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Investigation of the Reflections of Prospective Science Teachers' Preferred Assessment and Evaluation Approaches on Lesson Plans

Serpil KARA[1*]

[1]Prof. Dr., Necmettin Erbakan University, Ahmet Kelesoglu Education Faculty, Science Education Department, Konya, Türkiye

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ABSTRACT

The aim of the study is to examine the assessment and evaluation approaches preferred by pre-service science teachers through the lesson plans they prepared within the scope of Teaching Practice 1 course. The lesson plans prepared by the pre-service teachers were analysed in terms of the assessment and evaluation techniques they preferred according to the science subject areas and the distribution of the subjects according to the grade levels. The study was conducted with the document analysis method. In the study, lesson plans prepared by 65 prospective science teachers were analysed. The data obtained were analysed by document analysis and Excel program. The results demonstrated that pre-service science in the lesson plans prepared by the teachers, they mostly preferred traditional assessment and evaluation techniques, and among the traditional techniques, they mostly preferred physics subjects and mostly preferred multiple-choice tests and true-false techniques. Among alternative techniques, they mostly preferred biology subjects, and in biology subjects, they mostly preferred the structured grid technique. In the findings related to the distribution of the subjects in which they used assessment and evaluation techniques according to grade levels, it was found that pre-service teachers mostly preferred the subjects at the 5th and 6th grade levels, and in these subjects, they preferred true-false techniques from traditional techniques at both grade levels. Among the alternative techniques, structured grid and diagnostic branched tree techniques at the 5th grade level, concept map at the 6th grade level. 8th grade level subjects are included at a limited level.

Fen Bilgisi Öğretmeni Adaylarının Tercih Ettikleri Ölçme ve Değerlendirme Yaklaşımlarının Ders Planlarına Yansımalarının İncelenmesi

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ÖZET

Araştırmanın amacı, fen bilgisi öğretmeni adaylarının öğretmenlik uygulaması 1 dersi kapsamında hazırladıkları ders planları aracılığıyla tercih ettikleri ölçme ve değerlendirme yaklaşımlarının incelenmesidir. Öğretmen adaylarının hazırladıkları ders planları, fen bilgisi konu alanlarına göre ve konuların sınıf düzeylerine göre dağılımında tercih ettikleri ölçme ve değerlendirme teknikleri bakımından değerlendirilmiştir. Bu çalışmada durum çalışması araştırma metodolojisi ve veri toplama aracı olarak doküman analizi yöntemi kapsamında dokümanlar kullanılmıştır. Fen bilgisi öğretmen adaylarının öğretmenlik uygulaması I dersi kapsamında hazırladıkları ders planları doküman olarak ele alınmış, öğretmen adaylarının ölçme ve değerlendirme yaklaşımlarına ilişkin tercihleri analiz edilmiştir. Araştırmanın verilerini 2023-2024 eğitim-öğretim yılı güz döneminde öğretmenlik uygulaması I dersini alan ve bu ders kapsamında fen bilgisi öğretmen adaylarının (N=65) hazırladıkları ders planları oluşturmaktadır. Elde edilen verilerin doküman analizinde Microsoft Excel programı kullanılmıştır. Analiz sonuçlarına göre öğretmen adayları hazırladıkları ders planlarında en fazla geleneksel ölçme ve değerlendirme tekniklerini tercih ettikleri, geleneksel tekniklerden en fazla fizik konularını ve bu alanda çoğunlukla çoktan seçmeli test ve doğru-yanlış tekniklerini tercih ettiği, alternatif tekniklerden ise en fazla biyoloji konularını, bu alanda ise en fazla yapılandırılmış grid tekniğini tercih ettikleri tespit edilmiştir. Ölçme ve değerlendirme tekniklerini kullandıkları konuların sınıf düzeylerine göre dağılımına ilişkin bulgularında ise, öğretmen adayları çoğunlukla 5. ve 6. sınıf düzeylerindeki konuları tercih ettikleri, bu konularda ise geleneksel tekniklerden her iki sınıf düzeyinde de doğru-yanlış teknikleri tercih ettikleri saptanmıştır. Alternatif tekniklerden 5. sınıf düzeyinde en fazla yapılandırılmış grid ve tanılayıcı dallanmış ağaç tekniği tercih edilirken 6. sınıf düzeyinde ise kavram haritasının tercih edildiği sonuçlarına ulaşılmıştır. 8. sınıf düzeyi konularına ise sınırlı düzeyde yer verdikleri görülmektedir. Çalışmanın bulguları ışığında önerilere yer verilmiştir.

