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Science Education Graduate Students' Views towards Ethics of Science

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Abstract. The aim of this research is to determine the views of science education graduate students towards ethics of science. In the study, phenomenological approach was employed as qualitative research method. The data were collected through personal information forms and semi-structured interview questions that were formed in accordance with the research purpose and were analyzed by content analysis technique. The views of graduate students were examined in depth within the scope of 8 themes, which are the concept of ethics of science, scientific ethics course, unethical behaviours, underlying reasons of unethical behaviours, socio-cultural factors, conducting academic studies at schools, sanctions for unethical behaviours and the effect of unethical behaviours on science. The results highlighted the significance of scientific ethics course integration to undergraduate and graduate level. Moreover, underlying reasons and preventive measures of unethical behaviours have been detected from the graduate students' perspective.

Keywords. Science education graduate students, ethics of science, interview, phenomenology.

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In addition to clarifying the phenomena in the universe, science; due to its feature of guiding societies in many different fields, it imposes important moral responsibilities on people involved in science production (Erzan & Irzık, 2008). In recent years, the problems experienced in the fulfilment of moral duties in scientific research have become more visible, and this has led to the need for more studies on the relationship between science and ethics. According to Resnik (2000), the reasons for the increase in concerns about the relationship between science and ethics are the strengthening of the media about the visibility of ethical problems and the questioning of the integrity of scientific studies due to ethical abuses. It is thought that an important difficulty for people involved in scientific processes to undertake moral duties is the subjectivity of moral elements and the variability of rules according to a number of factors. At this point, it is important to understand these concepts in the best way.

It is seen that there are many different definitions in the literature on the concept of ethics, which comes from the Greek root "ethikos". The Turkish Language Association (Turkish: Türk Dil Kurumu, TDK) (2005) defines the concept of ethics as "the set of behaviours that the parties must comply with or avoid among various professions". On the other hand, science ethics; It is expressed as ethical and scientific criteria that must be complied with regarding the planning and conduct of scientific research (Ertekin et al, 2002). Similarly, Kök (2001) emphasizes the importance of scientists to act honestly towards societies and humanity and not to mislead them when it comes to complying with ethical rules. Regarding the implementation of these rules, Gören (2002 as cited in Bülbül, 2004) states that the duty of science ethics is to show researchers the moral path in the research process.

According to studies conducted throughout the country and the world (Barutçu & Erten Orhan, 2018), scientists and students at all stages of education may ignore these principles for various reasons (Ruacan, 2005). Unethical behaviours are grouped under different headings in different studies. These behaviors were grouped under the titles of duplication, forgery, falsification, fabrication, and plagiarism by Turkish Academy of Sciences (Turkish: Türkiye Bilimler Akademisi, TÜBA) (2002, p.37-39).

There are many studies in the literature on the reasons why students and academicians tend to unethical behaviours. For example, Newstrom and Ruttekinh (1976) and Greene and Saxe (1992) state in their studies that the reasons for students' unethical behaviour are heavy course loads, the desire to get good grades, and the lack of study time. İnci (2009), on the other hand, explains the

reasons for unethical behaviour for both students and scientists, lack of education, criteria for academic appointment, attitudes of administrators, scientific culture, mental problems and external pressures. In general, the reasons for unethical behaviour; it is seen that it is gathered under two main headings as wrong research, ignorance and providing personal benefit (Ruacan, 2005).

Many studies report the reasons for students' unethical behaviour as lack of knowledge and lack of necessary education. An important innovation at this point is the 34/5 added to the postgraduate education and training regulation updated in 2016. It is the article: "At least one course including scientific research techniques and research and publication ethics must be given during graduate education". (Graduate Education and Training, 2016).

Based on the updated regulation, it is seen that the "Scientific Research and Publication Ethics" course has been added to the graduate education programs of many universities. Although the name and scope of this course vary according to universities, the ethical scope of the course generally includes unethical behaviours in science, its causes, and ways to prevent it, ethical rules related to scientific publications, scientist-ethics-society relationship.

In order to prevent ethical violations in the scientific research process, ethical committees established within universities and general control mechanisms such as Council of Higher Education (Turkish: Yükseköğretim Kurulu, YÖK) and Turkish Academy of Sciences (Turkish: Türkiye Bilimler Akademisi, TÜBA) play a role. However, despite the existence of these institutions, it is revealed by many studies that behaviours cannot be prevented sufficiently (Demircioğlu, 2014, p.150). Various sanctions are also applied to prevent these behaviours. For example, ethical review boards have been established under the Presidency of YÖK, which are responsible for the detection and punishment of disciplinary acts in terms of publishing ethics. The duties of these boards are to examine the unethical acts, to present the results of the investigations made by experts/experts and the suggestions they have developed for the purpose of carrying out educational activities in cooperation with the relevant institutions to the Presidency. As a result of the investigations opened on the basis of the "Disciplinary Regulation" supported by constitutional provisions, various sanctions such as dismissal of people who commit ethical violations, cancellation of their titles, publication bans, warnings, not taking the associate professorship exam, imprisonment or judicial fines are applied (Demircioğlu, 2014).

Various studies are carried out, especially with case and phenomenological methods, in order to reveal the causes of behaviours at the point of preventing unethical behaviours. These studies are

very important in gaining an insider's perspective and presenting preventive suggestions based on various parameters such as unethical factors, society and social factors. Conducting such studies at the master's level, where problems are most common in the scientific research process, can contribute to obtaining more realistic data and presenting suggestions, thanks to the students' reflection of their own experiences. Apart from this, as Resnik (2005, p.4) states, examining the ethical problematic in science education (STEM fields) is important in terms of providing a broad scope of laboratory studies on ethical rules.

Based on these views, the aim of this study is to reveal the perceptions of science education graduate students about the concept of science ethics, to determine the difficulties they experience during the scientific research process, and to determine their opinions and suggestions about sanctions for unethical behaviours.

Method

The type of research, the study group, data collection tools, validity and reliability, data collection techniques, analysis of the data are presented in this section.

Research Model

In this study, phenomenology design, one of the qualitative research methods, was used. Phenomenology requires an in-depth examination of the issues that we are aware of but do not have detailed information about (Yıldırım & Şimşek, 2008). Investigations on scientific ethics show that people involved exhibit unethical behaviours such as plagiarism and scientific fraud during the conduct of scientific studies. In revealing these situations, people's life experiences or observations are used. At this point, the phenomenology design was used, since it is important to examine the perceptions and experiences of the people involved in the process in detail, to discover the reasons for unethical behaviours and to offer suggestions.

