ALTERNATIVE ASSESSMENT TOOLS BASED ON A FEEDBACK PROCESS: PERCEPTIONS OF PRE-SERVICE SCIENCE TEACHERS

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ABSTRACT

This study aimed to determine the perceptions of pre-service science teachers on alternative assessment tools they developed using a feedback process. The pre-service teachers received written and verbal feedback during the process; however, they decided themselves to do revisions or not. Consequently, the second purpose of the study was to investigate why the pre-service teachers did not make revisions entirely based on the feedback which was given by researchers. This was a case study with 41 pre-service science teachers participating in "Education Technologies and Material Design" class. Data was collected using perception form including open ended questions as well as interviews conducted with the participants. The written explanations provided by the pre-service teachers to the open-ended questions and interview data were analysed using descriptive analysis. The participants' perceptions of the alternative assessment tools created using a feedback process were categorized themes including suitability to the objectives, daily life association, visual aspects, and higher-order thinking. The study results revealed that the participants perceived themselves as deficient especially in terms of higher-order thinking and daily life association categories. Additionally, the rate of participants benefiting from the feedback process was limited. Study results suggested that practice-based classes in undergraduate teacher training programs may be conducted using rubrics and feedback process. Feedback given to teachers about their performances would be beneficial.

Keywords: Formative Assessment, Rubric, Feedback, Pre-Service Teachers, Teacher Training

INTRODUCTION

Assessment is an important process in teaching. An individual, who receives feedback regarding his own learning and is aware of his learning experiences, may use his energy by focusing on the task given for his personal development rather than competing against other individuals. An assessment is considered useful and consistent for both teachers and students, when the students' learning is authentic, namely by giving particular importance to students' learning. Formative assessment is identified as an evaluation based on the principle of determining students' needs and providing appropriate education (Liu & Carless, 2006; OECD, 2005). Formative assessment involves the process of uncovering background knowledge of students and modifying the teaching process accordingly, rather than the process of grading (Bulunuz & Bulunuz, 2013; Keeley, 2008). The primary purpose of formative

assessment is to improve the skills of students such as understanding or problem solving in areas of knowledge, skills, and certain content areas (Shute, 2007). Formative assessment may increase the quality of learning. Formative assessment includes a feedback process and alternative assessment tools which are the focus of this study.

Four main elements that should be included in education which determines the quality of education services are clues, student participation, reinforcement, and feedback-correction (Erişen, 1997). "Feedback-correction" is considered a process which educates students about their strong and weak performances enhancing their future studies (Oğuz, 1993). Additionally, feedback is an important mechanism enabling individuals to take responsibility for their own learning and evaluate their progress. Many researchers stated that feedback has a positive effect on learning and success (Black & William, 1998; Hattie & Timperley, 2007). Burnett and Mandel (2010) stated in their study conducted with primary school students that feedback toward completing a given task is beneficial for students. Demiraslan-Çevik (2014), concluded that learners who received or gave feedback had a more positive perception toward the general process of education. Attali, Laitusis, and Stone (2015) noted that the feedback process is beneficial especially when utilizing open-ended questions compared to multiple choice questions. Students should be readily evaluated and given feedback (Sünbül, Gündüz, & Yılmaz, 2002). Students should be given information on deficiencies and mistakes if they are underperforming (Sönmez, 2007). When feedback is not given, student behaviours regresses, improper behaviours may be reinforced, and the learner may lose interest in the course (Tok, 2007). Students should be given feedback during the education process to avoid these issues.