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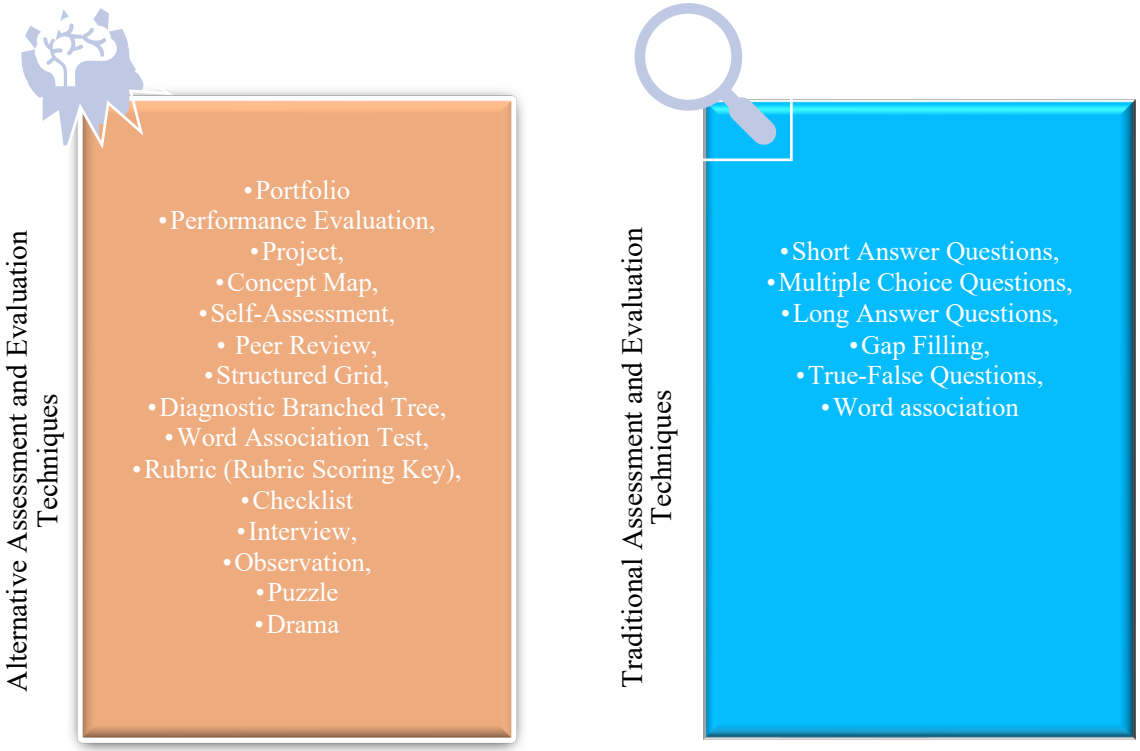
***Corresponding Author:** Serpil KARA, *serpilkara@erbakan.edu.tr*

INTRODUCTION

Rapid changes and developments in the fields of science and technology in the global context have brought about differences in the needs of individuals and societies. The differentiation of the roles expected from individuals within the scope of changing needs has also led to significant changes in the learning and teaching processes of individuals. Assessment and evaluation approaches play an important role in tracking the development and change of individuals, managing the improvement process and using resources effectively (Can, 2007; Özer, 2009). One of the educational inputs that enhance both academic and administrative work in higher education institutions is resource management (Akpan & Etor, 2015). According to Akpan & Etor (2015), the purpose of resource management in higher education is to produce quality graduates who can contribute meaningfully to the development of the nation. For this reason, it is important to evaluate the learning outcomes of prospective teachers in order to ensure that they have the necessary skills, knowledge and competence. There are at least three purposes for educational assessment: formative assessment to aid learning in the classroom; summative assessment for use at the classroom, school, or district level to determine student achievement levels; and program evaluation for comparison across classrooms, schools, districts, states, or countries. In the findings related to the distribution of the subjects in which they used assessment and evaluation techniques according to grade levels, it was found that pre-service teachers mostly preferred the subjects at the 5th and 6th grade levels, and in these subjects, they preferred true-false techniques from traditional techniques at both grade levels. Among the alternative techniques, structured grid and diagnostic branched tree techniques at the 5th grade level, concept map at the 6th grade level. 8th grade level subjects are included at a limited level researchers to study how new assessment methods can be used in classrooms, how assessments can be designed so that they are administered fairly to all students, and how various forms of assessment affect student learning, teacher practice, and educational decision-making (National Research Council (NRC), 2012)

Diversity arising from different factors in education (i.e., individual, educational level, course content, social environment, school facilities, etc.) plays an important role in ensuring the effectiveness and efficiency of assessment and evaluation practices. It is seen that alternative assessment and evaluation, which includes multi-focused assessment and evaluation approaches that can take into account individual differences, are included under different titles in the literature (DiMartino, Castaneda, Brownstein, & Miles 2007; Hamayan, 1995; Tan, 2019). The main purpose of using alternative assessment and evaluation techniques in the evaluation of classroom learning is to reveal what students can do, not what they have done, and to measure skills that cannot be measured by traditional assessment and evaluation methods (Dilmaç & Dilmaç, 2020). There are many different types of alternative assessment such as performance assessment, self-assessment, portfolio, peer assessment, journals, and student-teacher discussions (Bland & Gareis, 2018; Singh, Muhammad, Mostafa, Yunus, Noordin, & Darmi, 2022). In addition to offering new ways and approaches that motivate and inspire students to learn, alternative assessment types assess students' language skills on the basis of the originality of their language use (Alokozaya, 2022), encourage students to take responsibility as they evaluate the learning product together with the process (Ministry of National Education, 2018), and help educators measure mental and artistic processes more accurately and help students organize their own processes (Dilmaç & Dilmaç, 2020). Alternative assessment and evaluation techniques and traditional techniques in the literature are presented in Figure 1. (Bahar et al., 2015; Başol, 2015; Özenç, 2013):