The Study Group

The study group of this research consists of 5 people enrolled in the master's program of Science Education at 3 different universities in the Aegean Region. There are different opinions about sample size in phenomenological studies. It is stated in the literature that the number of items that will constitute the sample can vary between 5 and 25 items (Creswell, 2013; Neuman, 2014; Patton, 2005; Rubin & Babbie, 2016 as cited in Baltacı, 2018). As Coyne (1997) stated, the fact that the

sample consists of few people who meet the objectives of the research makes it easier to obtain detailed data.

The study group of the research was selected by the criterion sampling method, one of the purposive sampling methods. Criterion sampling is the creation of the sample from people, events, objects or situations with the qualities determined in relation to the problem (Büyüköztürk, 2012). In the selection of the sample, the criterion was determined that all participants were enrolled in the master's program in Science Education.

In order to better examine the issue of ethics in scientific research, considering the possibility that they have not done an article/thesis study before, undergraduate students; PhD students were not included in the sample due to the thought that they could master scientific research methods. Therefore, in this study, graduate students were preferred in order to reflect their problems and life experiences related to scientific research methods. On the other hand, the relevance of the variables of university, registration year, being in the thesis-course stage were also investigated.

Responses of individuals who studied at the same university during the undergraduate period but attended different universities during the graduate period, similarly, who attended different universities during the undergraduate period but continued at the same university during the graduate period are considered useful in terms of making comparisons in points such as the ethics committee processes of universities, the processing of ethical issues in the teaching curricula. In addition to the university variable, it is anticipated that the answers of the students who are at the thesis stage and at the course stage will also contribute to the interpretation. In order to have information about plagiarism programs and to examine the subject of supervision of their work by the programs, it is thought that the start of the graduate education of the students is another important variable.

Information about the study group is summarized in Table 1.

Table 1.

The Study Group

Code (Participant)	Code (University-BA)	Code (University- MS)	Master's Stage
P1	A	B	Thesis
P2	B	B	Thesis
P3	B	D	Thesis
P4	C	E	Course
P5	B	B	Course

In order to ensure their confidentiality, the participants were given codes such as P1, P2, …, P5 and the universities as A, B. Below is information about the characteristics of the participants to associate with the study. The participant with the code P1 completed his undergraduate education at University A, registered at University B for graduate education and is in the thesis stage of his education. He worked as a teacher at a private school for two years. P1 with a good level of foreign language (English) (he took one year of English preparatory education in his undergraduate education), 28 years old and not working. The participant with the code P2 completed her undergraduate education at B university and started her graduate education at the same university and is currently in the thesis stage. P2, who has an intermediate level of foreign language (English), is 28 years old and has been working as a science teacher in a public school for 4 years. The participant with the code P3 completed his undergraduate education at B university and started his graduate education at D university and is currently at the thesis stage. P3, whose foreign language (English) is intermediate level, is 26 years old. P3, who worked as a science center supervisor for two years, has been working as a science teacher for 2 years at a private school. The participant with the code P4 completed her undergraduate education at C university and started her graduate education at E university and is currently in the course phase. P4, who has an intermediate level of foreign language (English), is 35 years old and works as a science teacher in a public school. The participant with the code P5 completed his undergraduate education at B university and started his graduate education at the same university and is in the course phase. P5, who has an intermediate level of foreign language (English), is 24 years old and does not work currently.

Data Collection and Analysis

In this study, semi-structured interview technique was used to collect data. In this technique, the researcher prepares the interview form that includes the questions that s/he plans to ask beforehand. Depending on the flow of the interview, it can affect the flow of the interview with different side or sub-questions and enable the person to open/detail their answers (Türnüklü, 2000). The questions in the semi-structured interview form (Appendix-1) were created by the researchers by scanning the domestic and foreign literature. After the preparation of the interview form, the opinions of 4 experts were taken in terms of the linguistically appropriateness of the questions and the situation to be determined.

Inductive content analysis was used in accordance with the qualitative research design for the analysis of the data. Content analysis is the objective, systematic and quantitative description of the

presented content of the communication (Berelson 1952, p.17). In inductive analysis, the aim is to discover models, themes and categories of data (Patton, 2002). Within the scope of inductive analysis, a conceptual structure was created with the coding format (Strauss & Corbin, 1990) according to the concepts derived from the data.

Validity and Reliability

Information on ensuring the validity and reliability of the research is given below. In order to ensure the validity of the study, the method, process and results of the research are given in detail by adopting the understanding of in-depth research and examination (collection, analysis and evaluation of data), clearly and with direct quotations from the participants. Purposive sampling technique was preferred while determining the study group. The data collection tool, which was developed by examining the relevant literature, was presented to 1 Professor Doctor Lecturer working in the Science and Mathematics Education Department, 4 doctoral students from the Science Education Department, and 1 Associate Professor doctor working in the Education Programs and Teaching Department, and suggestions were made, and its final version was formed. The interviews lasted between 30 and 40 minutes. In order to prevent data loss in the interviews, a voice-recorder was used with the permission of the participants and the data were tried to be transcribed on the day of the interview.

The reliability of the study was calculated using the "percentage of agreement" formula suggested by Miles and Huberman (1994). The percentage of agreement is formulated as (Agreement) / (Agreement + Disagreement) x 100. Accordingly, it is stated that interview data can be used in cases where the percentage of agreement in the studies is 70 and above (Yıldırım & Şimşek, 2008). In this study, the intercoder reliability coefficient was calculated as .84.

Results

Findings obtained from the interview with graduate students about science ethics were gathered under 8 themes which are the concept of scientific ethics, science ethics course, unethical factors, the causes of unethical factors, the relationship of sociocultural level and unethical factors, studies in schools and the permission process, sanctions against unethical factors and the effect of unethical factors on science. The findings regarding the analysis of the data are given below.

Findings Regarding the Views of the Participants on the Concept of Ethics of Science

A theme related to the concept of ethics of science emerged. The responses of the participants to this theme are given in Table 2.

Table 2.

