



A Sample Lesson Design Carried out With Pre-Service Science Teachers for the Use of a Portfolio Supported by the Feedback Process

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Abstract

It was aimed in this study to design a lesson, carried out with pre-service science teachers, for the use of the portfolio based on the feedback process in the teaching of classroom assessment methods and to reveal the applicability of this lesson. In this study, carried out using qualitative research methods, an action research design was used. A total of 12 pre-service science teachers were the participants of the study. The study was conducted in the Assessment of Classroom Learning elective lesson. Data in this study were obtained from reflective writings of the preservice teachers and interviews conducted with them. Content analysis and descriptive analysis methods were used in the analysis of the study data. As a result of the study, the lesson designed to teach in-class assessment methods was found to be effective and beneficial by the pre-service teachers, and in particular, the feedback given to them was noted to be effective in assisting them to see their own mistakes and correct these mistakes and they reported seeing the improvement in themselves throughout the portfolio process. The study, which was carried out by using a portfolio supported by feedback, presented an exemplary lesson model that can be used in the teaching of classroom assessment methods.

Keywords: Feedback; portfolio; classroom assessment; action research; pre-service teachers

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1. Introduction

1.1. Formative Assessment and Portfolio

The starting point of the studies carried out in the field of education in recent years is the fact that the most important thing today is not only the acquisition of knowledge but

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also the skills and practice necessary to implement the strategies for life after graduation. In order to provide individuals with knowledge and skills that they can use in daily life, a good learning-teaching process is not enough itself and there is also a need for an effective assessment and evaluation. Assessment is at the heart of learning. Assessment of learning is crucial for making decisions about what learners have learned and how their success rate in achieving the pre-determined learning goals. As a result of a good assessment, effective and productive learning takes place (Stiggins, 1994). Assessment and evaluation applications in education are an integral part of education and assessment should not only be result-oriented but also includes the process (Ministry of Education [MoNE], 2018).

When special attention is paid to student learning, an assessment can be considered beneficial and consistent for both teachers and students. With the constructivist approach, the traditional assessment and evaluation approach has been insufficient and the learning process has also been included in the assessment (Baki & Birgin, 2004). Especially the social constructivist approach, which emerged under the leadership of Vygotsky, puts the focus on the social context, culture and collaborative dimensions of learning (Terwel, 1999). In the social constructivist approach, which forms the basis of the theoretical framework of the study, a group study is more important than an individual one.

The type of assessment, which is based on the principle of determining the learning needs of the students and teaching them accordingly and the process, is called formative assessment (Liu & Carless, 2006). The formative assessment type reveals students' prior knowledge and covers the processes of shaping the teaching accordingly, beyond grading (Bulunuz ve Bulunuz, 2013; Eberle & Keeley, 2008). Yalaki and Bayram (2015) concluded in their study with preservice chemistry teachers that formative assessment increases the success and effectiveness of learning. The main purpose of formative assessment is to improve students' knowledge, and skills as well as general skills such as understanding or problem-solving in some content areas (Shute, 2007). In this aspect, it is predicted that formative assessment can improve the quality of learning. The feedback process and portfolio, the focus of this study, are forms of formative assessment.

Alternative assessment tools are used in formative assessment. These are tools that allow students to reflect on their performance in the process compared to traditional assessment tools and are prepared to objectively assess this performance (Pekbay & Koray, 2020). These assessment tools, different from the traditional assessment and evaluation methods, include process-oriented methods that monitor the student's development and consider assessment as a part of learning (Acar & Anıl, 2009). One of the alternative assessment and evaluation tools is portfolios. Words such as “development file” and “product selection file”, which have the same meaning as portfolio, are also used in the literature (Öncü, 2009). The portfolio is a systematic collection of

examples of the work of students during the learning process (Supranata and Hatta, 2004). Portfolios, as an alternative assessment method, attract the attention of many teachers who want their students to participate in their own assessment processes and at the same time develop higher-order thinking skills and find a more comprehensive and meaningful way to assess the knowledge (Parlakayıldız, 2019). A portfolio is important as students gather all their work and demonstrate their knowledge, skills and capacities while creating their portfolios. With the help of a portfolio, the development, progress and success of students' learning are monitored (Klenowski, 2002). Providing feedback to students at this stage is extremely important for their learning.

1.2. Feedback in Higher Education

Feedback plays a key role in formative assessment (Hattie and Timperley 2007). Feedback is a process that improves students' future work by providing information about the strong and weak areas in their performances (Oğuz, 1993). Also, feedback is an important mechanism for students to evaluate their own learning and their own development. Studies show that feedback can improve students' learning (Black & Wiliam, 2018; Evans, 2013; Hattie & Timperley 2007). Hattie and Timperley (2007) stated in their study that while feedback may help students' learning, sometimes it has no effect, and may even have a negative effect on students' learning and motivation. Because the feedback process is complex. Students may experience some difficulties when trying to learn from feedback. Feedback can become useless for students when it is received too late in the learning process (Mulliner and Tucker 2017; Weaver, 2006). When students do not have the opportunity to review the feedback and resubmit, this limits their participation in feedback (Taras, 2006). There is a growing consensus on the background of such results that there are studies to determine the qualities of effective feedback practices and providing feedback practices that would increase motivation (Bader et al., 2019). At this point, the participation of students in the feedback process is an important step in effective feedback practices (Black & William, 2018).

