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Full Length Research Paper

Investigation of the values found in primary education science and technology textbooks in Turkey

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In this study, the value types of 6, 7 and 8 class text books which take place in the primary education science and technology education program, have been targeted for investigation for the present rate of these values in different textbooks, and, whether they changed in accordance with class variables (class, subject content, and divisions of the unit). For this purpose, science and technology activities in textbooks, texts, and different values for each grade level were analyzed "Values Form in the Textbooks (DKDF)" and the data obtained were analyzed using the SPSS program 17.00 quantitatively. At the end of the study, it has been found that mostly the theoretical values had been used in the science and technology textbooks and the value types had shown variations according to the class, subject content and the unit sections.

Key words: Values, elementary science education, textbook.

INTRODUCTION

It is quite important for the societies aiming to become the world leader from the point of view of economy and social rating to educate and increase the number of the science literate individuals with critical and creative thinking, use what they have learned to solve the problems faced, to use science-related decision-making in the face of a problem, participating in a discussion of scientific ideas, clearly voice, read and interpret scientific research, can understand the impact of science, technology and society on one another, and equipped with a number of contemporary values that are needed for the environment, and the time in which they exist (Çepni et al., 2003).

The main purpose of science education is to educate individuals with scientific literacy (Manocchi-Verrino, 2013; Nam et al., 2011; Bennett, 2011; Özdemir, 2010; Sülün et al., 2008). For an individual to be literate in science, one has to be open-minded with some values like, collaborative working, objective, critical and creative thinking (Çepni et al., 2003). Gains of knowledge, understanding and skills are not enough for our students to keep pace with science and technology literacy. For the realization of the vision of Science and Technology Lesson Education, students should be developed in specific scientific attitudes and values (Ministry of Education (MEB), 2006).

A classification of five categories was used in the regulation of science and technology 6, 7 and 8 class teaching program, for the scientific attitudes and values to be inflicted on the students. This classification consists of easy to difficult stages, namely the students perception of their own accord what is going on around them, to react appropriate to the situation positively, finally, organize, develop positive attitudes and values in self that are composed of a lifestyle to develop with positive attitudes and values (Ministry of Education (MEB), 2006).

The concept of value, to be followed in the community by creating social cohesion refers to the common patterns of behavior (Yaman et al., 2009). Values create criteria for social experiences. Values play an important role for preference of one behavior to another (Sarı,

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2005). UNESCO (United Nations Educational, Scientific and Cultural Organization) values are defined as follows: Values guide our decisions as to what is good, true and right. Thus, they depend as much on our feelings as on our thoughts. Values clarification is a technique for encouraging students to relate their thoughts and their feelings and thus enrich their awareness of their own values (http://www.unesco.org). Powney et al. (1995) drew a framework belonging to concept of the value consisting of three major parts: (1) Values include, but go beyond, the religious and moral areas of belief; (2) Values refer also to other aspects of how our lives are sustained, organised and experienced values may engage our cognition, emotions and behaviour; (3) Values may be expressed at two different levels: fundamental and contextual.

Values to be attributed to individuals in Turkey as it is in science and technology curriculum, subjects may be placed into the training and could be worked in the name of education of values. In the 1970's there was a renewed concern for 'moral education' which later became 'values education' (Snook, 2005). Values Education is known internationally by a number of names, including Moral Education, Character Education and Ethics Education. Each variant has a slightly different meaning, pointing to one or other distinctive emphasis. Overriding these differences, however, is a common theme born of a growing belief that entering into the world of personal and societal values is a legitimate and increasingly important role for teachers and schools to play (Lovat and Toomey, 2007).

Scientific knowledge is required in order to understand the interactions between science, technology, society and the environment, but this alone is not enough. For understanding these interactions,as well as the values specific to science, the specific values attributed to the society and the environment must be taken into account (MEB, 2006). Due to the centrality of science and technology in society, it is now quite appropriate to couple education in the sciences with developing the skills of citizenship (Bybee, 1982).