Categories and Codes Related to the Concept of Ethics of Science

	Categories	Participants
	Occupational ethics	P1, P2
	Morality in scientific studies	P1, P2, P3, P4, P5
Codes	obeying the rules	P1, P2
	the good and bad behaviors of academics	P2
	Appropriate citation	P2, P3, P4, P5
	entering the data correctly	P4
	not doing any unauthorized work	P4, P5
	not making plagiarism	P5
	ethical committee process	P5

Table 2 presents the answers of the participants about the concept of scientific ethics. When the table 2 is examined, it has been seen that there are two categories as occupational ethics and morality in scientific studies. The category of morality in scientific studies are gathered in 7 codes, which are obeying the rules, the good and bad behaviors of academics, appropriate citation, entering the data correctly, not doing any unauthorized work, not making plagiarism, and ethical committee process.

Below are sample expressions from the opinions of the participants on this subject.

"…it was associated with being ethical in terms of **professionalism**, being ethical in the academic field in scientific studies as **obeying the rules**" (P1, interview notes).

"...96% of the theses in Turkey were said to be **stolen**, not quoted from each other. Scientific ethics is the state of being moral in science. Conducting moral behavior in scientific matters. I can think of things that **academics** should do right or not do wrong" (P2, interview notes).

"When it comes to ethics... For example, when quoting a study, specifying that quote, **citing** in accordance with the rules to use in the study. That is, to specify the rules and from whom it is taken from that person without stealing. It may include **plagiarism**" (P3, interview notes).

"When we say ethics, **morality** recalls in my mind. **Citation**, getting **permission**, **entering data properly**" (P4, interview notes).

"**Morality**… That's what **the ethics committee** is for… in scientific research, not to **plagiarize**, to choose the words we use carefully in scientific research, for example, to choose the words we use in theses, or to do everything with **permission** in the state or in private sector" (P3, interview notes).

Findings Regarding the Views of the Participants about the Science Ethics (SE) Course

A theme related to the science ethics (SE) course emerged. The responses of the participants to this theme are given in Table 3.

Table 3.

Categories and Codes Related to Scientific Ethics (SE) Course

	Categories	Participants
Codes	**SE Course Content**	
	concepts of ethics / scientific ethics	P3
	morality / moral system	P2
	reasons for unethical behavior	P2, P4
	penalties for unethical behavior	P4
	principles of scientific research	P2, P3, P5
	scope of plagiarism	P1, P3, P4, P5
	use of subjects/participants	P1
Codes	**SE Course Benefits**	
	qualified scientific publications	P3, P5
	the researcher's self-confidence increase	P3
	the decrease of unethical behaviors	P2, P3, P4

When Table 3 is examined, it is seen that the answers of the participants about the science ethics course are gathered in 2 categories: the content of the science ethics course and the benefits of the course. The category of the content the scientific ethics course is gathered in 7 codes: concepts of ethics / scientific ethics, morality / moral system, reasons for unethical behavior, penalties for unethical behavior, principles of scientific research, scope of plagiarism, use of subjects/participants. The category of benefits of scientific ethics course is gathered in 3 codes: qualified scientific publications, the researcher's self-confidence increase, and the decrease of unethical behaviors.

Some of the participants' views on this issue are given below.

"Our undergraduate professors talked about this subject for a long time, not under the name of science ethics. Our teacher in research methods course also mentioned it in graduate school. But it was not mentioned as scientific ethics. Plagiarism... I think a more **particular course** should be reserved for this because it was under the initiative of the teacher. The content…maybe it had something to do with the **subjects' use**" (P1, interview notes).

"…I remember it was mentioned in the course content. But I definitely don't remember talking about ethics during my graduate course. Yes it should. Anyway, I don't know how useful the work of a person who doesn't have the concept of ethics in his head can be. First of all, we have to deal with the **moral** system or **why people show these behaviors**. If the person is given **enough scientific research**

knowledge and knows how to do it, unethical behavior and stealing will not be resorted to" (P2, interview notes).

"I think it is **necessary**… I think that the studies will be of **better quality** and their reliability will increase. I could have had clearer ideas and better knowledge. First of all, what ethics is scientific ethics, what should be considered?. Here, citing the bibliography, paying attention to **the rules when quoting**, and even stating that they should be paid attention to in oral expressions, too" (P3, interview notes).

"...scientific ethics was mentioned as a subject in master's degree. The researcher should be ethical, should not plagiarize, there are plagiarism programs, the data should be entered as it is, not according to the result we want. We should get **permission** before doing research. It is sufficient if it is mentioned as a subject, not as a course, but it needs to be emphasized more. With concrete examples, it would be better if those who acted unethically before and were **punished**, what are the legal **sanctions** of this and its place in our culture, it would be better if it is **exemplified**" (P4, interview notes).

"Yes, it is **necessary**. In fact, it is covered in scientific research and publication ethics, but it is not enough. Even if it is **a separate course**... the course is mixed. While the issue is about quantitative research, the teacher mentions ethics. If it were a separate course, what would the **rules** be? It would be better" (P5, interview notes).

Findings Regarding the Views of the Participants about Unethical Behaviours

A theme related to unethical behaviours emerged. The responses of the participants to this theme are given in Table 4.

Table 4.

Categories and Codes Related to Unethical Behaviours

	Categories	Participants
Codes	**problems related to assignments/theses**	
	stealing any study	P1, P2, P3
	having the thesis/articles written by others	P2, P4
	having the statistics done by others.	P2, P3
Codes	**problems related to scientific publications**	
	non-authentic studies	P1, P2, P3
	not citing	P1, P2
	translating without citing the source	P3
	copying the author's sentence exactly	P1, P3, P5
	manipulating the data	P2, P4
	paid journals	P4, P5
	not using plagiarism programs	P2, P5
Codes	**permission problems**	
	conducting study before ethical committee decision	P2, P5
	conducting study without applying ethical committee	P2, P3
	unauthorized use of students' photos.	P2, P5

When Table 4 is examined, it is seen that the answers of the participants regarding unethical behaviours are gathered in 3 categories: problems related to assignments/theses, problems related to scientific publications, and permission problems. Participants defined unethical behaviors related to assignments and theses as stealing any study, having the theses or articles written by others, and having the statistics part done by others. Problems with scientific publications are non-authentic studies, not citing, translating without citing the source, copying the author's sentence exactly, manipulating the data, paid journals, not using plagiarism programs. Permission problems defined by students are conducting study before ethical committee decision, conducting study without applying ethical committee, and unauthorized use of students' photos.