Findings from the Student Experience Survey in Australia (Krause et al., 2005) and the National Student Survey in the United Kingdom (Higher Education Funding Council for England, 2017) show the importance of feedback, particularly in higher education. Feedback studies also play a key role in Turkey, especially within the scope of efforts to improve the quality of higher education. Efforts to increase the quality of universities in our country started in the 1990s. Therefore, an important step was taken in 2006 by establishing the "Higher Education Qualifications Commission" to harmonize and standardize universities with the "Qualifications Framework for the European Higher Education Area" and "European Qualifications Framework for Lifelong Learning" (Higher Education Institution, 2010). Performance assessment practices in universities by taking student feedback into account are at the forefront of studies to increase quality

(Damar et al., 2015). However, studies conducted within the scope of higher education regarding feedback, especially within the framework of teacher education in Turkey, have mostly focused on the importance of feedback (Akalın, 2014), views on feedback (Çakır, 2010; Kırbaç et al., 2017; Pekbay and Koray, 2020; Öntaş & Kaya, 2019; Köğçe et al., 2012), relational and interventional studies on feedback (Akkuzu Güven & Uyulgan, 2020; Aşçı & Erturan İlker, 2018), and the features of feedback (Ülper, 2012). However, feedback is increasingly recognized as a complex concept within higher education (Price et al., 2011; Mulliner & Tucker 2017). Studies in which the entire lesson is designed according to the feedback process and the students are directly involved in this process are limited in science education.

1.3. Significance and Purpose of the Study

The starting point of this study has been feedback, the importance of which is increasing day by day to increase the quality in every field. Teachers play a key role in changing assessment practices. Therefore, the skills required from teachers in their professional life should be gained by pre-service teachers before their professional lives start. Traditional student assessment tools are based on testing and reproduction. They are not focused on assessing the ability of students to perform tasks in real situations, independently find information and acquire the necessary knowledge. In order to develop formative assessment practices, it is important to examine the opinions of pre-service teachers, especially future teachers, regarding their participation in formative assessment practices and to design a lesson in line with this.

There are studies on this subject in the literature (Aydeniz & Dogan, 2016; Aydeniz & Pabuccu, 2011; Black & Wiliam 1998; Buck et al., 2010; Boud & Falchikov 2007). However, when the portfolio is the main formative assessment and learning tool, there is a limited number of studies on how feedback is given and how trainees receive feedback (Bader et al., 2009; Burhanudin et al., 2009; Steen-Utheim & Hopfenbeck, 2009; Tillema & Smith 2000). In their study with university students, Steen-Utheim and Hopfenbeck (2009), based on an in-depth analysis of undergraduate students' reflective writings, examined students' experiences with verbal and written feedback and how they acted on this feedback by preparing a portfolio. The study results indicated that the overall experience of students in receiving feedback was positive and that students took responsibility during the feedback process.

In line with these observations, it was aimed in this study to determine the usability of the portfolio based on the feedback process in the teaching of classroom assessment methods and to reveal its applicability. Based on this, the question of the study was; "How to design an Assessment of Classroom Learning Course for the use of portfolios supported by the feedback process, and what are the opinions of pre-service science teachers about this designed lesson?" And the sub-questions are;

1. What are the opinions of pre-service teachers on the use of portfolios within the scope of the designed lesson?
2. What are the opinions of the pre-service teachers about the feedback process?
3. What are the opinions of pre-service teachers on the preparation of in-class assessment methods?
4. According to pre-service teachers, how can the effectiveness of the lesson designed for the use of portfolios supported by the feedback process be increased?

2. Method

2.1. Research Design

This study was planned as action research, one of the qualitative research methods, to design a lesson, carried out with pre-service science teachers, for the use of the portfolio based on the feedback process in the teaching of classroom assessment methods and to reveal the applicability of this lesson. Action research is an approach that aims at change in order to improve the action in a social event (Taylor, 2002), and is a process for understanding and improving the quality of teaching that takes place in the classroom (Johnson, 2005). Liberating/developing/critical action research, one of the action research types, was used in the study. In this approach, the aim was to make the practitioner critically question their own practices by providing new knowledge, skills and experiences to the practitioner (Yıldırım & Şimşek, 2021). Since the researcher was also a practitioner in this study, he/she always looked at his/her own work critically during the practices and gained new experiences about this lesson.

2.2. Action Research Process

Although there are different stages related to action research in the literature, action research basically involves identifying the problem and applying the solution for improvement (Güler, Halıcıoğlu, & Taşgın, 2015). The study was carried out in four stages using Tripp's (2005) action research cycle. These stages are planning, implementation, identification and evaluation.



Figure 1. Action research process (Tripp, 2005)

As seen in Figure 1, information was gathered by reviewing the literature on the situation in the first stage, and then the implementation process of the study was planned. In the second phase, the planned change was implemented. The data obtained during the study contributed to the development of the action plan. The identification stage is the stage in which the practical effects of the implemented action plans are tried to be understood. In the last stage, the positive and negative aspects of the action plans were evaluated. Based on the data collected at regular intervals, the effects of the application were determined. The opinions of the pre-service teachers about the action plan have been analyzed in detail.

2.3. *Participants*

A total of 12 pre-service teachers studying in the third year in the department of science teaching of a public university in the spring semester of the 2021-2022 academic years were the participants of the study. The implementation process of the study included all pre-service science teachers studying in the third year. While presenting the data about the participating pre-service teachers, the code names were used instead of their real names.