Figure 1
Assessment and evaluation techniques



Purpose and Importance of Research

In the Ministry of National Education (MoNE) (2018) program, it is stated that the measurement and evaluation process being "suitable for everyone", "valid and standardized for everyone" is contrary to the nature of human beings and therefore, it is emphasized to act with the understanding of maximum diversity and flexibility in the measurement and evaluation process. On the other hand, the Higher Education Institutions (CoHE, 2018), which has an important contribution to the training of future teachers, has added the course of 'evaluation of classroom learning' to the science teaching undergraduate program, which is taken by 4th grade students as a field education elective course. When this situation is evaluated in the global context, in recent years the collection of assessment methods used especially in higher education has greatly expanded (Alokozaya, 2022) and their use in different disciplines and different fields has increased (Dilmaç & Dilmaç, 2020). The fact that pre-service teachers take the 'measurement and evaluation in education' course as well as the 'assessment of classroom learning' course in their undergraduate education shows that measurement and evaluation has an important place in education and training and that pre-service teachers are trained in the best way in this regard. However, it is also important to evaluate the efficiency of this situation, that is, how effective the assessment of classroom learning course taken by pre-service teachers is and how much pre-service teachers can reflect the information they have received in this course to other fields. On the other hand, it is thought that with the current study, On the other hand, this study can provide insights into

determining the extentthe extent to which pre-service teachers can reflect the information they have received in the 'assessment of classroom learning' course to the 'teaching practice I' course content, which they are independent of this course, in line with the objectives determined as the answer.

Within higher education, especially in teacher education undergraduate programs, importance to train qualified and competent teacher candidates in order to make an effective contribution to national development. In this context, it is necessary not only to provide prospective teachers with theoretical knowledge but also to meet their expectations regarding their practical experiences before graduation. In particular, the evaluation of pre-service teachers' education at the 4th grade level is a critical stage in terms of their preparation for their teaching careers.

Evaluating serves as a key factor the degree to which pre-service teachers reflect the knowledge gained from the “assessment of classroom learning” course to other fields of education. This study aims to determine how pre-service teachers associate the knowledge they acquire from this course with the content of the “Teaching Practice I” course. In this context, revealing to what extent this information is effective in the lesson plans of the pre-service teachers during the adaptation process to the field will make a valuable contribution to the efficiency of the “Teaching Practice II” course that they will take in the second semester of the 4th grade.

In addition, considering the pre-service teachers' measurement and assessment preferences before graduation, it is aimed to assess the extent to which alternative measurement and assessment approaches in the updated curricula (MoNE; 2018, 2024) are adopted. This evaluation has the potential to guide researchers in the field and hopes to contribute to the development of innovative and effective teaching approaches.

Literature review

In a study evaluating the frequency of teachers' use of traditional and alternative assessment tools and strategies, it was found that teachers preferred to use traditional methods (Williams-McBean, 2022). Uygun and Saraç (2020), investigating pre-service classroom teachers' preferences for assessment and evaluation techniques were examined through lesson plans, demonstrated pre-service teachers’ preference fortraditional assessment and evaluation techniques more. According to prospective primary school teachers, it was determined that it is appropriate to use alternative assessment and evaluation techniques in science subjects in order to realize permanent and meaningful learning (Palaz, 2022). As a result of the research on alternative assessment strategies and classroom practices of foreign language teachers, also they used traditional approaches as well as alternative assessment, and it was also found that teachers need to be exposed to current assessments that they can use in teaching and need training in this regard (Singh et al., 2022). In a similar study conducted with Turkish teachers, it was put forward that Turkish teachers did not use process-oriented complementary assessment and evaluation tools at a sufficient level and that traditional tools were preferred more by teachers (Türkben, 2022). Congruent with these results, Bulut et al. (2022) revealed that teachers predominantly preferred traditional methods (Bulut, Ceylan & Ceylan, 2022). On the other hand, students' perceptions of alternative assessment at university and school level were investigated and it was found that students had a positive perception of the application of alternative assessment (Alokozaya, 2022).

