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ETHICAL PRINCIPLES IN CLASSROOM ASSESSMENT: INVESTIGATING THE PERCEPTIONS OF PRE-SERVICE TEACHERS[3]

Abstract: This study aims to determine the level of pre-service science teachers' perception of ethical principles in classroom assessment. The study, which was conducted with 607 pre-service science teachers from five different state universities, was based on a survey design. The data were collected using 15 scenarios about ethical principles in classroom assessment developed by Green et al. (2007) and revised by Fan et al. (2022). In analyses, the agreement rates between the participants and the experts were calculated for each scenario. As a result, it was determined that the participants generally agreed with the experts. In terms of ethical principle categories, participants showed the highest level of agreement on confidentiality and communication about grading categories. Agreement rates were lower in the categories of multiple assessment opportunities, grading practice, and fairness/bias compared to the other two categories. Participants showed the lowest level of agreement in the test administration category.

Keywords: classroom assessment, ethics, perception, pre-service teacher.

Introduction

Ethics plays a major role in every aspect of our lives and has become a subject of intense interest to researchers. Researchers have recently started to examine ethics in different fields and continue to address attitudes and behaviors in these fields in terms of ethics values (Aydın, 2018). One of the most important of these fields is education. Specific to education, ethics is a set of norms that shed light on the behavior of teachers for them to fulfill their designated responsibilities, provide public service for the benefit of society, and use their authority (Maxwell & Schwimmer, 2016). One of the important points of ethics in education is the extent to which teachers comply with the ethical principles determined while performing assessment practices. According to Nitko & Brookhart (2014), ethics in assessment is the professional responsibility to follow assessment practices guided by ethical standards and rules, as well as to collect and use the information obtained in the correct manner.

Ethics

It is possible to consider the concept of ethics as a discipline or moral philosophy. Ethics as a discipline sets moral principles, standards, and values by determining which relationships and behaviors in people's lives are right or wrong (Brandt & Rose, 2004). Ethics as a moral philosophy is a systematic community of ideas that examines the attitudes, behaviors, and activities of people both in their own lives and in the community and makes sense of them as right, wrong, good, and

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bad (Chowdhury, 2018). The interpretation of ethics varies in different situations (Shobana & Kanakarathinam, 2017). In our social lives, we need to follow the rules that are set in places such as schools, hospitals, and libraries. These rules, which are present almost everywhere in our lives, are indispensable in professional life because it is inevitable that there will be disruptive behaviors where there are no rules. For this reason, some rules and principles have been determined since the beginning of professionalization (Balaban & Cerrah-Özsevgeç, 2023).

Professional ethics includes general regulations that guide the behavior of professional members and provide guidance on what is appropriate or inappropriate behavior (Banks, 2003; Tichenor & Tichenor, 2005). In this context, professional ethics are the rules and principles established by professional groups to regulate competition within the profession, determine the limits of personal desires, and protect service ideals (Aydın, 2018; Wesley & Buysse, 2006). One of the concepts that is closely related to professional ethics is education. Education is a lifelong process that ensures the transmission of a society's values and culture from one generation to the next (Bhardwaj, 2016). Social values play a crucial role in sustaining nations and states, as they ensure the continuity of cultural and moral traditions across generations. Social values constitute the basis of ethics. In this respect, the concepts of ethics and education are closely linked. In schools, where formal educational activities occur, the values expected to be acquired form the basis of ethical behavior in children. The continuous transmission of these values ensures the continuity of the state, the nation, and the values. In this respect, education is the most important component that transmits and maintains ethical values (Ilgaz & Bilgili, 2006). In this context, the place of teachers is also critical (Çağatay, 2021) because teachers, who will interact with the individuals of the future, are expected to comply with ethical principles and convey them to future generations (Adami, 2014; Martin, 2013). Regardless of the level of education at which they work, teachers are expected to act in accordance with certain ethical principles. The Association of American Educators (2010) has developed codes of ethics for educators. These codes are grouped under four main headings: ethical behavior towards students, ethical behavior in performance and practices, ethical behavior towards colleagues, and ethical behavior towards society and parents. The ethical principles that teachers should follow throughout their professional lives are stated by Aydın (2018) as non-corruption, honesty-truth and trust, impartiality, commitment to the profession and continuous development, respect, effective use of resources, professionalism, providing a healthy and safe environment, responsibility in service, justice, and equality.