Below are sample expressions from the opinions of the participants on this subject.

"I mean, the assignments given were searched and brought from the internet like this old-fashioned **copy-paste**. Many teachers were not paying attention… I witnessed a lot in my friends" (P1, interview notes).

"...no one writes publications in an **original way**. By making additions to existing studies, or without even quoting. We weren't doing our homework through research. We found what we were asked to research and presented it as if it were our own homework" (P2, interview notes).

"…some parts of different sources can be taken and expressed as if their own... they can take the English source from **someone else's work** and **translate** it into Turkish and use it without referencing. A friend of mine started to implement **without getting (ethical committee) permission** to speed up the process. I think it is unethical behavior to have the **statistics** parts of the theses done by others, to have the theses written completely by others, to turn this into a market" (P3, interview notes).

"…with the data, one can **manipulate** it as s/he pleases. It appears in **advertisements** on the internet. Even if you are preparing the thesis, there are those who edit and prepare it according to its format..." (P4, interview notes).

"For example, **the use of photos of students** without permission in the school environment. For example, it is plagiarism to **copy an author's sentence**. …we didn't know how to do it (cite properly) during university years" (P5, interview notes).

Findings Regarding the Views of the Participants on the Underlying Reasons of Unethical Behaviours

A theme has emerged regarding the underlying reasons of unethical behaviors. The responses of the participants to this theme are given in Table 5.

Table 5.
Categories and Codes Related to Underlying Reasons of Unethical Behaviours

	Categories	Participants
Codes	**External factors**	
	Lack of education at undergraduate level	P2, P3
	Lack of knowledge	P2, P3
Codes	**Manipulative factors**	
	Personality	P1, P2, P3, P4, P5
	Popularity ambition	P3, P4, P5
	Ethical committee process*	P1, P2, P3
	Timing problem	P2, P3

When Table 5 is examined, it is seen that the answers of the participants regarding the causes of unethical factors are gathered in 2 categories as external factors and manipulative factors. Participants expressed the reasons for unethical factors as lack of education at undergraduate level and lack of knowledge as external factors. The manipulative reasons of unethical behaviors stated by the participants are personality, popularity ambition, ethical committee process*, timing problem.

Below are sample expressions from the opinions of the participants on this subject.

"A little **carelessness**, **laziness**, I guess. I mean, they don't care about the work done. They just do it to get it done. I think it's about the **personality**" (P1, interview notes).

"**Ignorance** is in the first place. For example, now I am trying to write a master's thesis, I am researching it with my own effort. I have difficulties due to lack of lessons, **time** factor, being in a different city. It may also be due to the person's upbringing in the **family**. This is how he saw it in the family, nowadays the **ambition** factor is very important. I guess that's where the trouble comes from. I think **not knowing how to do it basically** comes from the **education** at the university" (P2, interview notes).

"I think the most basic thing is to be fast or **not want to waste too much time on something**. Or rather, to do it for the sake of doing it. Articles gain points as they are published, for dissertations, to say for publications. So it's about not wanting to deal with a little **laziness**. People don't want to deal with, they don't want to work, but they want to get somewhere after a while **without making any effort**. The **lack of information** is also important here. Maybe it should be one of the **compulsory** courses when you are in the first year. Ethics is science, what ethics is. He does it unknowingly, maybe that too" (P3, interview notes).

"When the things they think do not match with the data, people are in favor of their opinions, rather they want the result they want, not the data. The data may be wrong, but s/he **does not want to admit his mistake and does not want to deal with it again**. ... s/he may be immoral, there may be a problem with his **character**, he wants to be **promoted quickly in the job**… " (P4, interview notes).

"For example, s/he may have liked his ideas very much but **could not interpret them in his own way**. His ability to interpret may not be very developed. Or, for example, he liked an idea very much, but wanted to use it as his own word" (P5, interview notes).

*Participants were also asked whether they had their own experience with the ethics committee process, the problems they experienced, and how they described the ethics committee process. Participants stated that the ethics committee process is slow (P1, P2), the criteria are high (P2, P3), and it is problematic (P1, P3), and the process of obtaining permission takes a long time (P1, P2, P3). On the other hand, they expressed their opinions that they personally witnessed or heard about the problems experienced by the ethics committee in their environment, without waiting for the approval of the ethics committee (P2, P3) or without the permission of the ethics committee (P2, P3). P4 and P5 coded participants stated that they have not applied to the ethics committee yet, but they have heard from their environment about the troublesome process.

Below are sample expressions from the opinions of the participants on this subject.

"The procedure regarding the ethics committee is a bit **slow**. Even for something very unimportant, I have to fix it and give it back. Again, it creates a **waste of time**. I had a lot of trouble with it myself. Maybe the process should go a little **faster**" (P1, interview notes).

"...a doctorate friend did his research at schools **without any permission** last year. Afterwards, the ethics committee took the permission while the student was away. The time should be waited, the **person should plan himself accordingly**. But there is a **really long procedure** in that regard as well. There is a slow process caused by the officers, correspondence takes too long" (P2, interview notes).

"…I couldn't start the implementation without getting permission. It's getting **tight**. The scientific research ethics committee of X University convenes in the last week of every month and it was supposed to be sent 10 days before this last week, so we sent it on the 10th day, but if we couldn't, we would have to wait for 1 month" (P3, interview notes).

Findings Regarding the Views of the Participants on the Relationship of Sociocultural Level with Unethical Factors

A theme has emerged regarding the relationship of the sociocultural level with unethical elements. The responses of the participants to this theme are given in Table 6.

Table 6.

Categories and Codes Regarding the Relationship of Sociocultural (Social Factors) Level with Unethical Factors

	Categories	**Participants**
Codes	Education level	P1, P2, P3, P4, P5
	Social status (academic title)	P5
	Economic reasons	P4, P5
	Values (individual-family)	P1, P2, P3, P4, P5

When Table 6 is examined, it is seen that the answers of the participants regarding the relationship between their sociocultural levels and unethical factors are gathered in 4 categories as education level, social status, economic reasons and (individual-family) values. All of the participants reported that they thought that the level of education was not a factor that directly affected unethical behaviours and emphasized that value judgments gained from individual, or family were effective.

Below are sample expressions from the opinions of the participants on this subject.