The existing literature embodies some studies conducted on the attitudes of teachers or pre-service teachers towards alternative assessment and evaluation (Avan et al., 2019), perceptions/opinions (Alokozaya, 2022; Alçın & İnanıcı, 2020; Bulut, Ceylan, & Ceylan, 2022; Karakuş, 2020; Kaya, 2018; Uygun, 2020), knowledge or usage levels (Singh et al., 2022; Şahin & Soylu, 2019; Williams-McBean, 2022; Yıldız & Yıldız, 2019), competencies (Çelebi & Kuşuçuran, 2019; Dilmaç & Dilmaç, 2020) or the effects of alternative assessment and evaluation approaches on students' academic achievement

(Bektüzün & Yel, 2019; Kepek & İzci, 2021) or attitudes (Aydoğdu, Tutak, & Kaya, 2020) as a result of their application to educational environments. In parallel with these results, in the analysis of the studies on alternative assessment and evaluation, it was found that there were studies in which the opinions of teachers / prospective teachers were mostly taken between 2008-2020 (Alokozaya, 2022; Şahin & Kaya, 2020). However, it was seen that the studies examining the level of transferring what they learned to another course content independently of the course they took remained at a limited level. Especially in terms of evaluating the ability of pre-service teachers to use and transfer the knowledge they have learned in one field to another field, this study is considered to be important in terms of evaluating the level of reflecting their knowledge of traditional or alternative assessment and evaluation approaches that they have learned while taking the course on the evaluation of classroom learning of the measurement and evaluation approaches preferred by pre-service teachers in the lesson plans they prepared in the Teaching Practice I course to other application areas without grade anxiety and will make important contributions to the literature. In this context, the research questions of the study are as follows:

In the lesson plans prepared by the prospective science teachers,

1- What are their preferred assessment and evaluation techniques?

2- What are the measurement and assessment techniques they prefer according to the subjects?

3- How is the distribution of the measurement and assessment techniques they use in subject areas according to grade levels?

METHOD

Research Design

In this study, case study research methodology was used. A case study can basically be defined as an intensive study about a person, a group of people or a unit, aiming to make generalizations about more than one unit (Heale & Twycross, 2017). As a data collection tool, documents were used within the scope of document analysis method. The document analysis method is the process of analyzing and interpreting written materials containing information about the phenomenon or phenomena under investigation (Yıldırım & Şimşek, 2018). This process involves the evaluation of data to create meaning and develop empirical knowledge (Bowen, 2009. age. p.27; cited in Özkan, 2021).

Document review is a method used for scientific research and provides research data by collecting, reviewing, questioning and analyzing various documents (O'Leary, 2017; Özkan, 2021). Documents that can be used in research can be agendas, attendance records, meeting minutes, manuals, notes, books, diaries, journals, program records, letters, charts, newspapers, artworks, program details, survey data, various public records and notebooks. These documents can be used as data sources for researchers (Labuschagne, 2003; as cited in Kıral, 2020). In the current study, the lesson plans prepared by pre-service science teachers within the scope of the Teaching Practice I course were handled as documents, and pre-service teachers' preferences for measurement and evaluation approaches were examined in terms of different variables.

Research Group

While determining the research group, convenience sampling, one of the purpose-oriented sampling methods, as well as criterion sampling methods were taken into consideration. Convenience sampling is the most frequently used but least desirable strategy in qualitative research (Patton, 2005). The aim of adopting this method is mainly related to its potential to lead (Bernard, 2011). In criterion sampling, as useful in terms of reflecting the characteristics of predetermined criteria to collect

information about targeted situations (Patton, 2014). While determining the research group, it was determined as a criterion that the pre-service teachers had taken measurement and evaluation, evaluation of classroom learning, Science Teaching I and II courses. The pre-service teachers completed all of these courses in the fall semesters of the 3rd and 4th grades. In this context, the pre-service teachers participating in the study meet the specified criteria. The data of the study consisted of the lesson plans prepared by pre-service science teachers (N=65) who took the Teaching Practice I course in the fall semester of the 2023-2024 academic year.