2.4. *Implementation Process*

The study was conducted in the "Assessment of Classroom Learning" elective lesson which is taught in the spring semester of the 3rd year in the Department of Science Education. Within the scope of the lesson, pre-service teachers individually prepared a portfolio on five in-class assessment methods each week in line with the acquisition of their choice from the science curriculum. These are examining the acquisitions according to Bloom's Taxonomy, preparing multiple choice-matching-true-false, fill-in-the-blanks-short answer-written exam questions, preparing alternative assessment and evaluation

techniques, and rubrics development. Furthermore, pre-service teachers prepared reflective writings about the portfolios they prepared. Pre-service teachers created their portfolios from these in-class assessment methods and reflective writings they have prepared.

The assignments prepared by the pre-service teachers were evaluated by the researcher every week. In the evaluations, face-to-face feedback was given according to the characteristics of the in-class assessment methods about the assignments of the pre-service teachers. Written feedback on each assignment was also provided. The pre-service teachers, who received verbal and written feedback about the assignments they prepared, made necessary corrections on the assignments in line with the feedback. They have included both the initial and corrected versions of assignments in their portfolio files. The portfolio preparation process, supported by the feedback, took nine weeks. The implementation process is given in Table 1 in detail.

Table 1. Weekly implementation process

Weeks	Practices
1. Week	Introduction of the course, information about the portfolio
2. Week	The role of assessment in teaching
3. Week	Acquisitions and Bloom's Taxonomy <i>Portfolio Study-1: Examination of Acquisitions According to Bloom's Taxonomy</i>
4. Week	High-Quality In-Class Assessment
5. Week	Selected Answer Evaluation: Multiple choice, True-false, Matching <i>Portfolio Study-2: Preparing questions</i>
6. Week	Assessment with Open-Ended Questions: Fill in the Blanks, Short Answer, Written Exams <i>Portfolio Study-3: Preparing questions</i>
7. Week	Alternative Assessment-Evaluation: Observation, Interview, Working Papers, Concept maps, <i>Portfolio Study-4: Preparing three examples from the learned tools</i>
8. Week	Alternative Assessment-Evaluation: Performance Evaluation, Peer and Self-Evaluation <i>Portfolio Study-5: Rubrics Development</i>
9. Week	Evaluation of the prepared portfolios, Obtaining the opinions of pre-service teachers

In the first week, pre-service teachers were informed about what they would learn in this lesson, the assignments they would prepare, and the portfolio preparation process supported by the feedback. In the second week, in-class assessment methods were explained by the researcher in general. Starting from the third week, the pre-service teachers have started to prepare their portfolios. The portfolio preparations process took five weeks. In the last week, the researcher made a general assessment of the portfolios prepared by the pre-service teachers and took the opinions of the pre-service teachers.

2.5. Data Collection Tools

In the study, the data were obtained from the reflective writings prepared by the pre-service teachers after each study and the interviews.

2.5.1. Semi-structured interview form

A semi-structured interview form prepared by the researcher was used to determine the opinions of pre-service science teachers on the use of portfolios supported by feedback. Expert opinions were obtained for the content validity of the prepared form, and then, interviews were completed with all the pre-service teachers in 30-40 minutes. In the open-ended interview form, there were a total of nine questions about the opinions of the pre-service teachers on the usability of the portfolio in the "Assessment of Classroom Learning" lesson, the feedback used in the process, and the implementation process. The sample questions are as follows:

1. Do you think the portfolio preparation process contributed to you? If yes, how did it contribute? If not, how?
2. What are your positive and negative opinions about the feedback given in the process?

2.5.2. Reflective writings

Pre-service teachers prepared reflective writings about what they thought about the work they prepared each week, the areas they had the most difficulties and enjoyed while completing their work, and what they suggested about the work, and placed these writings in their portfolios. The suggestions of the pre-service teachers were especially taken into account for the next study topic, and these writings were used as data collection tools to determine the effect of the practice on the pre-service teachers.

2.6. Data Analysis

In this study, the data were analyzed using the content and descriptive analysis method with the help of themes and evaluation criteria. Content analysis, one of the qualitative data analysis techniques, was used to analyze the data obtained from the interviews. The content analysis aims to organize and interpret these data by bringing

together interrelated data under certain themes (Yıldırım & Şimşek, 2013). The qualitative data in the study were evaluated in accordance with the categories extracted from the data during the analysis, not with a coding process determined before the data analysis in line with the theoretical framework. Evaluation of the portfolio use process supported by the feedback in the light of the data obtained from the opinions of the pre-service teachers through the open-ended interview form was gathered under four themes, which were "opinions on the use of the portfolio", "opinions on the feedback process", "opinions on the preparation of in-class assessment methods", and "suggestions for the process".

The data obtained from the reflective writings prepared by the pre-service teachers were analyzed with descriptive analysis. Descriptive analysis is the summarization and interpretation of the obtained data according to predetermined themes. The purpose of descriptive analysis is to present the readers with direct quotations in order to reflect the opinions of the participants in a noteworthy way (Yıldırım & Şimşek, 2008).

3. Results

It was aimed in this study to determine the usability of the portfolio based on the feedback process in the teaching of classroom assessment methods and to reveal its applicability. In this context, the data were presented according to the determined themes.

3.1. Findings on the theme of opinions on the use of portfolios

The opinions of the pre-service teachers on the use of portfolios supported by the feedback were evaluated under three sub-themes: the contributions of the practice, the favorite aspects of the practice and the difficulties experienced during the practice. The sub-themes and codes created are shown in Figure 2 in detail.

