Kesit Akademi Dergisi
The Journal of Kesit Academy

ISSN/ИССН: 2149 - 9225
Yıl/Year/Год: 6, **Sayı/Number/ Номер:** 23, **Haziran/June/ИЮНЬ 2020, s./pp.** 1-20

Geliş/Submitted/ Отправлено: 01.05.2020
Kabul/Accepted/ Принимать: 07.06.2020
Yayın/Published/ Опубликованный: 25.06.2020

DOI: 10.29228/kesit.43292
Araştırma Makalesi
Research Article
Научная Статья

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WHAT DO STUDENTS THINK ABOUT BIOETHICS ISSUES AND BIOETHICS EDUCATION IN TURKEY?*

Abstract

Aim of this study is to identify and develop bioethical awareness of middle school 7th grade students. The sample is 23 (10 girls and 13 boys) 7th grade students studying in Istanbul, Turkey. In this study, phenomenology was used among the models revealed within the scope of qualitative paradigm. Scenarios and semi-structured interviews on bioethics were used as data collection tools. The students have been involved in bioethical issues by scenarios for five weeks in the direction

* No conflicts of interest were reported for this article./Bu makale için herhangi bir çıkar çatışması bildirilmemiştir. Corresponding Author/Sorumlu Yazar: Gulbin OZKAN
Cite as/Atıf: Zengin Tepekuyu, H., Umdu Topsakal, U. ve Ozkan, G. (2020). What Do Students Think About Bioethics Issues And Bioethics Education in Turkey, *Kesit Akademi Dergisi* 6(23): 1-20. http://dx.doi.org/10.29228/kesit.43292

of a bioethics education model. At the end of the study, it was seen that students were positive for organ donation while they were negative for genetic studies like GMO products and reproduction technology. After bioethical education process, it was determined that bioethics awareness of students was developed. It is also seen that the ability of students to look at bioethics issues from different perspectives was developed.

Key Words: bioethics, bioethics education, bioethical awareness

ÖĞRENCİLER TÜRKİYE'DE BİYOETİK SORUNLARI VE BİYOETİK EĞİTİMİ HAKKINDA NE DÜŞÜNMEKTEDİRLER?

Öz

Bu çalışmanın amacı ortaokul 7. sınıf öğrencilerinin biyoetik farkındalıklarını tanımlamak ve geliştirmektir. Örneklem İstanbul, Türkiye'de okuyan 23 (10 kız ve 13 erkek) 7. sınıf öğrencisinden oluşmaktadır. Bu çalışmada nitel araştırma modellerinden fenomenoloji kullanılmıştır. Veri toplama aracı olarak biyoetik üzerine hazırlanan senaryolar ve yarı yapılandırılmış görüşmeler kullanılmıştır. Öğrenciler beş hafta boyunca biyoetik eğitimi kapsamında hazırlanan senaryolarla uygulanan eğitime katılmışlardır. Çalışma sonunda öğrencilerin organ bağışı için olumlu, GDO ürünleri ve üreme teknolojisi gibi genetik çalışmalar için olumsuz düşüncelere sahip oldukları görülmüştür. Biyoetik eğitim sürecinden sonra öğrencilerin biyoetik bilincinin geliştirildiği belirlenmiştir. Ayrıca öğrencilerin biyoetik konularına farklı açılardan bakma becerilerinin geliştirildiği görülmüştür.

Anahtar Kelimeler: biyoetik, biyoetik eğitimi, biyoetik farkındalık

INTRODUCTION

There are arguments for (Reiss, 1999) and against teaching ethics (Donnelly, 2002; Hall, 1999) in science lessons. But, recent years there has been increasing recognition of the importance of socio-scientific aspects as bioethics within science education (Jones et al., 2010). Science education with these aspects allows students to participate real life as effective citizens (Jones et al., 2010). 'Such teaching is desired by many students and can help both to motivate them and to locate science and technology teaching in the real world' (as cited in Reiss, 2010; 16). The aims of bioethics teaching might heighten the ethical sensitivity, might increase the ethical knowledge, might improve the ethical judgement and might make students better people (Davis, 1999; Reiss, 1999).