"...anyone who came to the postgraduate doctorate stage should know about these and pay attention to them. I think it's about the level of **education** and personality" (P1, interview notes).

"I attribute it more to familial **sociocultural** situations. If **ethical awareness** was formed in people with a high level of **education**, those who publish scientific publications would not be people with a very high level of education" (P2, interview notes).

"I think it is more about the person's own content, not the title or title of the education level. Information content, awareness content" (P3, interview notes).

"I can't say that **educated** and rich people don't do such a thing, or poor ignorant people cannot be called immoral, it is **a personal trait** rather than a socio-economic aspect. It is personal, I think we cannot generalize" (P4, interview notes).

"...it happens that the teachers do it too. Maybe it's a bit of **personality**. It may also be related to the **economic** dimension. Some just to make money. They can also do more work to be **popular** in the social circle for being recognized **socioculturally**" (P5, interview notes).

Findings Regarding the Views of the Participants about Conducting Academic Studies at Schools

A theme emerged related to conducting academic studies at schools. The answers of the participants to this theme are given in Table 7.

Table 7.

Categories and Codes Related to Conducting Academic Studies at Schools

	Categories	Participants
Codes	**Permit process**	
	Must be compulsory	P1, P2,
	Long duration	P1, P2, P3, P5
	MONE regulations	P2, P3, P4, P5
	Teacher's not apply for permission for self-study	P4
Codes	**Attitudes of administrators**	
	Unnecessary	P2, P4
	Anxious	P4

As can be seen in Table 7, this theme has been examined in 2 categories: the permit process and the attitude of the administrators. The participants emphasized that the permit process should be compulsory, that it is a long procedure for the implementation of the studies in schools, and that Mone regulations are considered troubles. On the other hand, one of the participants (P4) stated that a teacher sometimes have tendency not to apply for permission for his/ her own academic study. The participants expressed their opinions as unnecessary and anxious about the attitudes of the administrators towards the scientific studies that are desired to be done in schools.

Below are sample expressions from the opinions of the participants on this subject.

"…there should be an **obligation** to get permission, **a reviewing committee**. Because of its own class... I think it should not be able to implement it without going through a board. **Parent consent form** may also be requested for certain age groups in the permissions of the ethics committee. If I were a parent, I might not have wanted to if I did not know the content of the study. But I do not find it right that it is so difficult to practice in private schools or public institutions. The process should be **fast** and **facilitated** for people doing academic studies" (P1, interview notes).

"Obviously, schools in national education find it **unnecessary**, rather than a restriction. Let it be done, but there is the logic of what is needed. In national education, all academic studies are regarded as unnecessary. Both teachers and administrators. It's usually based on volunteerism anyway. Anyway, something done **without the permission of the children probably does not reflect the correct results**. …scientific studies **must have parental permission and student permission**. There are no such rules directly in schools. …but the student says share at that moment, then a friend makes fun of his photo. Then an investigation is opened about the teacher. But if there is written permission, it is okay to say that the parent signed it" (P2, interview notes).

"...we do not take **permission** during the period. At the beginning of the semester regarding the sharing of photos of students, sometimes it may come out. He thinks that individual photos will be shared, so he does not allow it. When I talk to my advisor about this, it will not be ethical... even now I am working with teachers, we will work with teachers in public schools, not teachers in my own school. ...it's easy for me to interfere with data at the beginning, I don't give direction, it changes shape. ...we did not select the data of the study as it may change" (P3, interview notes).

"So my friends have surveys**, I do them myself, I do the ones related to my course**. **I do not get permission for my own studies**. When someone else comes from outside of school, they also get a little nervous, they have such a concern as to whether I will take responsibility. Because they do not understand, principals may perceive it as something different if they have not done academic work. And when they hear that it will be recorded, they are afraid of what will happen. ...Mone has already sent a circular. So that you do not share pictures of children on social media without permission. That's why I cover children's faces when sharing photos. Or I don't take pictures of children in experimental videos or something. It can happen once (permission can be obtained). In general, in the form of a petition saying I give permission" (P4, interview notes).

"…first going to the institute... and then **getting approval from the national education**. Then I know that permission will be taken from the school administration, teachers, parents and students themselves. There was such a **long process**" (P5, interview notes).

Findings Regarding the Opinions of the Participants on Sanctions Regarding Unethical Behaviours

A theme has emerged regarding sanctions against unethical elements. The responses of the participants to this theme are given in Table 8.

Table 8.

Categories and Codes Related to Sanctions against Unethical Behaviors

	Categories	Participants
Codes	**Students aspect**	
	Warning	P3, P5
	Cancellation of handed assignments/theses	P1, P2, P5
Codes	**Academics aspect**	
	Dismissing from profession	P2, P3
	Cancellation of academic title	P3
	Cancellation of relevant publication	P5
	Imprisonment-litigation	P1, P4
	Social exclusion	P2
	Temporarily ban of publication	P3
	Control mechanisms	P1, P4

As can be seen in Table 8, the answers of the participants regarding the penalties (sanctions) for unethical factors are divided into 2 categories to be analyzed separately for students and academics. The sanctions that should be applied to students for unethical behaviors reported by the participants are warning students and cancellation of their assignments and theses. Sanctions that can be applied to academics are stated as dismissing from profession, cancellation of academic title, cancellation of relevant publication, imprisonment-litigation, social exclusion, temporarily ban of publication and control mechanisms.

Below are sample expressions from the opinions of the participants on this subject.

"...the assignment may be **cancelled**. …can **sue** people who commit plagiarism legally. …it would be better if there is something like an **audit commission** within the university or the government about this" (P1, interview notes).

"I think that a person who constantly engages in unethical behavior will not be able to **take much place in academics** and people will turn their backs on him. Exclusion but **social exclusion**. …you know, I said, until I get **banned from the profession**. It should be for students too" (P2, interview notes).

"It could be a **warning** for a college student. But an academic who has a doctorate or a research assistant may be **prevented from publishing for a year or a month**. As long as this process continues, a publication ban of 3 months and then 6 months, if necessary, can be taken. …certain punishments such as **warning** and **reprimand** must be given and followed by **exclusion from the profession**…" (P3, interview notes).

"There should be heavy **sanctions**. ... you take the university exam, you cheat, 2 years is not enough punishment for me to take the exam, I think he should not take the exams for life and he should be sentenced to **prison**. In other words, there are institutions and ethical committees that will regulate **penalties**, for example, it seems that it is not enough to prevent them" (P4, interview notes).