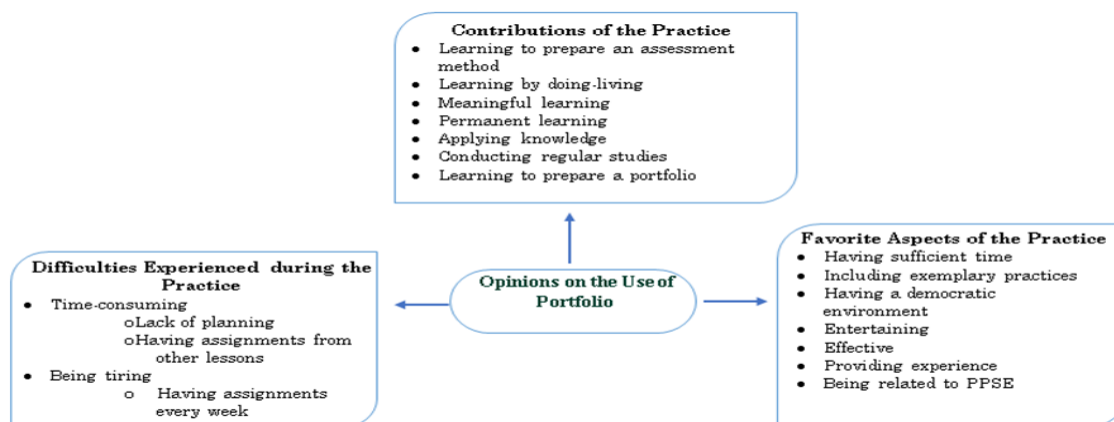


Figure 2. Sub-themes and codes related to the theme of opinions on portfolio use

What the pre-service teachers mentioned about the portfolio process such as "learning to prepare an assessment method, learning by doing-living, meaningful and permanent learning, applying knowledge, leading to regular studies and learning to prepare a portfolio" were coded under the contributions of the practice sub-theme. Pre-service teachers stated both in their interviews and in their reflective writings that the process contributed to permanent learning the most. Pre-service teacher 1 stated his/her opinion as such: *"The process has helped me a lot. I achieved more effective and permanent learning. If we learned this information theoretically and assessed it with traditional methods, it would not be effective learning for us."* Similarly, pre-service teacher 2 stated in his/her reflective writing that applying what was learned increased permanence. While pre-service teachers 6, 9 and 12 talked about the contribution of portfolio preparation to permanent learning, pre-service teacher 6 said *"We have the opportunity to concretize the subject with the help of weekly studies. This provided permanent learning for me."* Pre-service teachers 9 and 12 mentioned "learning how to prepare a portfolio" besides the permanent learning for the contributions of the practice. The opinion of pre-service teacher 9 on this was as such: *"I have never prepared a portfolio before. I believe I wouldn't have been able to prepare a very successful portfolio if we hadn't done the work on a weekly basis. I learned the formative assessment method by practicing it myself."* Pre-service teachers 4 and 7, on the other hand, mentioned in their reflective writings that the process contributed to learning to prepare a portfolio, which supports their views on this subject. Another contribution stated by the pre-service teachers was that the process led to conducting regular studies. Regarding this, pre-service teacher 8 expressed his/her opinion as *"The process was very good. Filing the studies we completed every week allowed us to study regularly."* Pre-service teacher 10, on the other hand, emphasized meaningful learning and mentioned both in the interview and in the reflective writing that the practice contributed to meaningful learning. At the same time, in parallel with this view, he/she emphasized the importance of learning by doing and living with the statement as such: *"The studies contributed to meaningful learning by using the information I learned in the course and to learning by living by participating in the process from start to finish."*

"Having sufficient time, including exemplary practices, having a democratic environment, the practice being entertaining and effective, providing experience and it is being related to the public personnel selection exam (PPSE)" were the areas pre-service teachers mentioned regarding the favorites aspects sub-theme of the practice. The majority of the pre-service teachers stated that their favorite aspect of the process was the fact that it provides experience. They often expressed this as the preparation for their profession. Regarding this, pre-service teacher 11 said *"It was one of the important lessons that prepared us for the teaching profession. I have gained a lot of experience*

with formative assessment and feedback.” In the continuation of his/her statement *“Experiencing and preparing the process would make it easier for me in my professional life.”* pre-service teacher 10 expressed his/her favorite aspects about the process by emphasizing that it included exemplary practices. Especially the reflective writing included the statement *“If I had this study without preparing questions, only with the teacher's lecturing, I would not have understood it so well. It has been a very good example for us.”* Apart from that, the opinion of pre-service teachers 1, 5, 11 and 12 who said that using portfolios was entertaining and the opinion of pre-service teacher 1 in this direction was *“The portfolio preparation process had a lot of fun and was effective at the same time. I think it was a good process.”* Besides the fact that the process was entertaining and effective, pre-service teacher 1 mentioned in the reflective writing that there was sufficient time in portfolio preparation and a democratic environment. Lastly, pre-service teacher 7 stated that his/her favorite part of the portfolio preparation process was that it was related to the PPSE. Pre-service teacher 7 had a statement as such in regards to this: *“There were many things I have learned from all the preparations I have made. I like the fact that all of this was related to PPSE.”*