Taylor (2009) emphasizes the need to address bioethics issues in the science curriculum, and states that bioethics is an excellent tool for revealing the relevance of science content. Bioethics subject critical thinking skills in students with uncertainty in ethical and moral perspectives and support the development of problem-solving strategies. Students need to understand the difference between facts, ideas and values, and to improve their ability to make

sensible decisions while recognizing the role of personal commentaries. A bioethical discussion is not just about making students think about a problem; at the same time, discovering other aspects of perspective (Taylor, 2009).

There is an increasing recognition of cooperating the ethical issues arising from the development of biotechnology within school science education hence bioethics and science education have been investigated in various studies (Bryant & Baggott la Velle, 2003; Dawson & Taylor, 2000). In Turkey recently the number of studies about bioethics education have been increased (Yazıcı, 2009; Özkan & Umdu Topsakal, 2016; Yaman, 2011; Sürmeli, 2008; Ceylan & Umdu Topsakal, 2018) In a study of 8th grade students on bioethics education; the effects of bioethics discussions on academic achievement and attitude with the help of science fiction were examined; watch-and-discuss activities were found to be more effective than other activities in improving academic achievement, developing biotechnology and bioethics attitudes (Yazıcı, 2009). In the study conducted with the 9th grade students, the bioethical value inventory was developed and it was seen that the students had important contributions to the bioethics education process. It was ensured that students could recognize the ethical dilemma and understand different opinions (Keskin Samancı, 2009).

The processing of bioethical issues will give students different perspectives. It will also raise awareness of respect for the views of people. All these developments draw attention to bioethics education, which raises awareness. Bioethics education, which is considered in an effective process, improves the ability of individuals to judge and negotiate right and wrong by getting basic information about the subject and understanding the risks, advantages and disadvantages of this subject (Erol Işık, 2003).

In this study, it was aimed to determine and develop bioethics awareness of middle school 7th grade students in Turkey.

Bioethics

The concept of bioethics was first mentioned in the 1970s by the American medical scientist Van Rensselaer Potter in the book "Bioethics: Bridge to the Future" (Mepham, 2005). The word bioethics is formed by the combination of the words "bio" and "ethics", which means dictionary of live ethics. From this point of view, it is a field on the evaluation of the right or wrong behaviors and attitudes about living things. It is a branch of science related to fields such as bioethics, biotechnology, medicine and sociological issues. When studies on bioethics are examined, it is seen that four principles are adopted. These are benefit and harm, autonomy and individual responsibility, respect for the individual, and respect for the integrity of the individual, and equality, fairness and equity.

Bioethics is more concerned with developing the capacity to judge, negotiate, judge and envision on a subject rather than how they should behave in a subject. It is an ethical field that examines the consequences and problems of technological developments in the field of bioethics, biology and related science on the ethical and social plane. The concept of bioethics examines ethical issues related to all living things on earth (Yıldırım & Çobanoğlu, 2009). Frequently heard GMO foods, environmental pollution, stem cell therapy, cloning, and gene

therapy are issues that cause controversy affecting the society.

Bioethics Education

While innovations continue to be made every day technologically, it should be kept up. Since there is no such thing as stopping the work done on the grounds that it harms people, they should have gained the skill of how to solve the problem they face. It is of great importance for which factors the individual decides during his decision. Individuals who make decisions based on ethical decision making principles will have made a healthier decision. Therefore, there should be bioethics education in the education process. The main purpose of bioethics education is to give the student the ability to reasoning and be justified by adhering to ethical principles (Ersoy, 1996).

In an effective bioethics education, the student needs to actively participate in the learning process. While conducting ethical discussions, it should be handled in every aspect of the subject and students should be given different perspectives. Bioethics education is primarily about making students aware of the ethical problems associated with social sciences, and secondly, enabling students to develop their decision-making skills on ethical theories (Dawson, 1999). Peters et al. (1997) thinks that although individuals have different moral views, ethics can be taught at least to a certain extent as people grow. Students should be aware of ethics, bioethics and biotechnology concepts in science education starting from secondary school. These issues pose a problem for each individual and it is important to inform students about these issues since there is no specific solution.

Bioethics in Science Education

The individual has to be objective. But bioethical issues are controversial, complex and anxious. This can be complicated for teachers and students. However, in recent years, developments in technology in science education have been envisaged to be processed together. Social issues are also considered in science lessons and an approach known as Science-Technology-Society-Environment (STSE) has emerged. Ethical issues associated with biology are often grouped under the heading “bioethics” and “bioethics” can be addressed as part of the STSE approach (Ekici et al., 2005).