"...I think, for example, that **publication should be removed**. If he wrote an article or thesis about a topic, it should be removed. … first ... if there is a deficiency, then it can be said to be corrected as a warning ...then if it comes back when he is on the defensive, I think that broadcast should be **cancelled**. As a result, people will not be discouraged if it is a direct **warning** and then a punishment instead of giving punishment first" (P5, interview notes).

Findings Regarding the Views of the Participants on the Effect of Unethical Behaviours on Science

The participants were asked whether unethical factors have an effect on science and (if any) what these effects are/could be, and their answers are presented in Table 9 with frequency values.

Table 9.

Categories and Codes Related to the Effect of Unethical Behaviours on Science

	Categories	Participants
Code	**Affecting aspects**	
	change in the results of the studies	P1, P3, P4, P5
	decrease in the original inventions	P2, P4
	chain chaos	P3, P4
	poor quality of the publications	P2, P5
	delay in the emergence of the facts	P1, P3, P4
Code	**Not affecting aspects**	
	Transparency of science	P3, P4
	Universal laws	P3

According to Table 9, it is seen that the answers of the participants regarding the effect of unethical behaviours on science are gathered in 2 categories as affecting and not affecting aspects. The aspects that are thought to affect the science of unethical factors are expressed as the change in the results of the studies, the decrease in the original inventions, the chain chaos, the poor quality of the publications, and the delay in the emergence of the facts. On the other hand, it has been emphasized by the participants that the transparency of science and universal laws are the aspects that unethical behaviours cannot affect.

Below are sample expressions from the opinions of the participants on this subject.

"The **results** of studies **may vary**. It can **mislead** science" (P1, interview notes).

"...constantly circulating from the same sources and using them, such a thing cannot be **discovered**" (P2, interview notes).

"...Perhaps the people who will do that work after me will be guided by what I wrote. Therefore, it can also **disrupt** that person's work. Or ...it can lead to the person's work. ...**universal laws** may not affect the laws of physics. But perception, vision awareness are things that are studied very often. Since we work with the person, we can change his direction" (P3, interview notes).

"...the most beautiful thing about science is that it is **transparent**. They take risks, that is, those who play with the data. Sooner or later, the facts come out. …it is impossible to determine the accuracy

of the studies of each new article. ...he refers to it as a chain because it is accepted as true. He refers to it, all of them refer to the same, but the source is wrong... **chain reaction**... so ...it can delay the emergence of facts, lead to wrong practices while developing programs while a new education model is being made" (P4, interview notes).

"The publications made by people just to be **popular** or just to improve their economic situation are not enough. I don't think those people do it to do scientific studies... Let's do it **quickly**, then we will spread it as if we did it for 5 weeks, so they can do such a method" (P5, interview notes).

Discussion and Conclusion

In this study, the opinions of the students enrolled in the graduate program were consulted in order to obtain in-depth information and analyze the subject of science ethics, which has been emphasized with the increase of unethical factors recently. As a result of the data obtained, the emphasis has been placed on giving more importance to ethical issues in general, making ethics committee documents mandatory in every institution, adding courses such as professional ethics and scientific ethics to teacher training higher education undergraduate programs.

In the study, 8 themes obtained as a result of content analysis were created in order to create a wide scope unlike other studies conducted with science ethics. The themes obtained within the scope of this study are the concept of scientific ethics, science ethics course, unethical elements and their reasons, the effect of sociocultural level, studies in schools, sanctions against unethical elements and the effect of unethical elements on science; It is thought that a comprehensive examination has been made in terms of the answers obtained both containing information about K-12 and higher education education stages and having a wide content such as from concept definitions to permission processes, and it is thought that the analyzes will contribute to the literature in emphasizing the deficiencies in the relevant subjects.

Responses of the participants to the themes were reduced to as many sub-categories and codes that provide common meanings as possible in order to make more specific and clear comments. The comments on the basis of themes, in which the results obtained from the findings are also associated with the demographic characteristics of the participants, are presented below.

Theme 1: The Concept of Science Ethics

During the interview, the participants were asked separately about the concepts of ethics and scientific ethics, but since the answers were generally for the concept of scientific ethics; In the first theme, the concepts of ethics and scientific ethics were evaluated in the same category. In addition,

it was concluded that there was a problem in terms of conceptual understanding in all of the participants associating the concept of ethics with morality. Although the terms "ethics" and "morality" are used synonymously, they have different meanings. While morality expresses the widely existing values and codes of conduct in a society or culture; ethics, on the other hand, is not content with making an unbiased description of how and according to what people behave in the society they live in; it aims to find the principles, rules, norms and values of moral life (Irzık, Ercan, 2008, p.1). As an explanation of the concept of ethics in the study, only the participant with the code P2 responded as "ethics is something that deals with good and evil" and made a suggestion for the concept of scientific ethics with the expression "things that academicians should do right or not do wrong". Opinions about the concept of science ethics were generally gathered at the point of "being ethical in the academic field in scientific studies" (P1), and it was seen that there was no emphasis on the pre-university education period. From this point of view, it can be interpreted that the subjects of "doing science" and "observing ethical elements" in these processes are not given enough importance in the pre-university education period.

Theme 2: Science Ethics Course

It can be thought that one of the reasons why comprehensive answers about science ethics could not be given in the first theme is that all of the participants did not take science ethics courses during their undergraduate and graduate periods. Participants mentioned that the concept of ethics was mentioned in the course content (P2), not as "scientific ethics". However, the participant with the code P5 stated that "in fact, scientific research and publication is handled in ethics, but it is not sufficient". Similarly, participant P1 said, "Only for the ethical part, plagiarism was mentioned. I think a more specific lesson should be devoted to this; because it was at the initiative of the teacher." He referred to the inadequacy of the concept of scientific ethics given in the graduate period. Indicating that, unlike the other participants, the subject of scientific ethics was mentioned during the undergraduate period, the participant with the code P1 said, "Our instructors during the undergraduate period were very meticulous about this." As it can be understood from the expression, it can be considered that it is an advantage to have an undergraduate education at a university providing education in a foreign language and to use foreign language resources. In addition, the participant coded P2 said that "some teachers were talking". Based on the expression, it can be interpreted that if the science ethics course is not integrated into the curriculum, the students who take courses from academics who do not show initiative will be disadvantaged if the subject of ethics is handled depending on the "initiative" of the academicians.