The last sub-theme of the theme of opinions on the use of portfolios is the difficulties experienced during the practice. Eight of the pre-service teachers (3, 4, 5, 6, 7, 8, 9 and 12) stated that they had some difficulties during the practice. Pre-service teachers 3 and 8 mentioned that the process took time. Pre-service teacher 3 stated having difficulty in the process because the process took time as such: *“It was very difficult in terms of time to have assignments in other lessons, especially without being planned during the term.”* Pre-service teachers 4, 5, 6, 7, 9, and 12 said that they had difficulties due to the process being tiring. In the reflective writing of pre-service teacher 5, there were statements that the process was tiring since there was a practice every week in the process. Pre-service teacher 7 expressed an opinion on this as such: *“I didn't have any difficulties other than getting tired while preparing the portfolio. It was a very effective process.”*

3.2. Findings on the Theme of Opinions on the Feedback Process

Pre-service teachers expressed positive opinions about both written and verbal feedback given to them during the portfolio preparation process. None of the pre-service teachers mentioned any negative opinion on this subject. The pre-service teachers said that the feedback given was useful, helped them to correct mistakes, and ensured their progress, and be aware of them. The created codes are shown in detail in Figure 3.

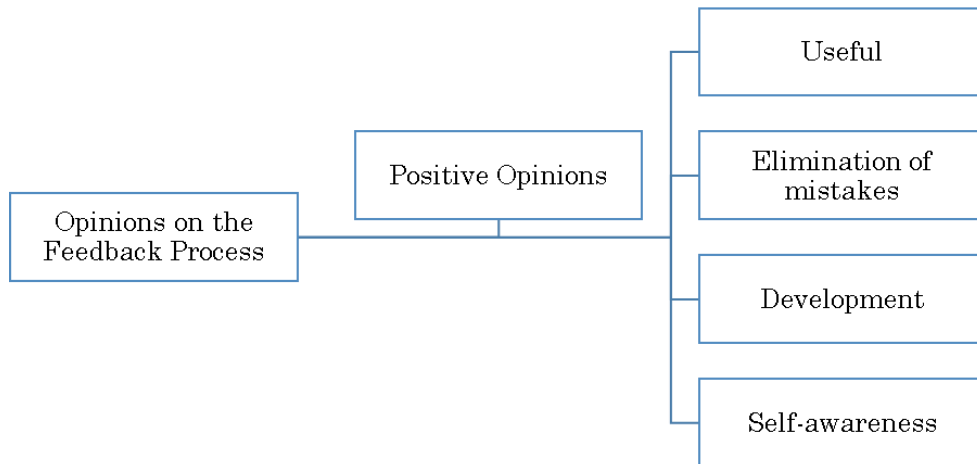


Figure 3. Sub-themes and codes related to the theme of opinions on the feedback process

During the portfolio preparation process, pre-service teachers were given both written and verbal feedback every week. They had the opportunity to make corrections to the work they had done in line with the feedback given. In this process, they mostly stated the fact that the feedback provided correction of mistakes. Pre-service teachers 2, 4, 5, 7, 8, and 11 mentioned that they found out the mistakes they made with the help of the feedback and they had the opportunity to correct these mistakes. The opinion of pre-service teacher 4 on this matter was *“Receiving the feedback was positive in terms of correcting the mistakes made. In this way, the opportunity to review the studies was given.”* Similarly, pre-service teacher 5 mentioned in the reflective writing that with the help of the feedback given, he/she both saw his/her mistakes and had the opportunity to correct these mistakes. pre-service teacher 7, on the other hand, emphasized with the statement *“I think feedback is very important and effective because when you get feedback, you understand where you need to correct, where you went wrong...”* that the feedback was very important as it ensured the elimination of mistakes.

Pre-service teachers 1, 8, and 12 mentioned both in interviews and in their reflective writings that feedback was beneficial. Regarding this, with the *“It was very useful for us to talk about the process and get feedback in each lesson. It provided the opportunity for correction.”* statement, pre-service teacher 8 highlighted that feedback was both useful

and ensured the elimination of mistakes. There were statements that the process was useful and effective in the reflective writings of pre-service teachers 1 and 12.

Different from the sub-themes of eliminating mistakes and being useful, the pre-service teachers emphasized that feedback made them self-aware. Two pre-service teachers (6 and 10) expressed that they realized their own rights and wrongs thanks to the feedback. While pre-service teacher 6 said *“Feedback made me realize my rights and wrongs”*, pre-service teacher 10 said *“Feedback during the process was not insufficient. It even made me see how I was doing with one of the studies.”* Lastly, pre-service teacher 3 highlighted a different point and said that especially the feedback provided improvement related to the work they completed. He/she had a statement as such regarding this point: *“The feedback given in the process greatly influenced our development on these assessment methods rather than our ability to prepare the assignments correctly. Therefore I don't have a negative opinion.”*

3.3. Findings regarding the opinions on the preparation of in-class assessment methods

The opinions of pre-service teachers about the preparation of in-class assessment methods were evaluated in two sub-themes: the favorites and the difficulties. The sub-themes and codes created are shown in Figure 4 in detail.