Alternative assessment tools enable learners to reflect on performance objectively compared to traditional assessment tools. Unlike the traditional evaluation methods, alternative assessment tools are composed of process oriented methods, tracking student development and making evaluation part of learning (Acar & Anıl, 2009; Watt, 2005). Many studies can be found in the literature on alternative evaluation tools. These studies revealed that teachers experience many problems regarding the use of alternative assessment (Benzer & Eldem, 2013; Sağlam-Arslan, Devecioğlu-Kaymakçı, & Arslan, 2009; Metin & Özmen, 2010). Teachers face problems adapting the evaluation tools to learners' levels, the time-consuming nature of the process, the delays of assignment submission, and teachers' subjective evaluation (Mamur, 2009; Özenç, Doğan, & Çakır, 2017). When the alternative evaluation literature is investigated, the studies of teachers' views (Nazlıçiçek & Akarsu, 2008; Metin & Demiryürek, 2009; Akbaş & Gençtürk, 2013; Altun & Gelbal, 2014; Yazıcı & Sözbilir, 2016), pre-service teachers' views (Duban & Küçükyılmaz, 2008; İzci & Şardağ, 2016; Karaman & Karaman, 2017), and teacher proficiencies (Metin & Demiryürek, 2009; Dokumaci-Sütçü & Bulut, 2015) can be found. However, the number of studies investigating the formative assessment practices in science education is limited (Bulunuz, Bulunuz, Karagöz, & Tavşanlı, 2016; Bulunuz, Bulunuz, & Peker, 2014; Karaman & Karaman, 2017). Akbaş and Gençtürk (2013) aimed to determine whether geography teachers used alternative assessment techniques. The results of the study revealed that teachers used traditional techniques rather than alternative assessment techniques. İzci and Şardağ's (2016) study with pre-service science teachers aimed to explore their evaluation perception. The results revealed that pre-service teachers perceive assessment as a process that places responsibility on the students, controls the responsibilities of the school and the teachers, and supports education. However, pre-service teachers also identified that evaluation processes are unnecessary as well.

Research shows the use of feedback has a positive effect on the learning process. Alternative evaluation tools have great importance in teacher training as well. In science course curriculum, the adopted assessment philosophy is to provide continuous feedback and the use of alternative assessment tools in observation and evaluation of students. This process determines learning difficulties and helps eliminate them, promoting permanent and meaningful learning [Ministry of National Education (MONE), 2013]. To achieve this aim, teachers need to understand the issue. This study aimed to determine the opinions of pre-service science teachers toward alternative assessment tools prepared using feedback processes. In this study, the pre-service teachers were asked to prepare alternative assessment tools including a mind map, a structured grid, a diagnostic tree, and a worksheet based on the feedback process. The participants received feedback for each assessment tool. Feedback gave the opportunity

to correct mistakes and address deficiencies throughout the study. Proposing their own evaluations in the process is important in improving the quality of teacher development. Kohler, Henning, and Usma-Wilches (2008) stated that pre-service teachers need to conduct teaching practices using formative assessment and provide reflection on their practices. Pre-service teachers who received such practice-based training during undergraduate education gained important outcomes in terms of pedagogy revealed the importance of the study. The education system requires that preservice teachers who will be teachers in the future must use this alternative assessment tools. Based on this, the answers to the following research questions were sought out in this study:

1. How the perceptions of preservice science teachers on alternative assessment varied in preparing effective alternative assessment tools regarding suitability to the objectives, daily life association, visual aspects and higher-order thinking?"
2. How are the perceptions of preservice science teachers on the reasons for not utilizing the feedback process in the revision of the assessment tools they developed?

METHOD

Research Design

This is a case study which utilized a qualitative research design method. The basic characteristic of a qualitative case study design is to investigate one or several cases in depth (Yıldırım & Şimşek, 2008). According to Creswell (2007) case study is a qualitative approach in which the researcher reports one or more cases using more than one data collection tools (observation, interview, document analysis, reports etc.). The case investigated in this study is the opinions of pre-service science teachers on the alternative assessment tools they prepared using a feedback process.

Participants

Since this study was conducted during the Education Technologies and Material Design (ETMD) course, the participants were selected using purposeful sampling. Purposeful sampling enables an in-depth investigation of the cases which are thought to provide rich information (Patton, 2002). This study was conducted at a state university in the Western Black Sea region of Turkey during the 2016-2017 academic years in the ETMD class in the faculty of education. The participants of the study included junior students of which four were male and 37 were female between the ages of 19 and 21 years old. All of the participants were taking the ETMD class for the first time.