Regarding the need to address bioethics issues in the curriculum of the science course, Taylor (2009) states:

1. Bioethics is an excellent tool to reveal interest in science content and to determine relationships. It provides an interesting entry point for students by putting students in a discussion of personal values, rights and responsibilities related to traditional subjects in biology. Some examples are new breeding technologies, acid rain, and the use of limited natural resources.

2. Once students are excitedly concerned with a problem, they are more motivated to discover the facts to better understand the problem and find a logical solution. For these suitable facts, research can be done using the library, CD ROM, laser disc and internet resources.

3. Uncertainties in ethical and moral perspectives combat critical thinking abilities and support the development of problem solving strategies.

4. Science subjects are not devoid of personal and social values and are open to personal interpretations. Perceptions are under the influence of values. An example is; to identify and protect endangered species.

5. Science subjects are not devoid of personal and social values and are open to personal interpretations. Perceptions are under the influence of values. An example is; to identify and protect endangered species.

6. Bioethical decisions often have to set priorities or question values in combating values. Students need to understand the difference between facts, ideas and values, and develop the ability to make logical decisions while realizing the role of their personal interpretation. A bioethical discussion is not just about making students think about a problem; it also means they explore other points of view.

Different methods and techniques that can be used while teaching bioethics education in science class are included in the literature. One of them is to play a role. Complex issues with many different perspectives can be best presented with structured role playing. In thinking exercises, a problem is presented to the class while dealing with ethical issues; they are asked to think about it for a minute and then they raise their hands and vote required (Bryant & Baggott la Velle, 2003). Classroom discussion method is used as an effective method in bioethics education. Class discussion is one of the important stages in Smith's bioethics education process as well (Smith, 1992).

From an ethical point of view, science teachers should ensure that students develop the skills necessary for self-decision-making, evaluating and evaluating ethical issues related to innovations in science, thus making them knowledgeable choices like adults. The debate suitable for such a pedagogical issue is the subject of bioethics education (Dawson, 1999).

METHOD

Research Design

Qualitative research method was used in the study. In this study, phenomenology was used among the models revealed within the scope of qualitative paradigm. From a phenomenological point of view, the main goal in social science is to try to understand how different groups of people define social reality. Social science has a subjective quality beyond an objective reality created by the researcher (Şişman, 1998). Therefore, the model of phenomenology was deemed appropriate in the study.

Sample of Research

The research was carried out within the scope of the 7th grade 'Science' course and the study period was determined as 5 weeks. The sample of the study is 23 7th grade students. These students are 10 girls and 13 boys.

Data Collection Tools

In this research, scenarios related to bioethics and interviews were used as data collection tools. The data collection tools are described below.

1. Scenarios Related to Bioethics Issues

While using scenarios in bioethics teaching; students are given the opportunity to learn about the situation and discuss their results with their friends (Staddon, 2008).

Scenarios contain problem situations that include bioethics issues. Scenarios applied in the study were prepared by the researcher after the related field-field examination. Attention has been paid to ensure that the 7th grade students in the script are in compliance with the curriculum and the level of education. Scenario issues include GMOs, reproductive technologies, organ donation, mind-blowing drugs, media and ethics. Two scenarios are about plants, one is about animals and seven are about human. Totally ten scenarios were used in the study. Scenarios have been evaluated with their expert opinions and 6 science teachers.

2. Interview

The most important feature of the interview technique used in qualitative research is to reveal the points of view of interviewees. Therefore, it is necessary to recognize the meaning of the opinions, feelings and thoughts, to acquire more in-depth knowledge, not superficial to the quantitative negotiations (Yıldırım and Şimşek, 2006). In the negotiations, students' opinions about bioethics and bioethics education in parallel with the bioethical scenario have been tried to be determined in depth. In this study, semi-structured interview technique and data were collected. The interview questions used in the research were prepared by the researcher by scanning the related field literature and consisted of questions that were scoped by the expert opinion. Prior to the interviews, the questionnaire was restructured by piloting with 5 people selected from the sample. Interview questions consist of 7 questions. In parallel with the answers from the students and in order to obtain more in-depth information, additional questions paralleled these questions were directed to the students. Students were interviewed by appointment in advance. Because negotiations were far from distractions, school support was provided in the training room for 20 minutes. Negotiations were recorded using the voice recorder after obtaining permission from students and parents. The interviews were conducted at the beginning and end of the study (pre-post interview) with 4 randomly selected students from the sample.