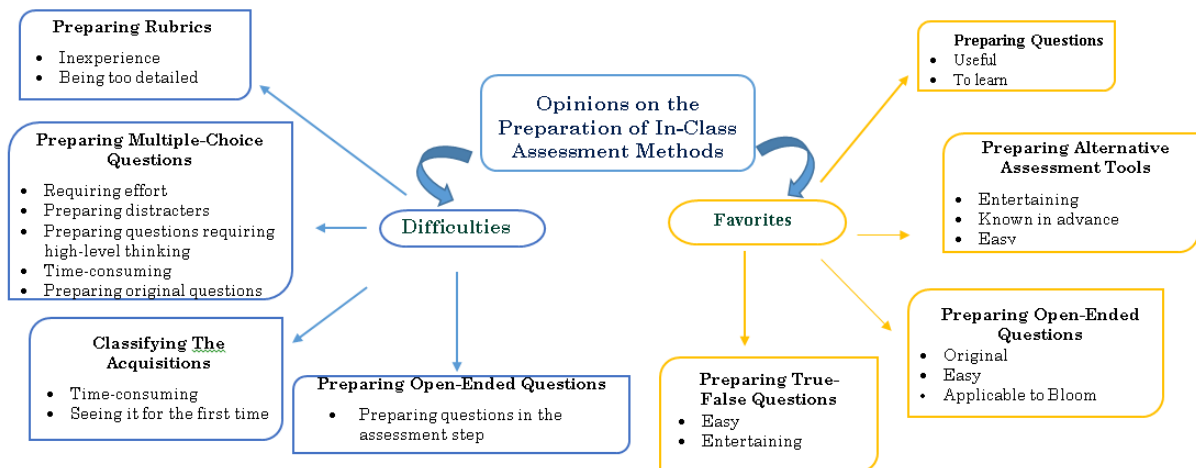


Figure 4. Sub-themes and codes related to the theme of opinions on the preparation of in-class assessment methods

Under the theme of favorites, the opinions of the pre-service teachers were divided into sub-themes of preparing questions, preparing alternative assessment tools, preparing open-ended questions, and preparing true-false questions. In fact, when each sub-theme is examined, it is seen that there are common codes. Briefly, codes such as

being useful, entertaining, easy, known in advance, and original were among the reasons why pre-service teachers liked it while preparing in-class assessment methods.

In general, pre-service teachers enjoyed preparing alternative assessment tools. One of the reasons for this is that it was entertaining. Pre-service teachers 2, 4, 5, 8, 9 and 11 expressed their opinions in this direction both in interviews and reflective writings. The statement of pre-service teacher 2 was as follows: *“Alternative assessment and evaluation methods were the ones I liked to prepare the most. It was also enjoyable to prepare because it was different from traditional methods.”* Pre-service teacher 11's *“Preparing alternative assessment and evaluation. Because it was a method that I enjoyed when I was a student. Being visual was the thing which was more noteworthy.”* statement was supportive of the opinions of pre-service teacher 2. Similarly, also pre-service teacher 9 mentioned in the reflective writings that preparing alternative assessment and evaluation methods was entertaining. Pre-service teachers 5 and 8 mentioned that they liked the fact that the in-class assessment method was easy to prepare besides being entertaining. Regarding this, pre-service teacher 8 said, *“I liked the written exam worksheet the most. It was fun and easier to write questions in many different styles.”* Pre-service teachers 1, 10 and 12 mentioned that they liked to prepare in-class assessment methods because it was beneficial. Regarding this, pre-service teacher 1's statement *“Preparing questions was my favorite assessment method. I am glad that I learned the specifics of preparing the method that I faced, knowing that it will be beneficial for me in the future while preparing these with true-false, fill-in-the-blanks, and multiple-choice questions.”* is noteworthy. Preparing open-ended questions was the second most liked practice by the pre-service teachers, following the preparation of an alternative assessment tool. Pre-service teachers mentioned that they prepared more original questions while preparing open-ended questions. While pre-service teachers 3 and 6 expressed their views on this, both of them wrote in their reflective writings that, they prepared more original questions according to the steps of Bloom's taxonomy while they were preparing open-ended questions. Lastly, pre-service teacher 4 emphasized a point that others did not mention and stated that he/she enjoyed preparing alternative assessment and evaluation tools, and the reason for this was a tool he/she knew beforehand. He/she expressed his/her opinion with the statement as such: *“The diagnostic branched tree and the structured grid were not difficult to prepare and I enjoyed doing it because I knew how to prepare it beforehand.”*

Preparing multiple-choice questions was the in-class assessment method that pre-service teachers had the most difficulty in. Apart from that, there were also pre-service teachers who had difficulties in preparing rubrics, classifying the acquisitions, and preparing open-ended questions. The most coded one among the reasons for the difficulty was to prepare a distracter in multiple choice questions. Five pre-service teachers (2, 6, 9, 10, and 11) stated that they had difficulties in writing the distracters. Regarding this, pre-service teacher 6 said, *“I had difficulties while preparing a multiple choice test. It was*

really difficult to write distracting options related to the question.” Also, pre-service teachers 2, 9 and 11 stated that they had difficulty in preparing questions that required high-level thinking besides having difficulties in writing distracters. The opinion of pre-service teacher 9 was as such: *“I had the most difficulty in preparing multiple-choice and open-ended questions. I had difficulty in preparing original multiple-choice questions and preparing distracters. In open-ended, I tried to prepare questions for the higher steps of the cognitive field. That's why I struggled. It's really hard to prepare questions that require high-level thinking.”* With this statement, pre-service teacher 9 also referred to the code of original question preparation. *“It is necessary to prepare questions by following the rules and to have original questions with quality. I think that was the hardest part.”* statement of pre-service teacher 5 in his/her reflective writings supports the opinions of pre-service teacher 9. Another difficulty focused on was the fact that preparing a question takes time. Pre-service teachers 3 and 8 have expressed their opinions about this code. Regarding this, pre-service teacher 8 also referred to the code that it requires effort in addition to the statement *“It was difficult to prepare multiple choice questions. Writing a question was a very time-consuming and demanding process.”* Only pre-service teacher 10, of all the pre-service teachers, emphasized both in his/her interview and in his/her reflective writings that he/she had difficulties because the rubric was too detailed. Lastly, pre-service teachers 1 and 12 provided their opinions about the code of inexperience. *“I had some difficulty in preparing the rubric. I was inexperienced as it was my first time trying it. I wasn't sure if my rubric was correct or not. Therefore, the most difficult thing for me was to prepare the rubric.”* statement of pre-service teacher 1 on this matter was noteworthy.