Data Collection Tool

Data were collected using a perception form including open ended questions given to the participants. Then interviews were conducted with six of the participants. In this study, the researchers prepared a perception form composed of eight questions as a data collection tool. These questions were selected by considering the criteria of preparing the material and expert consultants. The purpose of this form was to explore the opinions of participants on alternative assessment tools before and after the feedback process. The content validity of the form was ensured by consulting two field experts. For each alternative assessment tool, a different form was prepared. After preparing and scoring each material the forms were given to the participants. Some of the questions included are given below:

1. What do you think about your material in terms of daily life before the feedback?
2. What do you think about your material in terms of visual aspects after the feedback?

Another data collection tool used in the study was an interview form composed of six questions. The purpose of the interview was to investigate the views of the pre-service teachers on the alternative assessment tools. Additionally, the interview investigated the reasons why pre-service teachers did not revise materials after the feedback. Six pre-service teachers who prepared all four assessment tools but did not revise the materials following the feedback process were selected for the interview. These six

pre-service teachers were selected with maximum diversity sampling from purposive sampling method. For this reason, students' notes received from the material were examined and two students from low-medium-high scores were selected. Interviews lasted approximately 30 minutes and voice recorder was used during the interviews. An example of the question asked of the participants was "Although you felt yourself inadequate with your worksheet, why didn't you revise it?".

Implementation

The study was conducted during the ETMD course in the first semester of the Science Teaching Division of 3rd grade students. During the class, the participants were directed to prepare four two-dimensional alternative assessment tools. These alternative development tools were a worksheet, a structured grid, a diagnostic tree, and a concept map. The researchers informed the participants at the start of class about the alternative assessment tools they would be preparing.

Rubrics were developed on each assessment tool by the researchers and given to the participants. Rubrics were developed by considering the properties of each materials and expert consultants. For example, rubric for worksheets consists of visual material, page setup, spelling rules, guideline, originality, content, higher order thinking. Sample rubric developed is in Appendix. Afterward, the alternative assessment tools they prepared were evaluated by the researchers. In the evaluation process the researchers provided face-to-face and written feedback to the students on their work regarding the material design principles and the characteristics of the material. During feedback, the rubrics were utilized and the materials were scored first. Table 1 presents the feedback process. Participants who received feedback on their materials and saw their scores were given five days to correct their materials according to the feedback provided. At the end of the five days, the materials of the pre-service teachers who wanted to increase their scores by submitting their material again, were evaluated and scored one more time. This process was identified as optional for pre-service teachers. Altering the materials was not mandatory after the feedback process. The feedback process continued for six weeks within the scope of "Educational Technologies and Material Design" lecture. Table 1 shows the data relating to the research:

Table 1
The feedback process relating to alternative evaluation tools

Week	Subject
1st week (03.10.2016)	Providing theoretical knowledge about concept maps
2nd week (10.10.2016)	Students' concept map preparations (given feedback in 2 days) Providing theoretical knowledge about structured grid
3rd week (17.10.2016)	Students' submission of corrections about concept maps Students' preparations related to structured grid (given feedback in 2 days) Providing theoretical knowledge about diagnostic tree
4th week (24.10.2016)	Students' submission of corrections about structured grid Students' preparations related to diagnostic tree materials (given feedback in 2 days) Providing theoretical knowledge about worksheet
5th week (31.10.2016)	Students' submission of corrections about diagnostic tree Students' preparations about their worksheets (given feedback in 2 days) Providing theoretical knowledge about diagnostic tree
6th week (07.11.2016)	Students' submission of corrections about worksheets

Data Analysis

In this study, all research questions were analysed through descriptive analysis method. The written statements of the pre-service teachers on the open-ended opinion form were analysed through descriptive analysis; a qualitative data analysis technique. Primary themes were determined according to the questions on the open-ended opinion form. Themes revealed for each evaluation tool were determined as the pre-service teachers' opinions related to materials. This is based on "suitability for acquisition", "association with daily life", "visual aspects" and "higher order thinking". These themes were selected by considering the criteria of preparing the material and literature within theoretical frame. The first and underlying feature of prepared material is suitability for acquisition. Also prepared material provides higher order thinking; it is association with daily life and it should be visual aspects. When preservice teachers will be teachers in the future, it is expected that pre-service teachers prepare materials have these features.