As can be seen, the principles that teachers are expected to comply with in their professional lives are multidimensional. One of the most important practices among these is adherence to ethical principles in classroom assessment. This is because teachers' assessment practices have a great impact on students' participation, motivation, and learning, as well as on their teaching (Aitken, 2012; Harlen, 2009; Lyon, 2013). However, many people often ignore the ethical context in the assessment process. Due to this problem, especially educators need to comply with ethical principles related to classroom assessment (Aydın, 2018).

Ethics in Classroom Assessment

Teachers have the responsibility to carry out assessment practices, which have a critical importance in terms of teaching processes, in agreement with laws and ethical principles (Brookhart, 2011). This is because teachers make various judgments while performing the basic tasks of assessment, such as scoring and interpretation (Black & Wiliam, 2009; Qureshi et al., 2017). Many factors affect these judgments and practices of teachers, and some of them may lead to unethical assessment practices (Colnerud, 1997). These factors may be internal factors such as teachers' moral values and beliefs (Pantić & Wubbels, 2012), personal biases (McMillan, 2010), experiences (Duncan & Noonan, 2007), gender, and professional competencies (Biberman-Shalev et al., 2011), or external factors such as grade level (Randall & Engelhard, 2009), expectations of administrators and parents (McMillan, 2003).

While ethical assessment practices play an important role in preventing potential harm that may affect students in the classroom assessment process (Green & Johnson, 2010), unethical practices may provide incomplete or misleading information about students' performances (Schmeiser, 1995). Therefore, ethical principles should be considered in assessment activities (Pope, 2006). Ethical issues in classroom assessment are common (Gao et al., 2021) and frequently encountered. For example, teachers may express the correct answer as a clue during the exam or even erase students' mistakes during the grading process and mark the correct answer instead. Some teachers may post learning materials on the classroom walls to provide clues about the test or teach students the content of a test similar to the one that will be administered. Some teachers may overly facilitate the test and inaccurately measure student learning (National Center for Fair & Open Testing, 2011). As can be seen from the examples, ethical issues in classroom assessment are very diverse. Based on this diversity, Green et al. (2007) categorized the relevant principles into seven categories: *grading practice*, *communication about grading*, *multiple assessment opportunities*, *fairness/bias*, *confidentiality*, *test administration*, and *standardized test preparation*.

For ethical assessment practices within the category of *communication about grading*, students should be informed in advance about the activity, method, and contents to be considered before grading, and teachers should be in constant communication with students during the assessment process (Stiggins et al., 1989). Another category of ethics in assessment is preparing students to solve *standardized test preparation*. Pre-administering a test that is similar to the test to be administered or teaching students test-solving skills are examples of unethical activities (Mehrens & Kaminski, 1989). Additionally, students may perform differently in various types of assessments. For this reason, *multiple assessment opportunities* should be used to obtain sufficient information about their learning (Waugh & Gronlund, 2013). This is because only one test or task is insufficient to fully measure learning levels (Wiggins, 1994). Within the *fairness/bias* category, students' scores should reflect their learning completely, and feedback should be given about their strengths and weaknesses (Ory & Ryan, 1993). If only students' strengths or weaknesses are mentioned, they will be harmed, and this is an unethical practice (Gao et al., 2022). In *test administration*, test administrators or proctors should ensure that the measurement process is carried out appropriately (Nitko & Brookhart, 2014). Therefore, the conditions of test administration should be the same for all participants (Kline, 2000). Regarding *confidentiality* in assessment, teachers should protect the privacy and confidentiality of students' information (National Council on Measurement in Education [NCME], 1995). Accordingly, practices such as peer marking or disclosure of student scores to the whole class are unethical (Gao et al., 2022). *Grading practice* is also very important for assessment. Teachers should avoid non-grading factors (Popham, 1991) by minimizing the impact of factors that are not related to the objectives of the assessment (Oosterhof, 2002), such as students' ability, attitude, and participation in the course (Popham, 1991). This is because non-scoring factors may provide inaccurate information about their learning (Pope, 2006).