Procedure

The two scenarios that were determined each week for the students were applied for five weeks. The implementation of the scenarios was based on the "Bioethics Education Process Model" developed by Smith (Smith, 1992).

In practice, the process steps based on this model are summarized below:

(1) Identifying and presenting dilemma

In the first phase of the bioethical training process model based on the researcher, explanations about class comparisons were made. A scenario for each dilemma is shown so that students can notice the dilemma and see the situation that is causing the ethical debate. After

the scenario was given to students, "What is the main problem in the dilemma? Who are the parties? What are the values to consider in the decision-making process?" were asked.

(2) Identification of preliminary information

In order to reveal the preliminary knowledge of the students, the students were asked about the topics covered in the scenario.

(3) Defining individual viewpoints

For this phase, which enabled students to recognize and express their own values and beliefs about the dilemma that was presented, 5 minutes were given to the students during the implementation process and they were given thought about the ethical dilemma.

(4) Small group discussion (comprehension)

Small groups were formed in the next stage. Students were provided with discussions on the scenarios for a certain period of time. In the small group discussion, students also saw different ideas and shared their views on ethical dilemma with their friends. This stage is important for them to be able to see ideas other than their ideas and to question their own ideas.

(5) Class discussion

At this stage, the students who were divided into small discussion groups came together again and the class discussion took place. All ideas were shared and questioned. With the large class discussion, students have listened to the ideas of their students and made their own decisions. The goal here is not to make a common decision.

(6) Terminating and summarizing the discussion

At this stage the subject has been summarized by the researcher in general terms. Values and ethical principles in decision making process are summarized and people, institutions and events are evaluated within the context of the scenario covered in the ethical dilemma.

In accordance with the model based on the application, the next stage is expansion and application. It is said that students who are dependent on this stage will be able to apply the information that they have obtained by deepening the subject at different stages.

Some students were interviewed in order to examine their opinions about bioethics more in depth.

Data Analysis

The data were analyzed and interpreted by content analysis method. The main purpose of content analysis is to bring together similar data within specific themes to reach correlations as readers understand. The following steps were followed when analyzing content. These steps; coding of data, finding of themes, arrangement of codes and themes, and interpretation of the findings (Yıldırım & Şimşek, 2011).

An explicit coding technique has been used to encode and quantify the obtained data. Codes and themes are given by taking samples from the expressions of the students. Since the answers of some students are included in more than one code, the total number of codes is

more than the number of samples.

The codes for the data collected in the research process were established by the researcher and a science teacher. Codes generated by two people were compared and found to be 82% coding.

FINDINGS

Findings from Scenario

Findings are given in separate tables for each scenario together with the scenarios. In some tables, the total frequency is high (n = 23) because some students mentioned more than one category.

Scenario 1. Apple with GMO is as follows:

"Scientists have been able to get more apples from an apple tree grown with the technology they have developed. The genetics of the apple seed have been modified so that more seeds have been obtained using less seed. Should apple production be continued in this way in such a situation? Why?"

The answers given to the above scenario are collected under three themes. The themes are positive (4), negative (18) and undecided (3). The majority of students (18) emphasized that they are negative towards genetically modified organisms. The obtained codes are given in Table 1.

Table 1. Codes related to "Apple with GMO" (Scenario 1)

Pre-application Themes	**Pre-application Codes**	**Frequency**	**Total Frequency**
Positive	Too much Food	2	4
	Profit	2	
Negative	Unhealthy	13	18
	Harmful for Society	2	
	Not Organic	2	
	Alergic	1	
Undecided	Undecided	3	3

Scenario 2. "A different Fruity Tree" is shown below:

"As technology advances in the coming years, there cuold be new design trees. For example, you get a lot of different fruits from a tree; Orange, mandarin and apple from the same tree. If you had such trees, how did you react? Explain your thoughts. '

The answers given to the above scenario are collected under three themes. The themes are positive (1), negative (27) and undecided (2). The majority of students (27) have emphasized that they are negative about getting more fruits from a single tree variety. The obtained codes are given in Table 2.