In the "Suitability for Objective" theme, the expectation is for the participant to be able to check the material they prepared in terms of whether the material has the requested objective or not. For example, concept maps are semantic tools used to illustrate the relationship between concepts. At this point, while preparing the concept map, pre-service teachers would be expected to write the acquisition of "It correctly builds the relationships between the concepts related to X". In associating with the daily life theme, the expectation from the pre-service teachers was related to how much they were able to associate the content of the material they prepared with daily life. For example, when a student prepared a structured grid material about environmental pollution, would they be able to reflect on the current and immediate surrounding environmental pollution events to their material. Visual aspects theme requires the learner to consider their material from the perspectives of the visuals' reflection of reality, the relationship between written information and the images, and the effective use of colours. Lastly, in the higher order thinking theme, pre-service teachers are observed preparing material to see how intentional and flexible they consider the issues such as comprising different aspects of the subject, using interesting examples, propositions and images, and improving technical parts of the material. The data of the study used the opinions proposed by the pre-service teachers on the materials they prepared based on the rubrics. This included these themes by "studying the feedbacks and re-evaluating their materials".

The frequency values of the pre-service teachers were evaluated as revising their materials for each theme after feedback and not making any corrections. Then the opinions of the pre-service teachers regarding the reasons for not giving feedback were analysed. By evaluating these opinions through descriptive analysis, the codes were defined and the frequency values were determined according to the participants' repeated frequency of these views. The data subjected to descriptive analysis was evaluated through two different rate and Miles-Huberman (Miles & Huberman, 1994) agreement value was calculated as 0,89.

The data obtained from the interviews with six pre-service teachers were evaluated through descriptive analysis. The aim of descriptive analysis is to describe the opinions of individuals who have been interviewed or observed, by citing the quotations to summarize their opinions (Yıldırım & Şimşek, 2008). First, interview data were converted into written form and all data were reviewed. Direct quotations from the interview data in this study was categorized by research themes and used to obtain the findings. Data about pre-service teachers was expressed through the following pseudonyms; Ayşe, Bahar, Bora, Deniz, Cansu, and Didem.

FINDINGS

The opinions of the pre-service teachers regarding the concept map, the structured grid, the diagnostic tree and the worksheet prepared following the feedback process were examined by four themes as "Suitability to the Objectives", "Daily Life Association", "Visual Aspects", and "Higher-Order Thinking". The findings were presented under four titles as "Opinions about the Concept Map, Structured Grid, Diagnostic Tree and the Worksheet", respectively. The frequency values of the alternative assessment

tools prepared for each theme were given as 'pre-service teachers who revised their alternative assessment tools after the feedback' and 'pre-service teachers who did not make any revision after the feedback'. Subsequently, the data on the reasons for the pre-service teachers' unwillingness to make use of the feedback process of the alternative assessment tools was presented.

Opinions regarding the concept map prepared using the feedback process:

Upon analysing the open-ended interview forms of the pre-service teachers, the researcher coded the pre-service teachers' opinions about the concept map as "Suitability to the objectives", "Daily life association", "Visual aspects", and "Higher-order thinking".

Table 2
The frequency values of the pre-service teachers who benefited from the feedback process and those who do not want to benefit from the feedback process regarding the themes related to the concept map

Themes	Pre-service teachers who benefit from the feedback process(f)	Pre-service teachers who do not want to benefit from the feedback process(f)	Pre-service teachers who express no comment(f)	Total(f)
Suitability to the objectives	9	31	1	41
Daily life association	6	35	-	41
Visual aspects	7	34	-	41
Higher-order thinking	20	20	1	41
My material is not sufficient				20
My material is sufficient				21