Collection of the Data

The data in the study were obtained from the lesson plans prepared by the prospective teachers for the subjects they were to teach in the internship schools within the scope of the Teaching Practice I course in accordance with the purpose of the research. According to the agreement signed between the Republic of Turkey MoNE (2018) and Council of Higher Education (CoHE, 2018) in line with the "Directive on the Teaching Practice of Prospective Teachers in Educational Institutions Affiliated to the Ministry of National Education" prepared by the Ministry of National Education General Directorate of Teacher Training and Education, prospective teachers have to fulfill the task of lecturing at least 4 (four) times during the practice period (MoNE, 2018; Article 7). However, this number is determined depending on the number of practicum students per practicum teacher. In this context, pre-service teachers are expected to plan the lesson for the subjects they will teach. Since the pre-service teachers were exposed to various teaching methods, approaches and models within the scope of the Science Teaching I and II courses they took in the 3rd grade, no criteria/limitations were imposed on the pre-service teachers in terms of both the method/model/approach they would use and the physical structure of the plan (such as giving a lesson plan template, including measurement and evaluation techniques/approaches in their plans). The pre-service teachers were not intervened in this regard. As a result, every lesson plan should include an assessment and evaluation section. In this context, the internship files submitted by the 4th grade pre-service teachers at the end of the Teaching Practice I course were collected and one lesson plan in this file was included in the evaluation. The lesson plan to be included in the evaluation was the first one among the plans in the internship file of each pre-service teacher. The reason for this is that a standard order was determined in the selection of the plans and the time period when all pre-service teachers first started their teaching practice courses was preferred. Since in the following weeks of the teaching practice courses, different mentor teachers in different practice schools and different faculty members working in the teaching practice course at the faculty will intervene in the lesson plans and their revision suggestions will be different, and this situation may affect the pre-service teachers' choices in the lesson plans, the first plans were evaluated with the idea that the evaluation would be healthier. The pre-service teachers prepared their lesson plans to cover one lesson hour (40 minutes) by using their knowledge of lesson plan preparation, which they frequently experienced in various course contents they took during their undergraduate education.

Analysis of the Data

The data were analyzed by document analysis in accordance with the nature of the research. The scholarly work indicates that the stages of document analysis are followed in different ways in the literature (Altheide & Sak, 2017; O'Leary, 2017), and based on these different stages, in the process of data analysis in the current research; data collection protocol, coding, data analysis -comparison- and reporting stages were followed (Sak et al., 2021). Within the scope of the research, a total of 65 lesson plans were analyzed. The measurement and evaluation section of the lesson plans were analyzed separately by the researcher and a faculty member who is an expert in science education, and codes and frequencies were determined. For the reliability of the study (Reliability= Agreement/Agreement + Disagreement x 100), the agreement between the coders was calculated (Miles & Huberman, 1994), and

as a result, 96% agreement was achieved. The remaining data were recorded by the researcher by creating codes for each of the measurement and evaluation techniques on the Microsoft Excel program and the necessary analyzes were made.

FINDINGS

In this section, firstly, the findings related to the assessment and evaluation techniques preferred by pre-service science teachers in the lesson plans they prepared are presented. Then, the findings related to the measurement and evaluation techniques they preferred according to the subject areas were presented. Finally, the findings related to the distribution of the subject areas in which they used measurement and assessment techniques according to grade levels were presented.

Findings Related to the Assessment and Evaluation Techniques Preferred by Prospective Science Teachers in Their Lesson Plans

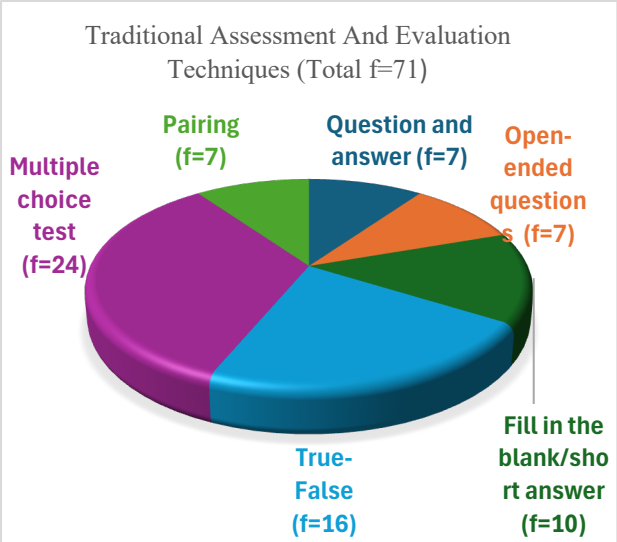
The findings regarding the assessment and evaluation techniques preferred by pre-service teachers are presented in Table 1.

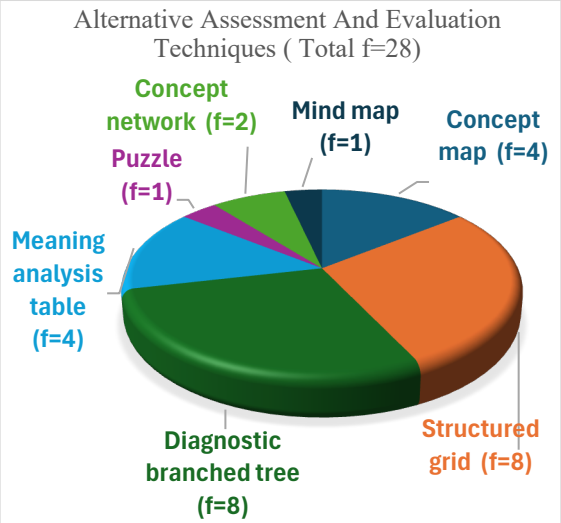
Table 1
Assessment and evaluation techniques preferred by pre-service teachers in their lesson plans