3.4. Findings on the theme of suggestions for the process

Suggestions of pre-service teachers were obtained to increase the effectiveness of the designed lesson by using the portfolio supported by the feedback. According to the results of the interviews with the pre-service teachers, they stated in general that the practice of using the portfolio supported by the feedback provided permanent learning, helped them gain experience in preparation for the profession, and allowed them to see and correct their mistakes immediately. Only three of the pre-service teachers made some suggestions for the process.

Pre-service teachers' suggestions for the effectiveness of the lesson were gathered under four sub-themes. Practices to be carried out as a group, individual verbal feedback to be provided, more feedback to be given and the lesson to be given in two terms were these sub-themes. Pre-service teacher 3 emphasized that the progress in preparing assessment methods for the lesson was positive and made two suggestions regarding the process. These suggestions were as such: *“There would be two things I would like to change during the lesson. The first was that after each practice, we could individually*

examine our practices with our teacher and exchange ideas. However, it seemed difficult for this to be applied due to the time restrictions. Secondly, preparing some of the practices as a group could have been effective."

Pre-service teachers 11 and 12 made one suggestion each, different from pre-service teacher 3. *"The overall, lesson process was very good. It was enjoyable. We learned many things. It was one of the important lessons that prepared us for the teaching profession. If I wanted to change something.... There could have been a little more feedback provided in the process."* statement of pre-service teacher 11 not only indicates the satisfaction from the process but also the suggestion of more feedback to be provided during the process. *"It was a tiring course because it has a lot of things in content. It can be much better if it is spread over two terms."* statement reveals the suggestion of pre-service teacher 12 who, on the other hand, emphasized that he/she felt very tired during the course and the course was intense.

Other pre-service teachers who did not have any suggestions expressed their satisfaction with the process. *"Overall, I was satisfied with the lesson. Having the practices every week was a bit difficult, but submitting the practices as a portfolio file allowed us to see our mistakes. We had completed similar assignments to the ones given in this lesson before, but we had not prepared a portfolio file. In that respect, it was a new learning for me."* statement of pre-service teacher 4 is a good example regarding those who were satisfied with the process

4. Conclusions and Discussion

This study, which was carried out within the Assessment of Classroom Learning lesson, was conducted to determine the usability and applicability of the portfolio based on the feedback for the teaching of classroom assessment methods within the scope of the opinions of science pre-service teachers. In line with the findings obtained from the study, the opinions of the pre-service teachers on the use of portfolios supported by the feedback have been discussed under four themes, which were "opinions on the use of the portfolio", "opinions on the feedback process", "opinions on the preparation of in-class assessment methods", and "suggestions for the process".

The study results showed that pre-service teachers, in general, were positive about portfolio evaluation. Pre-service teachers especially stated that the portfolio preparation process contributed to permanent learning, learning to use and prepare the portfolio, and conducting regular studies. Furthermore, the fact that the process has been entertaining and effective, and that it provided experience in preparing for the profession were among the positive opinions about the portfolio process. Similar results have been found in studies conducted with pre-service teachers in the literature (Bader et al., 2019; Buldur & Hasbek, 2020; Parlakyildiz, 2019; Uçak, Köse, & Aldan Karademir, 2009; Zelyurt & Karakaş, 2018). In their study, Bader et al. (2019) revealed the perceptions of pre-service

English teachers about feedback as a part of portfolio evaluation. The pre-service teachers prepared reflective writings about this and the results of the analysis of the data revealed that they expressed a positive opinion about the portfolio process. Similarly, in the study conducted by Parlakyıldız (2019), primary school pre-service teachers mentioned that the portfolio process was effective, that it led them to conduct regular studies, and that they had the opportunity to evaluate themselves. In the study of Deveci et al. (2006), pre-service teachers stated that using a portfolio contributed to their professional development.

The portfolio is one of the types of formative assessment. Since formative assessment is considered an assessment approach that actively involves both the teacher and the student in the assessment process (Popham, 2008), it is noteworthy that the opinions of pre-service teachers about the process are in line with the feature of portfolio evaluation. Since students are passive in the evaluation process in traditional assessment and evaluation approaches, their participation in such an evaluation may have caused them to enjoy the process. Johnson (2000) also mentioned that students felt bored during the traditional methods and had fun during the formative assessment. The use of the portfolio, especially in teacher education, contributes to the development of pre-service teachers' assessment, criticism and reflection skills that they will use in their professional lives (Groom & Maunonen-Eskelien, 2006).

Another result of this study revealed that a few of the pre-service teachers had the opinion that they had difficulties with the use of portfolios. Those who stated having difficulties mentioned that the portfolio process took time and they felt tired during this process. Pre-service teachers placed the in-class assessment methods they prepared into their portfolios every week for nine weeks and received feedback about them. The fact that there were different lessons and the process continued every week may have caused the pre-service teachers to have difficulties. There are studies in the literature in which participants reported negative opinions about portfolio use (Birgin, 2008; Imhof & Picard, 2009; Sırkıntı, 2007). Sırkıntı (2007) also revealed that teachers who participated in the portfolio process had problems with time, which is similar to the results of our study.