The Significance and Aim of the Study

Frequent encounters with ethical issues in classroom assessment have prompted researchers to conduct ongoing research on this topic (Gao et al., 2021). In the literature, there are studies examining the ethical perceptions about classroom assessment of different stakeholders in the education process; such as teachers (Alkharusi, 2016; İlhan et al., 2017; Fan et al., 2025; Liu et al., 2024a; Liu et al., 2024b; Yıldız & Kinay, 2020), education leaders (Johnson et al., 2008), (Fan et al, 2017; 2020), university students (Darabi Bazvand et al., 2023; Fan et al., 2022; Gao et al., 2022) and pre-service teachers (Bergman, 2013; 2018; Darabi Bazvand, 2023). In addition, there are also studies in which teachers' and pre-service teachers' perceptions of ethical principles in the classroom assessment are examined together (Cirlan, 2017; Green et al., 2007), and pre-service teachers' perceptions of ethical principles in classroom assessment in different cultures are examined comparatively (Fan et al., 2019; Liu et al., 2016).

Ethical issues in classroom assessment are universal and hold a very important place in educational activities. There is a need for ongoing research on this topic, and it is particularly recommended that studies be conducted in different cultures (Fan et al., 2017). In the literature, studies conducted on ethics in classroom assessment have yielded varying results. For this reason, it is of great importance to address the relevant issue by researchers around the world and to produce common solutions (Gao et al., 2019). In this context, this study examining Turkish pre-service teachers' perceptions of ethical principles in classroom assessment seems important. There are few studies on ethical principles in assessment in Türkiye (Ilhan et al., 2017; Yıldız & Kinay, 2020). Thus, the present study is important in shedding light on the topic and contributing to future research in the Turkish literature.

In one of the studies conducted in Türkiye, İlhan et al. (2017) adapted the "Adherence to Ethical Principles in Educational Assessment Scale" developed by Alkharusi (2016) into Turkish. This scale has three factors: test integrity, transparency, and confidentiality. In this study, six dimensions of ethics in assessment were emphasized in more detail: *confidentiality*, *multiple assessment opportunities*, *fairness/bias*, *grading practice*, *communication about grading*, and *test administration*. In another similar study, Yıldız & Kinay (2020) used the scale adapted by İlhan et al. (2017) to examine the level of secondary school teachers' commitment to ethical principles in educational assessment in terms of different variables. In the study, it was found that secondary school teachers were highly committed to ethical principles in educational assessment. Along with this result, it was determined that the level of teachers' commitment to ethical principles did not differ in terms of gender and professional seniority, while there was a differentiation according to teaching areas. In the current study, unlike the others, data was collected through scenarios. The participants gave their opinions on the hypothetical situations in the scenarios. Thus, another important aspect of this study is that it overcomes the social desirability experienced in other studies conducted using self-report scales (İlhan et al., 2017; Yıldız & Kinay, 2020). Another important aspect of this study is that it was conducted with pre-service teachers. Determining and improving pre-service teachers' perceptions and knowledge of ethical principles related to classroom assessment can help them perform these activities more effectively in their future professional lives. In light of this, the study aims to determine the level of perception of Turkish pre-service science teachers about ethical principles in classroom assessment.

Method

Research Design

In this study, a survey design was adopted due to the nature of the research questions. A survey design is a study conducted on the whole universe or a sample to be selected from it in order to reach a general conclusion on the universe consisting of a large number of elements (Cohen et al., 2018).

Participants

The participants of the study consisted of 607 pre-service teachers enrolled in different grade levels of science teaching programs at five state universities in Türkiye. Of these, 460 (75.8%) were female and 147 (24.2%) were male. In terms of grade levels, 151 (24,9%) were in the 1st grade, 141 (23,2%) were in the 2nd grade, 144 (23,7%) were in the 3rd grade, and 171 (24,9%) were in the 4th grade.

Data Collection Instrument

Data were collected using the "Scenarios Related to Ethical Principles in Classroom Assessment" questionnaire, which was developed by Green et al. (2007) and revised by Fan et al. (2022). The questionnaire consists of 15 scenarios, and these scenarios are related to the following categories

of ethics in classroom assessment: *confidentiality*, *multiple assessment opportunities*, *grading practice*, *fairness/bias*, *communication about grading*, and *test administration*. Participants were asked to answer each scenario as "ethical" or "unethical" in terms of ethical principles in classroom assessment. Responses that agreed with the experts were coded as "1" and responses that disagreed were coded as "0".