Assessment and Evaluation Approaches	Assessment and Evaluation Techniques	frequency (f)
Traditional Assessment and Evaluation Techniques	Question and answer	7
	Open-ended questions	7
	Fill in the blank/short answer	10
	True-False	16
	Multiple choice test	24
	Pairing	7
	Total	**71**
Alternative Assessment and Evaluation Techniques	Concept map	4
	Structured grid	8
	Diagnostic branched tree	8
	Meaning analysis table	4
	Puzzle	1
	Concept network	2
	Mind map	1
	Total	**28**

According to the findings in Table 1, it is seen that pre-service teachers mostly preferred traditional assessment and evaluation techniques (f=71) in their lesson plans, while alternative assessment and evaluation techniques (f=28) were significantly less preferred. The analysis of the preference of pre-service teachers for traditional assessment and evaluation techniques demonstrated that the most preferred techniques were multiple-choice tests (f=24), and the least preferred techniques were question-answer and open-ended questions (f=7). Among the alternative assessment and evaluation techniques, the most preferred techniques were structured grid and diagnostic branched tree (f=8) and the least preferred techniques were puzzle and mind map (f=1). The distribution of the frequencies of traditional and alternative techniques on the graph is shown in Figure 2.

Figure 2
Distribution of the frequency of preference of traditional and alternative techniques on the graph





Findings Related to The Assessment and Evaluation Techniques Preferred by Prospective Science Teachers in Their Lesson Plans According to Subject Areas

Table 2 shows the tendencies regarding the assessment and evaluation techniques preferred by pre-service teachers for physics, chemistry and biology subjects in their lesson plans.

Table 2

Assessment and evaluation techniques preferred by pre-service teachers in their lesson plans according to subject areas

	Assessment and Evaluation Techniques	Science subject areas		
		Physics (f)	Chemistry(f)	Biology (f)
Traditional Assessment and Evaluation Techniques	Question and answer	2	1	4
	Open-ended questions	6	-	1
	Fill in the blank/short answer	8	1	1
	True-False	10	1	5
	Multiple choice test	11	3	10
	Pairing	4	1	2
	Total	**44**	**7**	**23**
Alternative Assessment and Evaluation Techniques	Concept map	1	-	3
	Structured grid	2	1	5
	Diagnostic branched tree	3	4	1
	Meaning analysis table	1	-	3
	Puzzle	1	-	-
	Concept network	2	-	-
	Mind map	-	-	1
	Total	**10**	**5**	**13**

According to the findings in Table 2, pre-service teachers mostly preferred physics subjects (f=44) from traditional techniques in their lesson plans, and mostly preferred multiple-choice test (f=11) and true-false (f=10) techniques in physics subjects.

On the other hand, among the alternative techniques, pre-service teachers mostly preferred biology subjects (f=13), and in biology subjects, they mostly preferred the structured grid (f=5) technique. On the other hand, the least preferred traditional techniques were question and answer in physics (f=2), question-answer, fill-in-the-blank/answer, true-false and matching in chemistry (f=1),

open-ended questions and fill-in-the-blank/answer in biology (f=1); alternative techniques were concept map and semantic analysis table in physics (f=1), structured grid in chemistry (f=1) and diagnostic branched tree and mind map in biology (f=1).

Among the traditional techniques, open-ended questions in chemistry; among the alternative techniques, puzzles and mind maps in physics; semantic analysis table, puzzles, concept network and mind map in chemistry; and puzzles and concept network in biology were not preferred at all.

In general, pre-service teachers preferred chemistry subjects the least in both assessment and evaluation approaches.

Findings Related to The Distribution of Assessment and Evaluation Techniques Used by Prospective Science Teachers in Their Subject Areas According to Their Grade Levels

Table 3 presents the findings regarding the distribution of the assessment and evaluation techniques used by pre-service teachers in the subject areas of their lesson plans according to their grade levels.

Table 3

The distribution of the assessment and evaluation techniques used by pre-service teachers in their subject areas according to their grade levels

	Assessment and Evaluation Techniques	Physics subject area				Chemistry subject area				Biology subject area			
		Class levels(f)				Class levels(f)				Class levels(f)			
		5.	6.	7.	8.	5.	6.	7.	8.	5.	6.	7.	8.
Traditional Assessment and Evaluation Techniques	Q. and ans.	3				1				1	1	2	
	Op-en Q.	3	3								1		
	Fill blank/short	4	3		1				1		1		
	True-False	6	2	1	1	1					5		
	Mul. C. test	3	1	5				2	1	2	2	2	4
	Pairing	2	1		2	1					2		
	Total	**21**	**10**	**6**	**4**	**3**	**-**	**2**	**2**	**3**	**12**	**2**	**4**
Alternative Assessment and Evaluation Techniques	Concept map			2							3		
	Structured grid	1		2					1	3	1		
	Diagnostic b.t	1		3		2					1		
	Mea. An. table										3		
	Puzzle												
	Concept net.		1										
	Mind map									1			
	Total	**2**	**1**	**7**	**-**	**2**	**-**	**-**	**1**	**4**	**8**	**-**	**-**