On the other hand, P4 and P5 coded participants, who started their master's program in 2018, mentioned that they were given more comprehensive information about scientific ethics, although they thought that it was not enough. The subjects mentioned in the scientific research course in the participant master's program coded P4 were as follows: “The researcher should be ethical, not plagiarism, that there are plagiarism programs, that he/she detects it, that the data should be entered as it is, not according to the result we want while observing, that we should get permission before doing research.” sorted. P4, who was the only participant who stated that there was no need for a scientific ethics course to be a separate course, said, “There should be more emphasis on... With concrete examples, it would be better if those who acted unethically before and received penalties, what are the legal sanctions of this, and its place in our culture.” He emphasized that “examples from real life experiences” should be added to the subject of science ethics, which is covered in the curriculum. P4 supported this view with the idea of “Punishment should be a deterrent” and drew attention to the effectiveness of concrete examples in preventing unethical elements. Regarding the scope of a science ethics course to be integrated into the curriculum, it is concluded that the emphasis of the participants on the steps of creating scientific publications (see Table-3) is not sufficient despite taking a scientific research course during the graduate course. From this, it can be interpreted that although there are various publications on scientific ethics or scientific ethics, unless there is a compulsory course, the tendency of people to refer to these publications to obtain scientific ethics information is low. Similarly, in the study conducted by Özden and Ergin (2013) to determine the opinions of the participants with a master's degree in science teaching on the ethical rules applied in scientific research, the importance of adding the science ethics course to the curriculum and the students' need for guidance in the process of conducting scientific studies were revealed. In fact, a course on scientific research and ethics should be added not only to higher education but also to K-12 level.

As a result of the higher education program regulation updated in 2006, it is thought that it is important to examine the efficiency of the lesson, depending on the difficulties experienced by the students enrolled in the institute programs that added ethics courses to the curriculum, and the ethical violations they witnessed or committed, depending on the ethics course variable. For example, within the scope of this study, the views of students who took and did not take courses related to ethics were compared on various themes. Students (P4, F5) who received publication ethics, especially on scientific research methods, reported that they considered themselves more competent, but still lacked ethical aspects. More studies are needed with a larger sample on the subject.

Theme 3: Unethical Factors, Theme 4: Reasons, Theme 5: Social Factors

The themes of unethical factors and their reasons will be evaluated together in this section, as the participants simultaneously respond to their views on what unethical factors are and the reasons that lead people to these behaviors.

The subjects that the participants emphasize the most about unethical behavior are scientific publications, articles, assignments, thesis, etc. relates to the rules violated at the time of writing. They also stated that their level of knowledge on citation and writing bibliography is lacking. Participants with the code P2 and P5 emphasized that they violated these rules "unconsciously" due to their lack of knowledge during the license period. The participant coded P2 said, "We were finding the things we were asked to research from a ready-made place and presented it as if it were our own homework." The statement of the participant with the code P5 and "We used to put the word of an author or academician exactly and give references under it, for example, we put it without changing it. For example, it was plagiarism, but we didn't know". His statement explains the reasons for "plagiarism" due to "lack of knowledge". However, P5 stated that they received information about these rules in the "scientific research and publication ethics" course during the graduate period; P2 stated that he did not receive any information during the graduate period. P2 "I definitely don't remember talking about ethics during my master's course". With his statement, he supported that he did not acquire knowledge during the graduate course; He even stated that he is currently experiencing "difficulty in learning". It can be interpreted that the lack of knowledge of P2 and P5, who studied at the same university during the undergraduate period, is "related to the university they studied at during the undergraduate period". It is concluded that the participant coded P2, who continues to the master's program of the same university, started his education in 2013 and the registration of P5 in 2018 was effective in benefiting from the contents of the updated curriculum during this 5-year period. As an opinion against the stated views; considering that although students are not given information, they can acquire information with individual effort, it can be argued that lack of knowledge does not constitute a "just cause" for plagiarism.

When the results of the studies on the subject are examined, it is seen that the lack of knowledge is one of the most important factors that lead students to plagiarism. For example, Hamutoğlu, Akgün, and Yıldız (2013) stated in their study with educational sciences graduate students that the problems experienced while writing the thesis are not knowing how to cite, not being able to access the source, and not having knowledge about ethics. In the study conducted by Can and Ceyhan (2015) to

determine the proficiency of graduate students in writing scientific reports, it was found that they thought that “master's courses are not sufficient to have knowledge about scientific report writing”.

Another important issue that the participants focused on regarding unethical factors is “to have the statistics departments of the theses done by others, to have the theses written, and to turn this into a market (P3)”. On the subject, P2 said to a friend of his, “She had her second thesis done by paying a friend and she graduated.” gave an example. P2 said that his friend's behavior “He did his second master's degree so that I can go to the university as a social activity.” interpreted as. At this point, it draws attention to the extent to which the knowledge proficiency of a student who does not prepare his/her master's thesis is examined by the student's advisor and other jury members, and how this behavior of the student is not revealed. A similar situation encountered by the participant coded P2 is an unethical suggestion offered by a counselor to his student. P2's words about the teacher's offer to his student are as follows:

A friend called his teacher and said, “I don't have much free time to write the thesis. You give me the past theses and I'll turn it into a master's thesis”. His teacher agreed. His teacher then called my friend and offered him if he wanted to, “Let's do the same for you, I'll give you one of your undergraduate thesis, you change it to a master's thesis”. My friend replied, “No, sir, since it's happened, we've waited this long”. His teacher said, “You cannot write, I told you to help you” (P2, interview notes).

Based on these views, the following statements of the participants with the code P2 and P5 are supportive about the fact that “individuals' education levels are not effective in developing unethical behavior”:

“It happens that teachers do it too” (P5, interview notes).

“If ethical awareness was formed in people with a high level of education, people who publish scientific publications would not be people with a very high level of education” (P2, interview notes).