Data Collection Process

The data collection process took place face-to-face in classroom setting and was voluntary. Before the survey, participants were informed about the purpose of the study and told that they could stop answering at any time. Then, participants completed the survey form.

Data Analysis

In the analysis of the data, firstly, the rates of participants' agreement with the experts for each scenario were examined. Then, the agreement rates of the participants with the experts according to the ethics categories in the classroom assessment through the obtained ratios.

Findings

The participants' levels of perception of ethical principles are presented under separate subheadings for each category and scenario.

General Descriptive Findings for Categories

Table 1 shows the distribution of participants' agreement rates with experts according to the ethics categories of classroom assessment.

Table 1. *Distribution of Agreement Rates by Categories*

Category	General Agreement (%)	Category	General Agreement (%)
Confidentiality	77,27	Fairness/Bias	67,38
Multiple Assessment Opportunities	63,26	Communication About Grading	75,50
Grading Practice	57,50	Test Administration	23,97

As shown in Table 1, participants generally agreed with the experts. Participants showed the highest agreement in the categories of *confidentiality* and *communication about grading*. Agreement rates were slightly lower in the *multiple assessment opportunities*, *grading practice*, and *fairness/bias* categories than in the other two categories. Participants showed the lowest level of agreement in the *test administration* category.

General Descriptive Findings for Scenarios

The participants' agreement rates for scenarios in the *communication about grading* category are shown in Table 2.

Table 2. *Communication about Grading*

Scenario	Expert View	General Agreement (%)
Scenario 5	Unethical	78,3
Scenario 7	Unethical	61,8
Scenario 11	Ethical	86,5

When Table 2 was analyzed, 78.3% of participants responded that scenario 5 regarding "*asking questions about topics not included in the lecture notes*" was unethical. Similarly, 61.8% responded that scenario 7 regarding "*using rubrics in the assessment process*" was unethical. The majority of participants (86.5%) thought that in scenario 11 related to "*using rubrics in assessment and caring about students' ideas*" was ethical. The agreement rates of the participants for the scenarios in the *multiple assessment opportunities* category are shown in Table 3.

Table 3. *Multiple Assessment Opportunities*

Scenario	Expert View	General Agreement (%)
Scenario 3	Ethical	95,1
Scenario 14	Unethical	31,5

According to the data in Table 3, most of the participants (95,1%) thought that the practice in scenario 3 "*the use of various assessment methods*" was ethical. For scenario 14 on the same topic, 31,5% of the participants responded that such a practice would be unethical. The agreement rates for the participants regarding the scenarios in the *grading practice* category are presented in Table 4.

Table 4. *Grading Practice*

Scenario	Expert View	General Agreement (%)
Scenario 4	Ethical	73,6
Scenario 12	Unethical	42,8
Scenario 15	Unethical	56

Table 4 shows that 73.6% of participants thought that the practice in scenario 4 regarding "improving exam grades based on student course performance" was ethical. 42,8% of the participants responded that scenario 12 regarding "*awarding additional points to students' exams*" and 56% of the participants responded that scenario 15 regarding "*counting students' attendance in the exam grade*" was unethical. The agreement rates of the participants for the scenarios in the *confidentiality* category are shown in Table 5.

Table 5. *Confidentiality*

Scenario	Expert View	General Agreement (%)
Scenario 2	Unethical	77,6
Scenario 9	Unethical	76,9

When Table 5 is analyzed, 77,6% of participants thought that the practice in scenario 2 regarding "*grading and sharing of exam papers by peers*" was unethical. Similarly, 76,9% of the participants responded that scenario 9 regarding "*confidentiality of exam scores*" was unethical. The agreement rates of the scenario responses of the participants in the *fairness/bias* category are given in Table 6.