When Table 3, which shows the findings on the distribution of the assessment and evaluation techniques used by the pre service teachers in the subject areas in their lesson plans according to the grade levels. The pre-service teachers mostly preferred the subjects at the 5th (f=21) and 6th (f=12) grade levels. At the 5th grade level, mostly physics topics were used, and it was determined that they preferred the true-false technique (F=6) among the traditional techniques, while they preferred the structured grid and diagnostic branched tree technique (f=1) among the alternative techniques. At the 6th grade level, biology subjects were preferred the most, and it was observed that the true-false technique (f=5) was used the most among the traditional techniques, while concept map and semantic analysis table techniques (f=3) were used among the alternative techniques.

Conclusion and Discussion

In this study, the assessment and evaluation techniques selected by pre-service science teachers in line with their preferences in the lesson plans they prepared in the Teaching Practice I course and the distribution of these techniques according to subject and grade level components were examined. It was found that the pre-service teachers mostly preferred traditional assessment and evaluation techniques in their lesson plans and among these techniques, they mostly preferred multiple-choice test technique. Among the alternative assessment and evaluation techniques, pre-service teachers mostly used structured grid and diagnostic branched tree techniques in their lesson plans.

The current body of research integrates studies revealing that teacher (Duran, 2013; Okur, 2008; Williams-McBean, 2022) or pre-service teachers (Uygun & Saraç, 2020) mostly prefer traditional measurement and evaluation techniques in studies conducted in various time periods, which is in parallel with the results of the current study. While Uygun and Saraç (2020) concluded that the question-and-answer technique was preferred the most among the traditional techniques in their study, the current study indicated varied findings in that the multiple-choice technique is mostly preferred. Another situation that differs from the studies is that while performance/project assignments are mostly preferred among alternative techniques (Karakuş, 2020; Okur, 2008; Uygun & Saraç, 2020), structured grid and diagnostic branched tree techniques are the most preferred techniques in this study. Yunus (2018) took students' opinions about the alternative techniques used in the teaching process in a study and concluded that students enjoyed using structured grid and then diagnostic branched tree techniques the most. Similarly, Kepek and İzci (2021) and Halacı (2012) took the opinions of students about alternative techniques in their studies and concluded that students generally had positive opinions about the use of structured grid and diagnostic branched tree and wanted them to be used in teaching. When evaluated in the context of these positive opinions, the pre-service teachers' preference for these two techniques among the alternative techniques in their lesson plans reflects the consistency between the results. In addition, it is among the results that these techniques are significantly more effective in increasing academic achievement (Kepek & İzci, 2021).

Studies conducted in various countries and at different grade levels are generally conducted to determine students' perceptions or attitudes about alternative assessment and evaluation (Alokozaya, 2022; Ayu Fajarsari, 2016; Barnard Bachelor, 2017; Hameda Suwaed, 2018; Irawan, 2017). As a result of these studies, it was concluded that students' perceptions and attitudes towards the use of alternative techniques were positive. The fact that alternative techniques perceived positively by students are less preferred by teachers or pre-service teachers in national or international studies so far with the current study (Duran, 2013; Singh et al., 2022) is important and should be among the issues that need to be studied.

Another important issue that draws attention in the issue that of the current study but is not reflected in the findings because it is not included in any of the traditional or alternative assessment techniques categories in the literature is the Wordwall technique (f=13). Wordwall is defined as an online assessment tool that gamifies assessment categories such as question-answer, matching, short answer, multiple choice and true-false in the form of interactive tests (Khairunisa, 2021; Rahmasari, Murdiono, Sunarso, 2022; Shiddiq, 2021). Although Wordwall is technology-supported in accordance with today's conditions, it is noteworthy that it is based on traditional assessment and evaluation approaches, but it can also be used effectively in individual and group assessments. On the other hand, there is the "Scratch and Challenge Board" technique that has taken its place in literature under the name of alternative assessment techniques. This technique is defined as an alternative assessment that brings together different materials such as visuals, colors, and visual effects, and evaluates student performance through presentation, action, peer and group activities, or a combination of these through collaborative

visualization of creative ideas (Sulaiman et al., 2021). At the same time, when the content of CoHE (2018) science teaching undergraduate program is examined, the teaching of web 2.0 tools is among the subjects of the 'Material Design in Science Teaching' course in the 3rd grade and techniques such as Scratch and Wordwall are taught within the scope of this subject content. At this point, why did the pre-service teachers prefer the Wordwall technique, which reflects the traditional understanding, instead of the 'Scratch and Challenge Board' technique? As an answer to this question, although the opinions about alternative techniques are positive and support academic achievement, traditional methods cannot be easily abandoned.