When Table 2 is examined the number of the pre-service teachers who expressed the opinion "My material is not sufficient" with respect to the concept map is 21. These pre-service teachers wanted to benefit from the feedback process in order to revise their materials. Almost half of the pre-service teachers had the opinion "My material is sufficient", and they did not want to benefit from the feedback process and did not revise their materials. When Table 2 is examined with regard to themes, it appears that the pre-service teachers benefitted the most from the feedback process regarding the higher-order thinking dimension with relevance to their developed concept maps (f=20). The majority of the pre-service teachers thought that their materials were adequate regarding suitability to the objectives (f=31), daily life association (f=35), and visual aspects (f=34) themes. They did not want to benefit from the feedback process even though these pre-service teachers received feedback which indicated it was required.

Some pre-service teachers were unwilling to benefit from the feedback process regarding their concept maps. The reasons were investigated and it showed that they accepted their grade as satisfactory or were unwilling to revise the materials. For example, Bora expressed "To me, my grade is enough. I checked the grades according to relative evaluation. I thought I was above average, and I did not want to get feedback. I can't spend much time on getting higher grades (Bora, interview). He also said that he did not want to allocate much time on it. Similarly, Ayşe expressed "We already studied very hard to prepare the material. It took too much time. I did not want to spend extra time on it (Ayşe, interview).

Opinions regarding the structured grid prepared using the feedback process:

Table 3 presents the opinions of the pre-service teachers regarding the structured grid. The frequency values of the pre-service teachers who benefitted from the feedback process and those who did not want to benefit from the feedback process with respect to "Suitability to the objectives", "Daily life association", "Visual aspects", and Higher-order thinking" themes.

Table 3

The frequency values of the pre-service teachers who benefited from the feedback process and those who do not want to benefit from the feedback process regarding the themes related to the structured grid

Themes	The pre-service teachers who benefit from the feedback process(f)	The pre-service teachers who do not want to benefit from the feedback process(f)	The pre-service teachers who express no comment(f)	Total(f)
Suitability to the objectives	3	29	9	41
Daily life association	3	29	9	41
Visual aspects	1	32	8	41
Higher-order thinking	8	24	9	41
My material is not sufficient.				11
My material is sufficient.				30

According to Table 3, with respect to the structured grid, 11 pre-service teachers had the opinion that "my material is not sufficient". The pre-service teachers with this opinion revised their structured grids using the feedback process. Thirty pre-service teachers did not revise their grids, stating "my material is sufficient". The pre-service teachers mostly needed to revise their materials in the higher-order thinking theme (f=8), and they wanted to benefit from the feedback process. In addition, the majority of them thought their materials was sufficient regarding the themes of suitability to the objectives (f=29), daily life association (f=29), and visual aspects (f=32). Even though pre-service teachers had feedback about correction, they didn't want to benefit from this process one more time.

The pre-service teachers stated a number of reasons for not revising their grids after the feedback. These reasons included accepting their grades as satisfactory, inability to foster higher-order thinking, unwillingness to spend the extra time, failure to associate the material with daily life, having difficulty writing objectives, and the overload of the homework in other lessons. Bora was one pre-service teacher who did not want to benefit from the feedback process and did not revise his material, stated "I had difficulty in associating my grid to daily life, ensuring higher-order thinking, and including up-to-date information in my grid" (Bora, interview). Frequently the pre-service teachers expressed they were satisfied with their grades. Didem who did not expect any increase in the grade stated "The feedback that I got was to write the names under the pictures. Because I believed that my grade would not increase as much as I wanted and there would be little change in my grade, I did not want to revise" (Didem, interview). Another reason stated was "did not want to allocate further effort". On this issue, Cansu expressed that "I did not want to benefit from the feedback process and did not want to revise that homework because I had homework relevant to other lessons" (Cansu, interview).

Opinions regarding the diagnostic tree prepared using the feedback process:

The previous themes were coded based on the opinions of the pre-service teachers in the open-ended interviews regarding the diagnostic tree.

Table 4

The frequency values of the pre-service teachers who benefit from the feedback process and those who do not want to benefit from the feedback process regarding the themes related to diagnostic trees.