Theme	Code	Frequency	Total Frequency
Positive	Lucrative	1	1
Negative	Harmful / Unhealthy	23	27
	Allergy	2	
	Harmful to the Environment	1	
	The number of Trees Reduce	1	
Undecided	Undecided	4	4

Table 2. Codes related to "A different Fruity Tree" (Scenario 2)

Scenario 3. 'The Experimental Animals' are as follows:

Everyday something new is discovered thanks to the work done in the field of science. The availability of new treatments for helpless diseases is one of the most important of these studies. Scientists are experimenting with animals before humans to test these studies. What do you think of using animals to experiment like this? Why?'

The answers given to the above scenario are collected under three themes. These themes are positive (13), negative (10) and undecided (1). The majority of students (14) have emphasized that they are positive about using animals for experiments. The obtained codes are given in Table 3.

Table 3. Opinions about "Experimental Animals" (Scenario 3)

Theme	Code	Frequency	Total Frequency
Positive	Humanity is important for science	6	12
	It cannot be tried in human (dangerous)	2	
	Animals resemble human beings	2	
	Species with too much amount can be used for experiment	1	
	People should not be used for money	1	
Negative	Right to life	4	10
	Animals may be harmed	3	
	Animals may be affected by side effect	1	
	Animals are source of income	1	
	It is not suitable for religion	1	
Undecided	Undecided	1	1

Scenario 4. "Organ Donation" is as follows:

'If a mother with kidney failure finds a suitable kidney, she will get rid of this disease. The proper kidney was found in his own daughter. But her daughter is unstable in giving her kidney to her mother. How should this person decide? Why?'

The answers given to the above scenario are collected under three themes. The themes are positive (19), negative (2) and undecided (4). The majority of students (18) emphasized that they are positive about organ donation. The obtained codes are given in Table 4.

Table 4. Codes related to "Organ Donation" (Scenario 4)

Theme	**Code**	**Frequency**	**Total Frequency**
Positive	Parental Right	14	19
	Social Duty	3	
	Religiously appropriate	2	
Negative	The Health of the Recipient is Important	1	2
	S/he is already old.	1	
Undecided	Undecided	4	4

Scenario 5. "My Brother Will Born" is below:

"Mothers are given some tests during their pregnancy. As a result of the tests, no definitive information is given, and probable results are obtained. If the baby is likely to have a disability, the doctor will tell the family. Later, the parents will act according to the wishes. Parents decide whether or not they want the baby to be removed from the mother's womb before birth. Let's say you have a brother and s/he are likely to be disabled. How do you want your parents to decide in this case? Why?"

The answers given for the above scenario are collected under two themes. These themes are negative (35) and undecided (2). The majority of the students (35) emphasized that they are negative about being inflicted with a baby because of the possibility of birth. The obtained codes are given in Table 5.

Table 5. Codes related to "My Brother will born" (Scenario 5)

Theme	**Code**	**Frequency**	**Total Frequency**
Negative	Right to life	15	35
	Probability of error	13	
	Religious	7	
Undecided	Undecided	2	2

Scenario 6. 'Gender-Selected Baby' is listed below:

'Today, there are biotechnological developments that can determine the gender of the baby while being child-friendly. Do you want a sister with a pre-determined gender? Why?'

The answers given to the above scenario are collected under three themes. These themes

are positive (9), negative (13) and undecided (4). The majority of students (14) emphasized that the gender is negative for the pre-determined baby. The obtained codes are given in Table 6.

Table 6. Codes related to "Gender-Selected Baby" (Scenario 6)

Theme	Code	Frequency	Total Frequency
Positive	Chance of gender select	5	9
	Prevent abortion	2	
	Be conditional and legal	2	
Negative	The balance is distorted	8	13
	Be natural	3	
	It is not suitable for religion	2	
Undecided	Irrelevant	4	4

Scenario 7. "Baby Vaccinations" are listed below:

'When babies are born, they have many vaccines. Should not these vaccines be made for you? Why?'

The answers given for the above scenario are collected under two themes. These themes are positive (21), negative (6). The majority of students (21) emphasized that they are positive about infant vaccinations. The obtained codes are given in Table 7.