There are many science concepts and values that can be directly taught from the lives of scientists. This can be presented to project the scientists as normal human beings who succeeded because of their qualities and values which they have developed through their hard work, persistence, devotion and genuine commitment. Scientific and technological advances have created impacts resulting in the acceleration of the process of social change which, in turn, affects economic, cultural, political and religious sub-systems (APEID and UNESCO, 1993). Kwaku (2006) defined the values in science as the following: experiments and ethics, science and truth, science and probability, usefulness and relevance, humane outcomes, cloning and human reproduction, is science value free?, science and material poverty, science and religion, science and spirituality, protection of life, simplification, popper's falsifiability criterion, prediction, conjecturing, creativity.

Many science teachers shy away from addressing values, imagining that they are outside the domain of science or, worse, betray the very core of science. A deeper understanding of science, values, and objectivity, however, supports a mandate for discussing values in the science classroom. This need may not seem risky or difficult (Allchin, 1999).

Vision of science and technology education curriculum in Turkey have seven sub-dimensions of scientific literacy two of which are on "constituting the core values of science" and "the attitudes and values relating to science,". Accordingly, among the general objectives of the curriculum of the course of science and technology for students in, "science and technology-related social, economic and ethical values, to realize their personal health and environmental problems, make informed decisions and give them carrying responsibility " and "being willing to knowing and understanding, inquiry, logic, making it worth to have scientific values of the consequences of actions, such as thinking, acting in accordance with social and environmental relationships to ensure that these values are complied" are included. At the same time, it is stated that as the program progresses, students will be aware of a variety of issues related to science and technology values, perspectives and decisions and act in a responsible manner (MEB, 2006).

One of the most important tools used in teaching is textbooks. Textbooks are shaped by education programs. Integration of issues and values is proposed by Turkey's primary education science and technology curriculum for each grade level units. In this context, the values taking place in program are included in the textbooks of science and technology. The aim of study from this point is to examine the changeability of different types of values, and these values are present in science and technology textbooks as class subject contents and parts of the unit. To reveal the overall appearance of the results of a research found in science textbooks, science and technology is important in terms of transferring values to and thus the text found in the textbooks, and is thought to be important in terms of the points to be considered in the selection of activities.

Starting from the aim of the study, the sub problems were determined as follows:

1. What is the maximum value type given in the science and technology text books of primary education?
2. Do the values which exist in the primary school textbooks of science and technology vary according to grade level?
3. Do the values which exist in the primary school textbooks of science and technology vary according to the subject contents?
4. Do the values which exist in the primary school textbooks of science and technology vary according to unit divisions?

Table 1. Reliability information of the form.

Form and sub dimensions	The internal consistency coefficient
General Form	0.768
Social values	0.758
Theoretical values	0.872
Religious values	0.767
Economic values	0.714
Aesthetical values	0.761
Political values	0.791

Table 2. The evaluation of the form.

Availabity of the values	Point received
Available	2
Some	1
Not available	0

METHODOLOGY

Model of the study

This study is in survey model in which the values found in the science and technology textbooks are examined for any difference according to grade level, subject, and sections of the unit. According to Creswell (2008) survey research designs are procedures in quantitative research in which investigators administer a survey to a sample or to an entire population of people to describe the attitudes, opinions, behaviors, or characteristics of the population. In this procedure, survey researchers collect quantitative, numbered data using questionnaires (e.g., mailed questionnaires) or interviews (e.g., one-on-one interviews) and statistically analyze the data to describe trends about responses to questions and to test research questions or hypotheses.

Universe of the study

The science and technology lesson is given in 6^{th}, 7^{th} and 8^{th} classes of secondary stage of primary education. These textbooks taught in classrooms are distributed to students by the state and are uni type in all schools. In this case, one book for each grade level making a total of three books, so the work for which was carried out over the universe.