The distribution of the subjects included in the lesson plans prepared by the prospective teachers is as follows. They included mostly physics and least chemistry subjects in traditional assessment and evaluation techniques and mostly biology and least chemistry subjects in alternative assessment and evaluation techniques. Based on these results, pre-service teachers prefer physics subjects and multiple-choice test technique among traditional techniques, while they prefer biology subjects and structured grid technique among alternative techniques, so they feel themselves more competent in these fields and techniques. On the other hand, it can be inferred that they did not feel themselves at a sufficient level because both techniques included chemistry subjects the least. When we look at the distribution of the questions in the PISA 2022 (OECD, 2023) exam, which measures science literacy at the international level, most of the questions are related to matter and therefore reflect chemistry topics. Therefore, it can be concluded that it is important to give importance to the preference of chemistry subjects in lesson plans and to utilize alternative assessment and evaluation techniques in this subject area.

When the findings related to the distribution of the subjects in which pre-service teachers used measurement and evaluation techniques in their lesson plans according to the grade levels were examined, it was found that pre-service teachers generally prepared their lesson plans by preferring the subjects at the 5th and 6th grade level. On the other hand, 8th grade level subjects are included at a limited level. It was observed that the pre-service teachers who went to the internship said that exam-oriented studies were carried out in the 8th grade, so mostly multiple-choice tests were used and alternative evaluations were given very little space. Based on the findings of the study, when analyzed according to the grade levels, it can be interpreted that the reason why pre-service teachers prefer the lesson plan the least at the 8th grade level is that these grade levels are more exam-oriented rather than lecturing and multiple-choice test questions are included. As a matter of fact, Williams-McBean (2022) concluded in his study that school policies requiring grade point averages and express positive attitudes towards exams affect teachers to use traditional methods despite the type of school. However, the fact that the lesson plans prepared by pre-service teachers mostly did not include alternative methods at the 5th and 6th grade levels, which was not in line with the expectations, was found to be a surprising finding despite the expected results of the study.

SUGGESTIONS

The results of the studies in the related literature show that teachers' knowledge and skills in participating in effective assessment practices need to be improved (Sewagegn, 2019; Organization for Economic Cooperation and Development [OECD], 2019). In order to determine what teachers need, it is important to identify current assessment practices and to be able to understand and explain these practices (Williams-McBean, 2022).

It was determined that answer keys (rubrics) related to the measurement and evaluation approaches preferred by the pre-service teachers in their lesson plans, which is considered as an important issue observed during the process of the study. Among the 4th grade undergraduate courses, within the scope of the 'assessment of classroom learning' course, theoretical knowledge of both

traditional and alternative techniques is given, the creation of a rubric for the measurement and evaluation technique used, the issues to be considered while creating it, and the information that this rubric should be added to the lesson plan.

Teaching practice is a period in which pre-service teachers are part of the education process. During this period, pre-service teachers can develop their teaching skills in one or more classrooms under the supervision of the teacher in charge. During this practicum, pre-service teachers follow the teachers in charge at their grade levels and teach lessons under their supervision. In this process, pre-service teachers may have different experiences and expectations depending on the grade levels and subjects. Pre-service teachers may think that the choice of a particular class and subject should be in accordance with their preferences. However, pre-service teachers' choice of grade level and subject matter in the teaching practicum process may not only depend on the pre-service teacher's preference. Since pre-service teachers had to follow teachers in charge of different grade levels in their internship schools, they may have had to choose the subject areas and grade levels reached in the study. Although the first lesson plans were taken into consideration in order to prevent these situations from affecting the study, different approaches and criteria can be considered in this regard. In our country, more detailed analysis of criteria such as the schools preferred within the scope of teaching practice, determination of responsible teachers, etc. can be made, and more comprehensive information can be obtained by examining the lesson plans within the scope of the teaching practice II course.

Another issue that was observed among the results of the study but not reflected in the findings of the study and considered to be important, was that the pre-service teachers mostly (N=57) prepared their lesson plans according to the 5E or 3E learning model and to a limited extent (N=8) according to the TGA (Prediction-Observation-Explanation) learning model. It is noteworthy that pre-service teachers mostly used the 5E or 3E learning model in their lesson plans although they learned many learning models, methods and approaches in the 'science learning and teacher approaches' course among the 2nd year undergraduate courses. The extent to which the selected learning models, methods and approaches can affect the lesson plan process and even the preferred assessment and evaluation approach can also be investigated.

Ethical Statement

In this study, qualitative research design was applied using document analysis method. In the document analysis method, there is no need for ethical permission as written materials containing information about the phenomenon or phenomena being analyzed.

Author Contributions

Research Design, Data Collection, Research - Data analysis – Validation, Research - Data analysis – Validation, Writing the Article and Revision and Improvement of the Text (CRediT 1) Author 1 (%100)

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Conflict of Interest

There are no conflicts of interest to declare

Sustainable Development Goals (SDG)

Sustainable Development Goals: 4 Quality Education (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all)

Sustainable Development Goals: 17 Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

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