It is a point emphasized by all participants that unethical elements are "related to character" rather than individuals' academic titles and education levels. Examples of the features detailed about the character structure are “carelessness, indolence” (P1), “doing for the sake of doing it” (P1 & P3). In addition, at the point of social status, reasons such as “to get somewhere” (P3), “to rise fast” (P4), to “increase points” (P3, P4 & P5), which is one of the criteria for promotion in a job for academicians, lead academics to behave unethically elements appear. Some academics' making agreements with “journals that write for money" by publishing “3-4” (P4) instead of "publishing one study in a year”

is an example of these behaviors. Similarly, in the study of Aydın, Şahin, and Demirkasimoğlu (2014) on the causes of ethical violations, it was found that economic concerns override scientific thinking, anxiety for academic advancement, and self-interest are factors that lead academics to behave unethically. On the other hand, participants with the code P4 and P5 shared their information about the new regulations about these journals. It can be interpreted that such regulations are promising in terms of the emergence of "quality publications" and "plagiarists getting ahead of those who really work" (P4).

The common point of the studies on the causes of unethical behavior is the "character traits" of people. Even if the necessary training is provided, ethical violations will be inevitable due to the influence of character traits. As a matter of fact, the social environment, social values, social sensitivity, social conditions, etc. variables also affect the ethics of science (Erdem, 2012, p. 30; citing from İnci, 2008, p. 109; Yaşar, 2018). Therefore, at this point, it is thought that the studies to be carried out by considering the social factors will offer more permanent solution suggestions.

Theme 6: Studies in Schools and Permission Process

The participants attribute the difficulties of researchers in conducting scientific studies in schools affiliated to the Ministry of National Education to the "long and troublesome" permission process required from the relevant institutes and within the Ministry of National Education. In this regard, the participant with the code P5, in addition to official permissions; as stated in the graduate course, he also emphasized the point of taking permission from the school administration, teachers, parents and students themselves. It is seen that there are "differences of opinion" among the participants about getting permission to practice if the researcher is a teacher in charge at the school. Regarding the subject, P1 said, "Any research that he/she wants because of his/her class or maybe wrong, may not even be suitable for his/her age group." expressed an opinion. On the other hand, the participant with the code P4 said, "I do not take permission because I am myself." shared his knowledge. In addition to the troublesome leave process, he suggested the negative attitude of the participant administrators with the code P4 about the difficulty of conducting scientific studies in schools as the reason. The information P4 shared about the attitude of his school administration is given below:

"When someone else comes from outside the school, they (the school administration) get a little nervous too. It is in the style of "I wonder what he will do, what he will ask, if there is a problem, will we go to the newspaper and television". Here I am, you will do a research on whether there is sexual

abuse in the family, you went and looked, and it turned out to be true. This; The principals get scared when you say “there was such a thing at that school, his father was abusing him” the next day. “What will I allow now, do I take responsibility”; they also have such concerns. If they did not do academic work because they did not understand, the principals may perceive it as something different, when the journalists say that I will interview as if they are going to ask questions. And when they hear that it will be recorded, they are afraid of course, “what will happen, what will happen”. .. They also worry about the future for themselves. “So that I don't get into any trouble” (P4, interview notes)

It can be interpreted that the reason why P4 does not take permission while doing his own studies is the “tense” and “anxious” attitude of the school administration, as mentioned above. In addition, P4 said, “I don't need permission since the subjects in our lessons are related to the lesson.” added the information. As P1 said about doing scientific work in schools, “The process should be fast and facilitated for people who do science studies.” It is concluded that it is very important to make some arrangements so that the negative attitude of the school administration does not reduce the motivation of the researchers and scientific studies can be carried out without disrupting the functioning of the curriculum.

Theme 7: Sanctions against Unethical Elements

As a result of the answers given about the sanctions, which is the theme that the participants focused on the most, it was revealed that the participants were in agreement with the existing sanctions, and they presented it as a suggestion because they were not aware of some sanctions.

It can be argued that the reason why the participants evaluate the penalties for unethical factors separately for students and academics is that students may commit plagiarism "unknowingly" (P3). Emphasizing that penalties such as “warning” for undergraduate students and “invalid homework or thesis” for graduate students, the participants agree that there should be “heavy sanctions” (P4) for academics. Some participants' proposals such as “cancellation of academic title” (P3) and “disbarment from profession” show that they are not aware of these sanctions currently applied. At this point, as P4 stated, “Adding concrete examples to the science ethics course” can contribute to the fact that people have easier knowledge and ideas with sanctions. Because it can be interpreted that the tendency of developing unethical behavior will not decrease with the thought that there will be no sanctions for individuals who do not personally witness the sanctions imposed on unethical behaviors around them or who do not obtain information through regulations.

The primary reason for staying away from unethical behavior is "the unethical nature of not being subject to sanctions" is also a paradox that needs to be discussed. The main reason why individuals do not tend to these behaviors is "unethical" and the importance of educating individuals from the first steps of education in internalizing individual/societal ethical norms is striking. In this context, it can be suggested that more emphasis should be placed on ethical issues in the "Religious Culture and Moral Knowledge" course in the K-12 curriculum of the Turkish Education system. It can be interpreted that individuals who internalize ethical norms at an early age will decrease their tendency to develop unethical behavior in scientific studies.

Theme 8: Impact of Unethical Factors on Science

The answers of the participants about the effect of unethical factors on the direction of science were gathered around the idea of "misleading science" (P1). However, when the answers are examined specifically, the point emphasized here is not the nature of science, but that the new contents developed by researchers based on previous studies will have inauthentic, incorrect and poor quality qualities as a result of misconceptions. On the other hand, as stated by participant P3, "unethical behaviors do not affect universal laws" and participant coded P4's views that "the truth will come out sooner or later" may reveal an optimistic dimension in terms of science confirming itself over time. On the other hand, when unethical factors are considered in a social context, it is important to strengthen serious and deterrent inspection mechanisms within the state as a result of unethical gains among individuals, damage to the general value judgments of societies, and the inability of states to keep up with scientific and technological innovations in the global sense.

Appendix-1. Sample Semi-Structured Interview Form

1. How would you define the concept of ethics of science?
2. Have you taken any courses related to the science ethics? If not, do you think such a course would be necessary (eg.content, benefits)?
3. What sorts of behaviours would you define as unethical behaviours? Have you encountered any of them?
4. What do you think the underlying reasons of unethical behaviours could be?
5. Do you think there is a relationship between social factors and unethical factors?
6. What do you think about conducting academic studies at schools? (permission procedure, attitudes of authorities)
7. What kind of sanctions should be applied against unethical behaviours
8. Do you think unethical behaviours affect science? In which aspects?

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