Data collection tool

The data of the study was collected by "Values in Textbooks Form (DKDF)" developed by Yaman et al. (2009). There are a total of 62 trio Likert-type items of this scale. During the development of the scale, the authors have followed the below steps (Yaman et al., 2009):

(i) At first, an item pool was created by examining the relevant literature.
(ii) Then, the validity of the form of the draft articles were examined by three faculty members who are experts in the field then by the moving on the evaluation, the form was finalized from the content and their criticisms and suggestions.
(iii) Cronbach alpha reliability coefficient was determined for the form. Reliability information of the form and the sizes of the sub form are in Table 1.

In this study, Cronbach's alpha internal consistency coefficient of the form's overall is 0.818, social values 0.741, the theoretical values 0.792, religious values 0.754, economic values 0.688, Aesthetic values 0.768, political values were found to be 0.812.

Evaluation of data

In this study, articles of the form were filled by five specialists for each book and the articles on which at least three of five experts agreed, articles of DKDF were marked as existing, a little and none. At this stage, the evaluation are as shown in Table 2.

According to Table 2, if there are materials of DKDF in textbooks received 2 Points, have been mentioned a little, received 1 point, and if not available, received 0 point. In this way, the total scores obtained as a result of the evaluation were analyzed using SPSS software. One-Way ANOVA test was used in this context.

FINDINGS

This section is grouped under four headings according to the sub-problems in the research.

Availability of the value types in text books

"Which is the maximum value type given in the textbooks of primary science and technology?" The findings of the evaluation on this sub problem are given in the Table 3. To find the answer to the sub problem as a result of where N is the value of the unit which's determined by taking into account is the smallest unit sections (Section Access, Information Text, Function (experimental / model), Question/ poster / research / do you know these ?, Project, Reading Text and Evaluation).

As can be seen from Table 3, the theoretical values take place in science and technology textbooks with the highest average (X = 8.83). Following the theoretical values, social values (X = 1.34), then, aesthetic values (X = 1.28), political values (X = 0.35), the economic values (X = 0.29), and finally the religious values (X = 0.11) to come. According to the science and technology departments in units that make up the textbooks are said to direct the students mostly to gain the theoretical values.

Comparison of DKDF scores by grade level

"Are the values which exist in the primary school textbooks of science and technology varying according to grade level?" to find the answer to the sub problem as a result of the evaluation, the findings are given in the Table 4. This comparison was made between three categories of classes that are included since Turkish primary education conceives 6^{th}, 7^{th} and 8^{th} classes.

Table 3. compare the mean scores of unit sections in textbooks and value types DKDF

	N	Min.-max. scores	Min.-max. scores in findings	Mean	Std. Deviation
General form	161	0-124	0-35	12.20	6.44
Social values	161	0-60	0-20	1.34	2.28
Theoretical values	161	0-22	0-18	8.83	4.06
Religious values	161	0-10	0-3	0.11	0.43
Economic values	161	0-8	0-4	0.29	0.73
Aesthetical values	161	0-10	0-5	1.28	1.22
Political values	161	0-14	0-3	0.35	0.66

Table 4. Comparison of the DKDF mean scores by grade level

	6^{th} class (N=56) X±SS	7^{th} class (N=49) X±SS	8^{th} class (N=56) X±SS	F	p	Scheffe
General form	12.25±6.95	13.04±7.30	11.43±4.94	0.82	0.44	
Social values	1.32±2.87	1.76±3.77	1.00±1.48	0.94	0.39	
Theoretical values	9.09±4.10	8.94±4.29	8.48±3.84	0.35	0.72	
Religious values	0.14±0.35	0.20±0.68	0.00±0.00	3.11	0.06	
Economic values	0.18±0.76	0.39±0.49	0.32±0.86	1.14	0.32	
Aesthetical values	1.36±1.26	1.47±1.37	1.04±1.01	1.84	0.16	
Political values	0.16±0.49	0.29±0.61	0.59±0.78	6.57	0.00	6-8