One of the results of the study was the opinions of the pre-service teachers about the feedback which has been the basis of this study. All of the pre-service teachers expressed positive opinions about the feedback process. In the study, both verbal and written feedback was provided to the pre-service teachers on a weekly basis. Timely feedback is very important in terms of supporting students' use of feedback (Gibbs & Simpson, 2005; Mulliner & Tucker, 2017). The fact that the feedback provided to the pre-service teachers was given at the appropriate time and they had the chance to correct their mistakes immediately might be the reason for this positive opinion they had. Similar findings have been reported by researchers in the literature (Price et al., 2011; Steen-Utheim and Hopfenbeck, 2009).

Pre-service teachers stated that the most important contribution of the feedback process is to see their own mistakes and correct these mistakes. Also, the result of the study in this regard indicates that the feedback process made contributions to the development of the pre-service teachers. Results of both national and international studies in the literature (Bader et al., 2009; Çakır, 2010; Kirbaç et al., 2017; Pekbay & Koray, 2020; Öntaş & Kaya, 2019; Steen-Utheim & Hopfenbeck, 2009; Thomas & Sondergeld, 2015; White, 2007) support the opinions of pre-service teachers about feedback in this study. In the study conducted by Çakır (2010) with pre-service teachers participants stated that they saw many shortcomings with the feedback given by the instructor and had the opportunity to correct them instantly. Öntaş and Kaya (2019) gathered the positive opinions of the participants on the feedback process in four sub-themes in their study with pre-service teachers. Among these sub-themes, the themes of "correcting the mistakes by seeing" and "identifying the mistakes more easily" were related to the study. The results of the study conducted by Thomas and Sondergeld (2015) with both pre-service teachers and secondary school students showed that both pre-service teachers and students expressed positive opinions about feedback.

Another result of the study shows that pre-service teachers did not have any negative opinions about the feedback process. However, there are also studies with results different from our results in the literature (Koray et al., 2016; Öntaş & Kaya, 2019; Weaver, 2006). Weaver (2006) emphasized that students reported negative opinions besides positive opinions about feedback. The fact that feedback was very generic and not clear and it focused especially on negative behaviors were some of the negative student opinions. In this study, attention was paid to the fact that the feedback given to the pre-service teachers was explanatory and understandable, therefore, both verbal and written feedback was provided to them. However, the results of the study showed that although the pre-service teachers did not express any negative opinions, their suggestions for the process were related to feedback. One of the participants considered the verbal feedback given in the process insufficient and suggested that more verbal feedback be given. However, in the study conducted by Kirbac et al. (2017), most of the teachers wanted their feedback to be given in writing.

The results related to the last sub-theme of the study were the opinions of the pre-service teachers about preparing in-class assessment methods. The pre-service teachers were observed to emphasize positive comments on the in-class assessment method such as it was useful, entertaining and easy to prepare. Another result of the study was related to the difficulties experienced by pre-service teachers while preparing in-class assessment methods. Pre-service teachers stated having difficulty the most in writing distracter options during the preparation of multiple-choice questions. When the literature was reviewed, no study could be found in which the opinions of pre-service teachers on both traditional and alternative assessment and evaluation methods that they prepared themselves were examined. However, Birgin and Gürbüz (2008)

determined in their study that primary school pre-service teachers prefer to use multiple-choice and open-ended questions rather than alternative assessment and evaluation methods. The fact that the pre-service teachers did not have any experience with alternative assessment approaches was noted as the reason for this. In this study, it is gratifying that our results were the opposite of the results of Birgin and Gürbüz (2008). After 2018, the Ministry of National Education started to give more importance to teacher training on alternative assessment and evaluation methods, which is one of the process-oriented assessment methods (Suna et al., 2021). Because it has become important to evaluate the students in the process instead of just evaluating the results with traditional assessment and evaluation methods. Therefore, it can be said that it is important to use alternative assessment approaches, such as portfolios, in which process evaluation is carried out, especially with pre-service teachers.

5. Recommendations

In this study, by analyzing the opinions of pre-service science teachers, the usability of the portfolio based on the feedback for teaching in-class assessment methods was determined and its applicability was revealed. Students' opinions are important in the development of complex feedback processes, especially in higher education. These opinions obtained from the participants in this study might support the development of future feedback practices. However, it should be taken into account that this study was conducted on a small scale, in a public university with 12 science pre-service teachers from the same discipline.

In this study, while verbal feedback was given to the pre-service teachers as a group regarding the practices carried out every week; individual feedback was provided on the portfolios of each participant. In this practice, there might be verbal feedback that pre-service teachers do not understand. Researchers who would carry out such practices are recommended to take this into account. In this study, a nine-week lesson was designed. These nine weeks were quite intense for both the pre-service teachers and the researcher. Despite this, it was found that the portfolio supported by the feedback can be used in teaching in-class assessment methods. The lesson can be carried out more comfortably by spreading it over a longer period of time. As a conclusion of the study, a sample course design was presented for the "Assessment of Classroom Learning" lesson. Five tasks related to the in-class assessment methods that pre-service teachers should prepare for portfolio practices were identified. This content may be changed in a different study. In this study, pre-service teachers completed the assigned tasks individually. This has led to time loss when providing feedback. Therefore, the practices might be carried out in groups.

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