Table 7. Codes related to 'Baby Vaccinations' (Scenario 7)

Theme	Code	Frequency	Total Frequency
Positive	To keep away you from illness when you are getting older	14	21
	To gain immunity	4	
	Because of the state support	3	
Negative	Probability of error	3	6
	Likelihood of sickness	2	
	Likelihood of harm	1	

Scenario 8. "Mind-Releasing Drug" are listed below:

"There are mind-opening drugs. Should a student use these medicines to be successful? Why?"

The answers given to the above scenario are collected under three themes. These themes are positive (5), negative (24) and undecided (1). The majority of students (24) emphasized that they are negative about mind-opening drugs. The obtained codes are given in Table 8.

Table 8. Codes related to 'Mind-Releasing Drugs' (Scenario 8)

Theme	Code	Frequency	Total Frequency
Positive	Must be used by doctor	2	5
	Prevent headache, stress, fatique	2	
	If it was harmful, why would it produce?	1	
Negative	Unhealthy / Harmful	12	24
	Personal right (religious)	6	
	Addictiveness	4	
	Copy	2	
Undecided	Undecided	1	1

Scenario 9. 'Health Care Programs on TV' is below:

'There are many health related programs on the TV. People seeking cure for their illness will immediately allow them to hear it in programs coming out in the media. There are also many who believe in this value source without researching it. What do you think about believes of people who are looking for remedies in the media and commercials? '

The answers given for the above scenario are collected under two themes. These themes are positive (1), negative (24). The majority of students (24) have negatively liked and emphasized the news provided by health programs on TV. The coding obtained is given in Table 9.

Table 9. Codes related to 'Health-care Programs on TV' (Scenario 9)

Theme	Code	Frequency	Total Frequency
Positive	Experience / used	1	1
Negative	Drug-use according to doctor recommendation	10	24
	Insecure / fake	7	
	Harmful	3	
	Drug-use may change according to person	3	
	Side effect	1	

Scenario 10. 'Is it Doctor or Herbalist? ' is as below:

A patient who uses drugs given by her doctor watches an herbalist who advices herbal remedies on the television program. Should he continue to use his doctor's medication, or should he use herbal remedies advised by the herbalist? Why?'

The answers given to the above scenario are 21 doctors and 6 herbalists. The coding obtained is given in Table 10.

Table 10. Opinions related to Scenario 10

Answer	Code	Frequency	Total

			Frequency
Doctor	Better	4	21
	Drugs vary according to each patient	5	
	Herbalist is harmful	5	
	Allergy to herbal drug/ side effect	7	
Herbalist	Herbalist can be preferred when problem is little.	4	6
	Herbalist must be used in control of doctor	2	

Findings from Interviews

In pre-interviews, students stated that they did not hear the concept of bioethics and could not explain it. In post-interviews, students described bioethics in the form of moral events related to living things. It is also seen that they tried to explain the bioethics with examples through the subjects in the scenario. They tried to define the bioethics through examples such as deciding not to care for a child because of the possibility of a child being born with a disability, experimenting with animals, kidney donation. The examples given below are the answers given for the definition of bioethics in post interviews:

– "Bio means live, ethics means morality; bioethics is morality about living things. For example, a woman with a disabled child ninety percent will decide whether to ignore it or not." (Student 6)

– "Something likes morality about living things. A concept related to biology. It contains moral issues. It includes verifying one's own ideas." (Student 19)

– "Moral things about the health of the living." (Student 15)

– "For example, if we go out of health, a mother should not take care of her child, or the child with a disability should not be taken. Or there may be no hormones in the plants." (Student 3)

In pre-interviews, students could not give any example about bioethics. In post-interviews, it was seen that using medicines rather than herbal mixtures, plants hormones or organ donation are some given examples for bioethics issues. As an example of bioethical issues, it was determined that all the students who participated in interviews gave examples of scenarios used in the study. The students were not able to give a different example from the scenarios dealing with bioethics. Here are some sample answers:

– "One person gives her kidney to someone else. The person who has organ transplanted thinks if her body would be accepting the new organ. The other wonders that she will live well." (Student 19)

– "The mother should be reminded that the child in the womb will be disabled. I think the baby should not be terminated. Because he has right to live." (Student 15)

– "For example, a baby with a disability should not be terminated. Or there may be no hormones in the plants." (Student 3)

In the pre-interviews students were asked to answer what they do when there is a disagreement between two of their friends. Two students said that they would try to bring them in a place and force them to talk each other. The other students did not know how to act and said that they would not try to do anything to solve this situation. In the last round of talks, it was seen that the answer of these students who are undecided is positive in the direction of trying to make peace.