According to the grade level, values in textbooks which were found showing no significant difference between the mean total score received from DKDF (Table 4). In terms of value types, according to the class level, significant differences were observed in the political values, ($p<0.05$). After Scheffe test was conducted by the level of class, as a result, this difference has been determined between the classes of 6^{th} and 8^{th}. Considering the mean scores, 8^{th} grade science and technology textbook may be said to include more political value than 6^{th} Class science and technology textbook. Other types of value have not been determined to show significant difference by grade level.

Comparison of the DKDF scores by subject content

"Are the values present in primary education school science and technology textbooks varying in according to subject content?" to find the answer to this sub problem as a result of of the evaluation the findings are given in the Table 5. The issue here is the content of the learning areas of the Ministry of Education have been considered and each unit was studied in four groups according to the included subjects of biology, physics, chemistry, and including the world-universe.

After examining the Table 5, no significant difference in relating to learning areas was found between the mean total scores of the values in textbooks received from the DKDF. In terms of value types, only significant difference was observed on the content of subject based social values, ($p <0.05$). The Scheffe test was identified as a result of this difference found between biology-physics and biology-chemistry, and and has been found to be in favor of the biology learning area. Moving on from this finding, it can be mentioned that the social values have been processed more than on biology in existing primary education science and technology books.

Comparison of the DKDF scores for the parts of the unit

"Are the values existing in primary education science and technology textbooks varying according to the sections of the unit ?" As a result of the evaluation to find the answer to the this sub problem, the findings are given in the Table 6. Here, as parts of unit 1) Section entry text questions, 2) Information Text, 3) Events (experimental model), 4) Question, poster, research, do you know these?, 5) Project, 6) Reading text, and 7) Review sections are taken into consideration.

Upon analyzing the table 4 as regards the unit sections, a significant difference found between the mean total score values in textbooks received from DKDF ($p<0.05$). However, the value types like the social values, the theoretical values, economic values and aesthetic values have been identified showing significant differences according to sections of the units ($p<0.05$). The differences were identified as a result of Scheffe test between the groups which can be seen in Table 6. According to the information, values held by text, were found to have a

Table 5. Comparison of the average scores of DKDF according to subject content

	Biology (N=42) X±SS	Physics (N=63) X±SS	Chemistry (N=35) X±SS	Universe (N=21) X±SS	F	p	
General form	13.55±8.38	11.33±4.99	12.49±6.04	11.67±6.44	1.07	0.36	
Social values	2.88±4.51	0.67±1.44	0.91±1.50	1.00±2.12	6.34	0.00	Bio
Theoretical values	8.52±4.21	8.75±3.78	9.20±4.46	9.09±4.11	0.21	0.89	
Religious values	0.19±0.67	0.10±0.35	0.09±0.28	0.05±0.22	0.68	0.56	
Economic values	0.21±0.68	0.27±0.48	0.43±1.01	0.29±0.90	0.58	0.63	
Aesthetical values	1.33±1.37	1.21±1.18	1.49±1.09	1.05±1.24	0.68	0.56	
Political values	0.40±0.73	0.35±0.68	0.37±0.69	0.19±0.40	0.51	0.68	

Table 6. Comparison of the DKDF mean score values according to the unit sections (N = 23 for all groups)