Table 6. *Fairness/Bias*

Scenario	Expert View	General Agreement (%)
Scenario 1	Unethical	84,2
Scenario 8	Unethical	65,7
Scenario 10	Unethical	52,2

Based on Table 6, 84,2% of the participants thought that the practice in scenario 1 regarding "*giving feedback only on students' strengths*" was unethical. Similarly, 65,7% of the participants responded that the scenario 8 regarding "*looking at the name while reading the exam paper*" was unethical, while this rate was 52,2% for scenario 10 regarding "*reflecting the emotional state of the student in the grade*". The agreement rates of the participants for the scenarios in the *test administration* category are shown in Table 7.

Table 7. *Test Administration*

Scenario	Expert View	General Agreement (%)
Scenario 6	Unethical	19,6
Scenario 13	Unethical	28,3

When Table 7 is analyzed, in scenario 6 regarding "*correcting a student's answers recorded in the wrong order*" a small portion of the participants (19,6%) think that such a practice is unethical, while the majority think that it is ethical. In scenario 13 regarding "*correcting an incorrectly answered question*" 28,3% of the participants think that such a practice is unethical.

Discussion and Conclusion

In this study, firstly, the agreement rates of pre-service science teachers with experts in terms of ethical categories of classroom assessment were examined, and it was determined that they generally had compatible opinions with experts (Table 1). Participants had the highest agreement in the categories of *confidentiality* and *communication about grading*. In the categories of *multiple assessment opportunities*, *grading practice*, and *fairness/bias*, the agreement rates were slightly lower compared to the other two categories. The *test administration* category was the area where participants showed the lowest level of agreement.

In the second stage, the perception levels of ethical principles in classroom assessment among pre-service teachers were analyzed separately for each scenario. According to the results, 78,3% of the participants deemed scenario 5, belonging to the *communication about grading* category, unethical (Table 2). A similar study found that 22,99% of Chinese and 91,33% of American pre-service teachers thought scenario 5 was unethical (Liu et al., 2016). In one of the similar studies conducted with American pre-service teachers (Bergman, 2013), 59,1% of the participants answered unethical, while this rate was 64,9% in the study conducted by Green et al. (2007). Similarly, in Cirlan's (2017) study, 51% of Finnish pre-service teachers answered unethical. According to the results obtained, it is seen that especially Chinese pre-service teachers have a lower rate of agreement with experts compared to other participants. According to the findings obtained from the current study, one of the reasons why Turkish pre-service science teachers generally have a higher rate of agreement with experts compared to pre-service teachers in other countries can be explained by the fact that they adopt more to keep the exam content within the limits of the course notes.

In scenario 7 of the same category, 61,8% of the participants answered unethical (Table 2). In one of the similar studies (Bergman, 2013), 98,9% of American pre-service teachers answered unethical, while in another study (Green et al., 2007), 97,4% of American participants gave the same answer. It is noteworthy that in the studies conducted by Bergman (2013) and Green et al. (2007), the agreement rates of the pre-service teachers with the experts were much higher compared to the Turkish pre-service science teachers. The reason for the participants' lower level of agreement may be that the importance given to the use of rubrics or group work in the education and training system in the other country where the study was conducted is higher than in Türkiye.

In scenario 11 of the same category, 86,5% of participants thought such a practice was ethical (Table 2). In a similar study conducted by Liu et al. (2016), 93,68% of Chinese and 97,11% of American pre-service teachers stated that it was ethical. In Cirlan's (2017) study, all Finnish pre-service teachers answered that it was ethical. It can be said that the results of similar studies in literature and the findings obtained are parallel. A possible reason for this result may be that participants believe an objective assessment process could be more beneficial thanks to the use of rubrics, and at the same time, they consider it important to take students' opinions into account during the assessment process.

In scenario 3 in the *multiple assessment opportunities* category, 95,1% of the participants answered ethical (Table 3). Liu et al. (2016) found that 68,97% of Chinese and 97,11% of American pre-service teachers answered ethical. In other studies (Bergman, 2013; Green et al., 2007), in which findings similar to the results in the literature were obtained, it was concluded that 99,1% of American pre-service teachers gave the ethical answer. In another parallel study (Cirlan, 2017), it was found that 91% of Finnish pre-service teachers thought it ethical. The results obtained from the current study are almost identical to those obtained in similar studies. However, it is noteworthy that the agreement rate of Chinese pre-service teachers with experts is lower than in other studies. The reason for this result may be that the frequency and purposes of using multiple assessment methods in the Chinese education system are different from other countries.