In post-interviews, students have pointed out that discussion of bioethics in the science lessons have given different perspectives, have provided them with a more sensitive approach to the events in their environment, and have not been able to be selfish. Moreover, students emphasized that when discussing these issues, they tried to think about events from different sides. The sample answers are below.

– "I learned things about biology that I was interested in" (Student 6)

– "Yes, it helped me. This made me realize something." (Student 19)

– "I learned not to think myself. I decided that I should not be selfish." (Student 15)

– "I know better how to behave when things happen. These lessons helped me to recognize some things." (Student 3)

Students who did not have an idea about bioethics at the pre-interviews could not comment on whether bioethics issues should be addressed in the science class. Most of the students who participated in post-interviews (3) think that it would be better to process the bioethical subjects in science classes. They state that these discussions will be necessary to change people's viewpoints, that people will improve their morality and that healthier generations will be able to grow up on this issue. They state that in the decision-making process the situation will need to think about their positive and negative aspects, they will be able to make better decisions about those situations that are likely to be encountered in the future and to look at the events differently. Only one of the interviewed students wants the bioethics topic to be processed, but stresses that the decision-making process will be difficult. Below are answers from students who want to learn about bioethics in science class:

– "Yes, it corrects one's morality. Thus, healthier generations grow." (Student 19)

– "I'd love to. These issues have to be learned, because we have to change people's perspective. " (Student 15)

– "Yeah. I am very interested in these issues. People are in difficulty to make decisions. If I had to take such a decision in the future, that decision would reveal the positive and negative aspects for me." (Student 3)

The student response that negatively affects the handling of bioethics topics in the science class is as follows:

-"Yes, but the decision-making process can be difficult." (Student 6)

CONCLUSIONS

The majority of students in our study did not find it appropriate to change the genetics of organism. It has been determined that students have negative opinions about genetic modifications on all living organism. In some studies, different from our results, it has been determined that genetic modification helps individuals to become more resistant to diseases, to find new methods for hereditary diseases, and to reduce the chance of getting fatal diseases (Gunter et al., 1998; Inaba & Macer, 2004).

The majority of students (14) emphasized that to decide the gender for a baby is negative. It has been observed that students have negative attitudes towards studies on reproduction technology. Unlike our study, in some studies students were found to be positive towards genetic studies on human (Bal et al., 2007; Topsakal, 2011). The fact that the study was conducted in a region with low education and socio-economic level is thought to be effective in this result.

Most of the students (14) have emphasized that they are positive about using animals in experiments. Bal et al. (2007) found in their study that students state that genetic studies may be performed on animals. Islam is the largest religion in Turkey**.** Bioethics and Islam have been investigated in various researches (Ghaly, 2010, 2012, 2013; Sekaleshfar, 2012; Shabana, 2013). Islamic sources, Qur'an and hadith said that all things including animals have been divinely granted to humans for their use for food, clothing and etc. Hence it should not be surprising to find that the religiously Muslims could agree to use animals in biomedical research or human benefits (Tappan, 2017).

The majority of the students stated that they are positive about organ donation (18) and infant vaccinations (21). Previous studies have shown positive results in biotechnological studies as long as they are in the best interest of mankind (Topsakal, 2011).

"Ethic; (Gündoğdu, 1999) discusses the values of human beings in terms of "good" and "what is evil", how "wrong" and "right" should be understood. In this context, the use of mind-opening drugs has not been considered ethical.

Most of the students (24) have mentioned that they are negative about health programs on TV. The majority of the students stated that the medicines recommended by the doctor should be used instead of the herbal products transferred in the disease treatment. Mass media, or more frequent use of the media, is becoming an integral part of our everyday life by increasing its effectiveness today, along with some ethical questions. The ethical dimension of health news on the media has a separate prescription in terms of both the communication field and the health coverage. Bakar (2010) mentions the moral dimensions of getting the right news, especially as the community is influenced by the health news in the media.