Themes	The pre-service teachers who benefit from the feedback process(f)	The pre-service teachers who do not want to benefit from the feedback process(f)	The pre-service teachers who expressed no comment(f)	Total(f)
Suitability to the objectives	-	32	9	41
Daily life association	4	21	16	41
Visual aspects	1	38	2	41
Higher-order thinking	1	30	10	41
My material is not sufficient.				6
My material is sufficient.				35

Table 4 shows the revision rates regarding the diagnostic tree. When compared to the other two assessment tools the rates are quite low. Only six pre-service teachers stated "my material is not sufficient" with respect to the diagnostic tree material they prepared, and they revised their material after the feedback. On the other hand, 35 pre-service teachers stated "my material is sufficient" regarding their materials, and they did not revise their materials. The pre-service teachers mostly expressed that their diagnostic tree materials are insufficient regarding the theme of daily life association (f=4). The majority of the pre-service teachers believed their materials was sufficient regarding the themes of suitability to the objectives (f=32), visual aspects (f=38), and higher-order thinking (f=30). These pre-service teachers did not want to benefit from the feedback process even though they were provided with the required feedback.

The pre-service teachers stated reasons for being unwilling to benefit from the feedback process related to the diagnostic tree. They included similar reasons; satisfaction with their grade, unwillingness to spend further effort and time, insufficiency of promoting higher-order thinking, failure to associate it with daily life, and the overload of the homework in other lessons. Additionally, they expressed difficulty in preparing the diagnostic tree material, and not understanding the provided feedback. Underlying their satisfaction with the grade, Deniz stated "Since I had difficulty preparing this material and I was satisfied with my grade, I did not want to benefit from the feedback process again" (Deniz, interview). Bora, who did not want to benefit from the feedback process, focused on inadequate or insufficient feedback and stated "I did not revise the material because I think I was not provided with sufficient feedback. I did not understand exactly how to revise and what affects it" (Bora, interview).

Opinions regarding the worksheet they prepared using the feedback process:

The opinions of the pre-service teachers about the worksheet they prepared were again categorized under the four themes.

Table 5

The frequency values of the pre-service teachers who benefit from the feedback process and those who do not want to benefit from the feedback process regarding the themes related to the worksheet.

Themes	The pre-service teachers who benefit from the feedback process(f)	The pre-service teachers who do not want to benefit from the feedback process(f)	The pre-service teachers who expressed no comment(f)	Total(f)
Suitability to the objectives	2	28	11	41
Daily life association	2	27	12	41
Visual aspects	2	28	11	41
Higher-order thinking	2	28	11	41
My material is not sufficient				4
My material is sufficient				37

Table 5 illustrates only four pre-service teachers having the opinion "my material is not sufficient" related to the worksheet material they prepared using the feedback process. These pre-service teachers revised their materials after the feedback process. On the other hand, 37 pre-service teachers expressed "my material is sufficient", and did not make any revisions. Two pre-service teachers in each theme benefitted from the process and revised their materials. The majority of the pre-service teachers were satisfied with their materials in all themes, and they did not want to benefit from the feedback process again.

The pre-service teachers responded with the same reasons for not revising their worksheets after the feedback. Again, they were satisfied with their grades, failed to promote higher-order thinking, unwilling to allocate further effort and time for their materials, and had difficulty preparing the material. In addition, one reason for not making the required revisions was that there were exams in the same week. This situation was highlighted by Ayşe, "We could not revise because of the exam week and lack of the time. Actually, our grade is low" (Ayşe, interview).

