaluation of new primary science and technology curriculum: Sample of Adıyaman. Türk Fen Eğitimi Dergisi 5(2): 70-81
22. Kara S, 2008. İlköğretim 6. Sınıf Fen ve Teknoloji Dersi Öğretimi Yapan Öğretmenlerin Yeni 2005 Yılı Fen ve Teknoloji Programının Uygulanması ile İlgili Görüş ve Değerlendirmeleri (Afyonkarahisar İl Örneği). Yüksek Lisans Tezi, Afyon Kocatepe Üniversitesi
23. Millar R, Osborne J, 1998. Beyond 2000: Science Education for the Future. Nuf.eld Foundation, London
24. MoNE, 2013. İlköğretim Fen Bilimleri Dersi (3, 4, 5, 6, 7 ve 8. Sınıflar) Öğretim Programı. Ankara: Talim ve Terbiye Kurulu Başkanlığı
25. Özdemir N, 2006. İlköğretim II. Kademedeki Fen Bilgisi Öğretiminde Yaşanan Sorunlar ve Çözüm Önerileri. Yüksek Lisans Tezi, Pamukkale Üniversitesi
26. Özdemir A M, 2007. İlköğretim Okulları 4. ve 5. Sınıflarda 2005 Fen ve Teknoloji Dersi Öğretim Programının Uygulanmasında Karşılaşılan Güçlüklerin Öğretmen Görüşlerine Göre Değerlendirilmesi (Afyonkarahisar İli Örneği). Yüksek Lisans Tezi, Afyon Kocatepe Üniversitesi
27. Solomon J, 1993. Teaching Science, Technology and Society. Open University Press, Buckingham
28. Şeker S, 2007. Yeni İlköğretim Altıncı Sınıf Fen ve Teknoloji Öğretim Programının Öğretmen Görüşleri Işığında Değerlendirilmesi; (Gümüşhane İli Örneği). Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi
29. Tekbıyık A, Akdeniz A R, 2008. İlköğretim fen ve teknoloji dersi öğretim programını kabullenmeye ve uygulamaya yönelik öğretmen görüşleri. Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi 2(2): 23-37.
30. Topsakal S, 1999. Fen Öğretimi. Alfa Yayınları, Bursa
31. Toraman S, Alcı B, 2013. Fen ve teknoloji öğretmenlerinin yenilenen fen bilimleri dersi öğretim programına ilişkin görüşleri. EKEV Akademi Dergisi 17(56): 11-22
32. Tsai C C, 2003. Taiwanese science students' and teachers' perceptions of the laboratory learning environments: exploring epistemological gaps. International Journal of Science Education 25 (7): 847-860
33. Tüysüz C, Aydın H, 2009. İlköğretim fen ve teknoloji dersi öğretmenlerinin yeni fen ve teknoloji programına yönelik görüşleri. Gazi Eğitim Fakültesi Dergisi 29(1): 37-54

34. Unayağyol S, 2009. Öğretmenlerin Fen ve Teknoloji Programının Uygulanması Sürecinde Karşılaştığı Sorunlar ve Çözüm Önerileri. Yüksek Lisans Tezi, Dokuz Eylül Üniversitesi
35. Ünişen A, Kaya E, 2015. Fen bilimleri dersinin ilkokul üçüncü sınıf programına alınmasıyla ilgili öğretmen görüşlerinin değerlendirilmesi. Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 8(20): 546-571
36. Varış F, 1998. Temel Kavramlar ve Program Geliştirmeye Sistematik Yaklaşım. (Ed.: Ayhan Hakan), Eğitim Bilimlerinde Yenilikler, Eskişehir: Anadolu Üniversitesi Açık Öğretim Fakültesi Yayınları, pp s3-15
37. Yangın S, 2007. 2004 Öğretim Programı Çerçevesinde İlköğretim Fen ve Teknoloji Dersinin Öğretimine İlişkin Öğretmen ve Öğrenci Görüşleri. Doktora Tezi, Gazi Üniversitesi
38. Yıldırım H İ, Şensoy Ö, Karatepe A, Yalçın N, 2006. Fen bilgisi öğretimi amaçlarının gerçekleştirilmesinde yeni programın öğretme-öğrenme süreçleri boyutunda uygunluğu konusunda öğretmen görüşleri. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi 20: 33-41
39. Yıldırım N, Güngör Akgün Ö, 2015. İlkokul 3. sınıf öğretmenlerinin yenilenen fen bilimleri dersine ilişkin görüşleri. Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi 16(2): 199-218.
40. Yıldırım A, Şimşek H, 2005. Sosyal Bilimlerde Nitel Araştırma Yöntemleri. (8. Basım). Ankara: Seçkin Kitabevi