As one of the result of interviews, at the beginning of the study, there are fewer students interested in bad relationships between two friends. Some of the students have chosen to stay indifferent. At the end of the research, all of the students gave answers about trying to solve this problem. One of the important behaviors that bioethics education will bring to the students is to make them more sensitive to social events. There are significant changes in the problem-solving

skills positively of those who have studied "ethical discussion" in a "planned education process", and on the basis of these changes, there is a change in the perception of one's collective and its role in this society (Velasquez et al., 2009).

All of students stated that they did not hear the concept of bioethics at the beginning of the research. At the end of the research, they noted what they heard from the bioethics scenarios they discussed in the class. In contrast to this study, university students know the concept of bioethics at the beginning of research (Bakar, 2010), which may be due to age.

When we look at the examples given about bioethics at the end of the research, we see that the students mostly gave examples about the problem of not ending baby's life in the mother's womb. Students were mostly influenced by this scenario and gave this example. This situation has provided important spiritual values to the forefront of students in terms of bioethics education. For this reason, they may have more affectionate feelings towards the baby. Another reason may be that they think that such a behavior would not be right because of family cultures and religious considerations. On the contrary, in the doctoral study conducted by Sürmeli (2008), university students found that the families of infants who are likely to be infected had to practice themselves in a cul-de-sac, and students expressed a far-reaching answer to ethical principles.

After giving bioethics education in science class, students stated that they want to learn more about bioethics. This can be seen as a finding of bioethical awareness in students who are one of the objectives of this research. Because this shows that students are likely to encounter such problems in the future and they are aware of how to think about them when they meet. The bioethical issues have attracted the attention of students. They want to know what is happening in the script because there are situations in the future. Moreover, discussing these types of topics in the science classroom provided a different perception and change of perspective. Contrary to our work, a Ph.D. study on bioethics approaches, attitudes, opinions and values about biotechnology students' knowledge about biotechnology and biotechnology applications has resulted in the fact that the vast majority of students do not see bioethics education in schools. When bioethical education was given as a reason for not giving bioethics education, they thought that certain ideas would be imposed on students. Very few students with bioethics education should be given this education starting from secondary school (Yüce, 2011).

Nevertheless, the final opinion of the students, they expressed a positive opinion that different opinions should be respected, consciousness in bioethics and ethics, being able to look at the events from different angles, being aware of current events and evaluating events in all dimensions when deciding. Similar results were obtained in studies carried out abroad. Conner's study (2000) showed that high school seniors changed and developed their thoughts about bioethics problems as a result of applied studies in class. In a study conducted by Downie (1993) at the University of Glasgow, the majority of students participating in the study indicated that bioethics is required and in addition, the discovery and evaluation of bioethics topics in biology lectures have been strongly advocated by students. In his Ph.D. study by Bakar (2010), prospective teachers defended that primary school students should be given bioethics

education. Bioethics education has been shown as a reason for educating conscious society, increasing students' sensitivity, teaching ethical behaviors, teaching different perspectives, improving decision-making skills, and thinking of others to increase their responsibility towards social events.

Dawson's (1999) study of bioethics has shown a significant impact on the learning of students. Bioethics education contributes to academic morality, academic ability, learning attitude, beliefs about science and ethics, family and religious belief.

When one of the most basic aims of bioethics teaching is thought to be respectful of different thoughts, moral propriety and justness to the students, it shows that students have reached one of the aims of the research to have stated their opinion at the end of the application.

RECOMMENDATIONS

The following suggestions can be made from the results of the research. While the science course is being taught, it may be suggested that appropriate gains should be given to Science-Technology-Society-Environment approach. Reiss (1999) emphasized that there is considerable evidence that students would like ethical issues to widely address in science. Therefore, it is important that bioethics issues are involved in the preparation of teaching activities. Activities and group activities that the learners are active in can be encouraged.

For future research, it may be advisable to apply the study in a more extensive sample and spread out over time. The survey did not consider students' gender, family information. These variables can be taken into account in subsequent studies. Studies have sought to improve the bioethical awareness of middle school students, but similar studies can be applied to students in secondary education, teacher students, and science teachers.

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