For scenario 14 in the same category, 31,5% of the participants responded that it would be unethical (Table 3). In Bergman's (2013) study, the rate of pre-service teachers who thought it was unethical was 73,7%, while this rate was 84% in Cirlan (2017). The rate in the study conducted by Green et al. (2007) is 77,2%. Notably, the rate of participants' agreement with experts is much lower compared to other similar studies in literature. The reason for this result can be explained by the frequent use of multiple-choice tests at all levels of the education system in Türkiye, especially in central exams (Buldur & Acar, 2019). The majority of pre-service teachers, who have probably taken many multiple-choice tests throughout their entire education life and will take many tests after graduation, see an assessment practice prepared only with multiple-choice test questions as ethical.

In scenario 4 in the category of *grading practice*, 73,6% of participants answered ethically (Table 4). In a similarly study with American pre-service teachers, Bergman (2013) found that 26% of participants answered ethically, while this rate was 33,3% in Green et al. (2007). Liu et al. (2016) found that 66,67% of Chinese and 39,31% of American pre-service teachers responded that the practice was ethical. In another study conducted with Finnish pre-service teachers (Cirlan, 2017), 80% of the participants stated that such a practice was ethical. The results of the studies show that the participants generally agreed with the experts at a higher rate, except for the American pre-service teachers. The American pre-service teachers' lower level of agreement with the experts compared to the others may be due to their belief that factors other than the exam should not have an impact on exam grades.

In scenario 12 in the same category, it was determined that 42,8% of the participants thought it was unethical (Table 4). In the study by Liu et al. (2016), 59,77% of Chinese and 47,98% of American pre-service teachers answered unethical. In another parallel study (Cirlan, 2017), 74% of Finnish pre-service teachers answered unethical. It is noteworthy that more than half of the Turkish pre-service science teachers in the current study disagreed with the experts. In addition, it is seen that the agreement rates of the participants and the American pre-service teachers with the experts were close to each other, while the Chinese and Finnish pre-service teachers showed a higher level of agreement with the experts. This can be explained by the fact that these related pre-service teachers perceive the expectation of giving additional points to all students as normal.

In scenario 15 of the same category, 56% of participants thought it was unethical (Table 4). In the study by Liu et al. (2016), 13,22% of Chinese and 35,84% of American pre-service teachers answered unethical. In one of the parallel studies (Bergman, 2013), 14,9% of American pre-service teachers stated that it was unethical, while this rate was 27,2% in the study conducted by Green et al. (2007). In Cirlan's (2017) study, 24% of Finnish pre-service teachers agreed that it was unethical. Accordingly, it is noteworthy that the agreement rate of participants in the current study with experts is higher than in other countries and that the results differ across countries. One possible reason for these differences may be the different beliefs and attitudes that pre-service teachers in different cultures adopt about class attendance.

In scenario 2 in the *confidentiality* category, it was determined that 77,6% of participants considered it to be unethical (Table 5). In Liu et al. (2016) study, 21,84% of Chinese and 63,58% of American pre-service teachers answered unethical. In another similar study, Cirlan (2017) found that 35% of Finnish pre-service teachers thought it was unethical. It is noteworthy that the rate of agreement with experts in the current study is higher compared to similar studies. A possible reason for this could be that pre-service science teachers' sense of trust in their peers is weaker than pre-service teachers in other countries, or that they are in a competitive education system due to high-stakes tests.

In scenario 1 in the category of *fairness/bias*, 84,2% of the participants answered unethical (Table 6). In Liu et al. (2016) study, 71,84% of Chinese and 74,57% of American pre-service teachers answered unethical. In similar studies conducted with American pre-service teachers, Bergman (2013) found that 62,7% and Green et al. (2007) found that 60,5% thought it was unethical. In Cirlan's (2017) study, 62% of Finnish pre-service teachers responded that it was unethical. In the current study, the agreement rate of the participants with the experts was higher compared to similar studies. This may be because the participants believed that sharing both the strengths and weaknesses of the students, while giving feedback after the assessment, would benefit them more.