DISCUSSION

The views of pre-service science teachers on the alternative assessment tools they prepared using a feedback process are discussed under the themes of *suitability to the objectives, daily life association, visual aspects and higher-order thinking*. When data were analysed; it was observed that the majority of pre-service teachers reorganized their concept maps after feedback. Although the pre-service teachers confirmed their acquisitions were sufficient under the suitability to the objectives theme, many of them also stated that they had difficulty writing the objectives for the concept map. They regard themselves as inadequate particularly pertaining to daily life association and higher-order thinking themes. Study results indicate their motives for not revising the concept maps after feedback was thinking their initial grades adequate and reluctance to revise their materials. The unwillingness of the pre-service teachers to further increase their moderate-level-scores can be viewed as a situation arising from the relative evaluation system. When the pre-service teachers observed their score as close to the class average, they did not consider revising their materials. This reflects that the participants perceive course scores as a source of motivation and act accordingly. In a study by Higgins, Hartley and Skelton (2002), students reported that they read and appreciated the feedback provided to them. Therefore, if the students were aware of the significance of scoring, they will be able to get motivated and benefit from the feedback that assisted them in comprehending the subject thoroughly.

Another study result demonstrates that as in other three themes, pre-service teachers benefited from the feedback process especially in the higher-order thinking theme when they prepared the structured grids. The participants considered their materials inadequate for the theme of higher-order thinking. Among the reasons for the difficulty in this theme could be noted as the pre-service teachers' inability to conceptualize higher-order thinking skills. Lack of training in this theme in the past may influence their inability to produce original and creative ideas or feelings of inadequacy. Research related to higher-order thinking skills show that students could not improve these skills sufficiently and this problem persists from primary education to the post graduate time (Arum & Roksa, 2011; Depinet, 2012; Güneş, 2012; Akkuş-Çakır, & Senemoğlu, 2016). Akkuş-Çakır and Senemoğlu (2016) conducted a study with pre-service teachers and instructors to analyse analytical thinking ability levels and identify the factors affecting the development of these skills. Their study results indicate that higher-order thinking ability levels of the pre-service teachers were low. In this study, pre-service teachers' higher order thinking skills were not measured, however it was seen that they were forced to develop material which has higher order thinking.

Study results show that after feedback, the number of corrections of diagnostic tree materials was low according to two other assessment tools. The pre-service teachers perceived themselves as sufficient in all themes in preparing the diagnostic tree. When opinions were analysed, the following reasons were seen in the lack of benefiting from the feedback process; belief in the sufficiency of the initially grade, unwillingness to strive in making materials, lack of development in higher-order thinking skills, failing to associate with daily life and abundance of assignments of other courses. One interesting result from other assessment tools showed that pre-service teachers found the preparation of the diagnostic tree as difficult. Other studies exist in the literature supports this result. In his study, Döş (2016) stated that alternative assessment and evaluation methods may be challenging in the sense of timing, equipment, financing and preparation.

It was shown that few pre-service teachers corrected the worksheets after they received feedback. And pre-service teachers still perceived themselves as inadequate in terms of higher-order thinking skills. In the results related to the structured grid materials, pre-service teachers had problems in higher-order thinking which can be attributed to lack of past experiences in this skill. Participants specified the decision to not benefit from the feedback process on their worksheets and stated similar reasons as before. The reasons were belief in the sufficiency of the initially grade, unwillingness to strive in making materials, lack of development in higher-order thinking skills, failing to associate with daily life and abundance of assignments of other courses.

The methods used in this research will make theoretical and practical contributions to the researchers and teachers working in this field. When training teachers, formative assessment types should be used as well as product-oriented assessment. Formative assessment means the process necessary to provide feedback consistently by monitoring or observing what the student has learned in the process of learning-teaching (Nuthall, 2007). The use of feedback may assist in relieving pre-service teachers from the anxiety of getting higher scores and passing their classes by focusing on their duties. For this reason, it is suggested that practice-based courses which are given in teaching undergraduate programs should be using rubrics and feedback processes. Feedback provided to pre-service teachers about their performances would be useful as suggested by this study. Similar to pre-service teachers, teachers should also be provided with in-service training towards increasing their understanding and skills related to formative assessment. For this reason, in-service training should be practical. In this study, the working group is pre-service science teachers. Similar studies can be carried out in different applied courses and sample groups. Similar studies can be implemented with additional pre-service teachers. Within the scope of the study, four different alternative assessment tools have been prepared. Studies in which different alternative assessment tools are prepared can be administered.