	1) Section Entry Text (X±SS)	2) Information Text (X±SS)	3) Events (experimental/model) (X±SS)	4) Question/ poster/research (X±SS)	5) Project (X±SS)	6) Reading text (X±SS)	7) Evaluation (X±SS)	F
General form	11.04±5.68	21.04±5.91	16.65±3.78	10.91±3.72	6.26±4.72	8.48±4.68	11.04±1.79	28.46
Social values	0.83±2.53	3.87±5.59	1.52±1.81	0.65±1.19	1.09±1.76	1.17±1.67	0.26±0.75	4.63
Theoretical values	7.56±1.65	13.52±2.33	13.04±2.44	7.83±2.82	4.09±2.43	5.87±3.41	9.91±1.41	48.22
Religious values	0.17±0.65	0.22±0.42	0.09±0.29	0.09±0.29	0.00±0.00	0.22±0.74	0.00±0.00	1.08
Economic values	0.13±0.34	1.04±1.49	0.17±0.39	0.04±0.21	0.22±0.42	0.13±0.46	0.30±0.47	5.96
Aesthetical values	1.83±1.49	1.87±1.25	1.56±1.12	1.78±1.28	0.48±0.79	0.91±0.85	0.52±0.59	7.45
Political values	0.52±0.89	0.52±0.73	0.26±0.54	0.52±0.73	0.39±0.72	0.17±0.49	0.04±0.21	2.01

higher average score than other parts of the unit.

DISCUSSION AND CONCLUSION

The results obtained by this study, in order to examine class of different types of values present in Science and technology textbooks and these values, for the changes attributable to class, subject matter, and the unit sections, are given in regard to sub problems as the followings.

When the general form scores which are obtained from the scale of values present in textbooks are considered, the highest score that can be from the DKDF is 124 scores while in this study, considering the general form of this study, 35 were found to be the highest total score.

This is almost one-fourth of the points that can be got as the tot very few textboo given place to the subdimensi place in most (2009) in their lesson, studied mostly, the soci desirede value

determined as the following: concern for family unity, hard work, respect for the flag and national anthem, patriotism, responsibility, honesty, integrity, respect, helpfulness and courage. In the same study, the values imparted to students at the school to avoid confusion with the value obtained in the family should be in accordance with the values specified (Yiğittir, 2010). In this sense, the result of the theoretical values took more place in the textbooks of science and technology, do not coincide with stated desire of families for more social values. However, the presence of social values in the content of social studies and Turkish (Yiğittir, 2010; Yaman et al., 2009), are considered, pro-cessing more theoretical values in the science and technology textbook is giving the thought to be useful for filling the gap related to this value type.

Values present in the textbooks by grade level were evaluated to determine to differ from each other as a result of the evaluation no difference between the total scores obtained from the DKDF was detected, whereas, in the political values of the value types were found to show a significant difference in favor of the level of class 8. This case can be interpreted by the formation of the political views of students as they get older, in parallel to this formation, these values came forward.

Any significant difference wasn't found in the general form scores obtained from DKDF according to the evaluation made by the subject contents. However, the social values varied according to the subject content and the biology content units reflected social values more than other units. This case stems from involves issues of the environment and human are thought to arise from the scope of biology. Indeed, in Laçin (2011)'s review of Science and Technology textbooks on environmental issues, ethical and aesthetic values,environmental ethics and aesthetics were neglected. On environmental ethics, responsibility and participation elements were emphasized, but respect, value and elements of compensation were neglected.

Regarding the parts, forming a unit in each section entry, 'text information, event (experimental model), question, poster, research, did you know?, project, reading text and evaluation parts' changes in the values, which were evaluated in order to determine the form of the evaluation. In the social theoretical aspect, there were significant differences in economic and aesthetic values. Accordingly, detected significant differences were found to be in favor of the text information in the overall total and subscales of DKDF.

In this study, the values in textbooks have been found insufficient and it was concluded that mostly theoretical values took their place. In education, with the establishment of the link between the expectations of society and the individual rights of students, it is extremely important to train individuals who are careful and independent in critical thinking; as well as the provision of national unity around some of the common values. In this regard, to ensure the national unity of education, standards are needed to meet the expectations and cover the values of society (Çepni et al., 2003). Thus in line with it, it is recommended to place more values on primary education of science and technology and to process different types of value in each subject in the books.

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