In scenario 8 of the same category, 65,7% of participants responded that it was unethical (Table 6). In the study by Liu et al. (2016), 83,91% of Chinese and 69,36% of American pre-service teachers thought it was unethical. Bergman (2013) and Green et al. (2007) conducted studies with American pre-service teachers and found that 36% and 57,9%, respectively, answered unethical. Cirlan (2017) found that 51% of Finnish pre-service teachers answered unethical. In light of the findings obtained, it is seen that the agreement rate of the participants with the experts and the agreement rate of the American pre-service teachers in the study of Liu et al. (2016) are closer to each other.

In scenario 10 in the same category, 52,2% of the participants answered unethical (Table 6). In the study by Liu et al. (2016), 74,14% of Chinese and 64,16% of American pre-service teachers answered unethical. In the study conducted by Bergman (2013), 85,9% of American pre-service teachers had the opinion of unethical, while this rate was 75,4% in the study of Green et al. (2007). Cirlan's (2017) study found that 47% of Finnish pre-service teachers thought it was unethical.

In Scenario 6 in the *test administration* category, a low percentage of participants (19,6%) thought that such a practice was unethical, while the majority thought that it was ethical (Table 7). In Liu et al. (2016) study, 37,93% of Chinese and 13,29% of American pre-service teachers stated that it was unethical. Bergman (2013) found that 24,5% of American pre-service teachers and Green et al. (2007) found that 31,6% of them answered unethical. In parallel with the current study, Cirlan (2017) found that 12% of Finnish pre-service teachers thought that such a practice was unethical. Considering the results obtained, it is seen that participants from different countries have similar thoughts about the relevant scenario.

In scenario 13 of the same category, 28,3% of participants responded that it was unethical (Table 7). In Liu et al. (2016) study, 79,89% of Chinese and 41,62% of American pre-service teachers thought it was unethical. In similar studies, Bergman (2013) found that 96,6% of American pre-service teachers, and Green et al. (2007) found that 96,5% of them answered unethical. In Cirlan's (2017) study, 4% of Finnish pre-service teachers answered unethical. It is noteworthy that the participants' rate of agreement with experts is higher than that of Finnish pre-service teachers and lower than that of Chinese and American pre-service teachers (Liu et al., 2016). However, contrary to the responses given by Turkish science pre-service teachers in the studies by Bergman (2013) and Green et al. (2007), the agreement rates between pre-service teachers and experts are much higher. A possible reason for the low agreement of both Finnish pre-service teachers and most of the participants in the current study with experts may be that they think it is ethical to treat all students in the same way during the exam.

In general, when the rates of agreement with experts for scenarios were examined, it was found that in some scenarios the rates were close to each other, while in others there were significant differences. A possible reason for these differences may be the divergence of moral and ethical issues in the countries where the study was conducted, as moral and ethical issues have a significant impact on educational policies in a country.

Limitations and Recommendations

The results of the study are limited to the data collected from 607 pre-service science teachers from five different universities in Türkiye. It would be wrong to expect this sample to represent all pre-service science teachers in Türkiye. However, it can be assumed that the participants have similar characteristics to other pre-service science teachers because the universities affiliated with the Council of Higher Education in Türkiye apply a common teacher training curriculum determined centrally, and the pre-service teachers receive similar training. Therefore, it can be said that the results obtained in this study can be generalized to pre-service science teachers in Türkiye. However, to overcome the limitation, it is recommended to study with larger samples that can represent the participants in general. Another limitation of this study is that it was conducted with pre-service science teachers. It is recommended to conduct future studies with pre-service teachers from different programs. This study was conducted with undergraduate students. Since assessment practices are a very important point for all levels of education, it is recommended to investigate the ethical perceptions of students at different levels (secondary school, high school, graduate school, etc.) in future studies.

Data collection in this study was limited to hypothetical scenarios. The results obtained in terms of this limitation may not fully reflect the participants' perceptions of ethics in classroom assessment. To reach more in-depth information, it is recommended that future studies should be conducted with different research methods, and especially, qualitative data collection tools should be used. The study is limited to 15 scenarios related to ethical principles. These scenarios cannot be expected to cover all ethical principles in classroom assessment. Therefore, this limitation can be overcome by increasing the number of scenarios in new studies. The questionnaire used in the study consists of ethical and unethical options. As there may be gray areas in participants' perceptions (Liu et al., 2024b), it is suggested that future studies should consider this point.

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