CONCLUSION

As a result of the study, it was observed that the majority of pre-service teachers reorganized their concept maps after feedback. Study results showed their motives for not revising the concept maps after feedback was thinking their initial grades adequate and reluctance to revise their materials.

In addition, from the results of the study, it is understood that as in other three themes, pre-service teachers benefited from the feedback process especially in the higher-order thinking theme when they prepared the structured grids. Pre-service teachers considered their materials insufficient for the theme of higher-order thinking.

Furthermore, it was showed that after feedback, the number of corrections of diagnostic tree materials was low according to two other assessment tools. The pre-service teachers perceived themselves adequate in all themes in preparing the diagnostic tree. One interesting result from other assessment tools showed that pre-service teachers found the preparation of the diagnostic tree as difficult.

The study shows that when the perception form was analysed, it was seen that pre-service teachers perceived themselves as inadequate in terms of higher-order thinking skills. At the same time, it was shown that few pre-service teachers corrected the worksheets after they got feedback.

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APPENDIX

EDUCATION TECHNOLOGIES AND MATERIAL DESIGN COURSE MIND MAP ASSIGNMENT ASSESSMENT SCALE			
CRITERIA	**SUCCESS LEVELS**		
	2 points	**3 points**	**4 points**
Deadline	The assignment was submitted two or more days after the deadline.	The assignment was submitted one day after the deadline.	The scale was submitted within the deadline.
Paper Size	Used paper smaller than A3	----	Used A3 or bigger paper
Concept List	----	----	Concept list is prepared.
Presentation of the Concepts	The concepts are not given in boxes.	The concepts are partially given in boxes.	The concepts are given in boxes.
Cover Page	There are more than 2 deficiencies in the cover.	There are 2 or less deficiencies in the cover.	There are no deficiencies in the cover.
	3 points	**4 points**	**5 points**
Technical Structure	The statements written as concepts are wrong. The numbers of concepts are less than ten.	The statements written as concepts are partially correct. The numbers of concepts are between ten and 12.	The statements written as concepts are correct. The numbers of concepts are 12 or more.

Sequence of the Concepts	The hierarchical structure is not considered in the sequence of the concept.	The hierarchical structure is partially considered in the sequence of the concept.	The hierarchical structure is considered in the sequence of the concept.
Relationship Among Concepts	There is no relationship among the concepts.	There is a partial relationship among the concepts.	There is a correct relationship among the concepts.
Visual Aspects	The visuals of the work are quite insufficient. The visuals are not attractive.	The visuals of the work are partly sufficient. The visuals are partly attractive.	The visuals of the work are sufficient. The visuals are attractive.
Spelling	The spelling rules are not observed. It is unreadable. The type size is too small to read.	Small mistakes exist but it does not constitute a problem for reading. The type size does not interrupt reading but it is not large enough.	It can be read quite fluently and understood accurately. The type size is appropriate.
Page Layout	The written and visual components are not correctly placed in the paper.	The written and visual components are somewhat correctly placed in the paper.	The written and visual components are correctly placed in the paper.
	4 points	**7 points**	**10 points**
Direction of the Arrow	There are more than 2 mistakes in the directions of the arrows among the concepts.	There are less than 2 mistakes in the directions of the arrows among the concepts.	The direction of arrows among the concepts is correct.
Originality	The proposed ideas or products are the same as the ones developed before.	The proposed ideas or products are inspired by the ones developed before.	The proposed ideas or products are the different from the ones developed before.
Expression of the Objective	The objective is not expressed correctly.	The objective is somewhat expressed correctly.	The objective is expressed correctly.
Content	The content of the assignment is not sufficiently related to daily life, the information is not up-to-date and correct.	The content of the assignment is partially related to daily life, the information is partially up-to-date and correct.	The content of the assignment is sufficiently related to daily life, the information is up-to-date and correct.
Higher Order Thinking	It does not sufficiently stimulate higher-order thinking.	It somewhat stimulates higher-order thinking.	It stimulates higher-order thinking.
TOTAL SCORE ____/100			