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A Reflective Report from Senior Mathematics Student Teachers Views of 'Feedback' Concept

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Abstract: The present study intends to seek senior mathematics student teachers' views of 'feedback' concept and to determine how they give feedback when one examination paper is presented. A four-item survey was administered to 56 senior mathematics student teachers randomly drawn from Department of Elementary Mathematics Teacher Education, Fatih Faculty of Education in the city of Trabzon, TURKEY. Under the light of the results, it can be concluded that senior mathematics student teachers are able to effectively integrate the feedback routines in their future teaching to some extent.

Key words: Feedback · Formative Assessment · Student Teacher

INTRODUCTION

Assessment, one of the most important concepts in learning and teaching, is a decision process that collects, records, interprets and exploits students' views so that it has a supplementary role [1-3]. To explore student's knowledge, diagnostic, formative and summative assessments are generally, used by teachers. Whereas summative assessment is in a harmony with a traditional instruction, diagnostic one is compatible with alternative teaching method that incorporates in student's pre-existing knowledge. Further, formative assessment is now one of tenets of constructivism that focuses on 'learning process' rather than 'learning product' [3-6].

We firstly introduce what formative and summative assessments mean and then describe the concept 'feedback'. Later, we present the related literature in this section.

Summative Assessment: In traditional manner, summative assessment is often exploited to elicit the degree to which students achieve the targeted aims or objectives and to classify students as if successful or unsuccessful. If students possess majority of the targeted goals and reflect them in their own exams, they are labeled as successful ones. At the same time, since students do not know the criteria that their teacher used they become unconscious of their own development. Therefore, they do not pay more attention to critical thinking, discussion and interpretation. That is, since they can achieve the exams with a less effort by means of rote learning, the skills 'critical thinking', 'discussion' and 'interpretation' are not appeal for them. In brief, the more superficial exams are used, the more superficial learning is also evaluated. Therefore, such traditional assessment provides little contribution to students' learning and development.

Formative Assessment: In formative assessment, teacher utilizes the assessment procedure that affords students to improve their knowledge/ability and to make a contribution to their learning [7-10]. On the other hand, Tunstall and Gipps [11] presented formative assessment as a process in which student's task or performance is not only decided but also assessed. Such an assessment has two different contexts [3]. Whilst the first is that

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formative assessment occurs in a complex, multi-criteria context [8], the second improves learning in the context of classroom teaching pedagogy [12-16]. Rather than scoring or labeling students' responses or performances, formative assessment exploits students' conducted tasks/performances so that it tries to enhance their ability and to make students aware of their development.

In brief, how formative assessment differs from summative one can be explained with two issues: (a) level of 'elaborateness' [3, 17] and (b) formative assessment explicitly concentrates on using feedback [3].

Feedback: One of the most crucial elements of formative assessment is feedback which plays a significant role at student's development [8, 18]. In learning and teaching processes, fostering student's development the feedback aims to result in better student achievement in a more complementary role, thereby; it does not insult students' self-confidence. Since feedback is in an informative manner, it not only enables students to comprehend their deficiencies or faults or their development but also to overcome them [19]. In brief, the feedback is a useful way to address gaps in knowledge and understanding [20].

The feedback incorporates in two types. Whilst the first viewed as the most effective one is given immediately after performance, the second is provided during assessment activities [10]. Providing feedbacks of students' performances enables them to actively correct their faults and to improve their learning.

Since most of assessment attempts is based on behaviorist assumptions known as traditional view, frequency of feedback appearing in traditional classes is very lower [10]. In view of Hattie [21], feedback is simply viewed as reporting correct and incorrect points. As a result, teachers do not make more modification of future activities and teaching materials. However, formative feedback on the basis of contemporary approach, where teacher does not correct his/her student's fault directly, has an opposite function in regard to traditional one. In this case, teacher attempts to omit what student made incorrect points if they are trivial. If such a procedure does not work, using various questions directly teacher gets students to eliminate them [22].

Accomplishing an effective teaching/learning depends on the quality of feedback given by teachers [23]. Unfortunately, the current scientific literature has not clarified the fact that most of the students read the feedbacks given by their teachers [5, 18]. In other words, there is no clear evidence about the aforementioned situation. For this reason, even if students read the given feedback by paying more attention, its content, timing and its given manner are very crucial [18, 24]. For example, students may not pay more attention the feedback whose timing is incorrect.

Features of Feedback: We produced two underlying features (content and timing) for effective feedback based on the related literature [18, 24-32]. The content of feedback should: (a) demonstrate the difference between existing performance and desired one, (b) include some suggestions about next step, (c) indicate students' failures and misunderstandings, (d) have an explanatory characteristic rather than testing or controlling, (e) focus on behaviors in place of student, (f) compare student's existing performance with previous one, not other students' ones, (g) concentrate on specific recommendations instead of general ones, (h) be reasonable and understandable and (i) refrain from implicit comments. The timing of feedback should be: (a) given immediately after measurement and (b) permanent as a natural part of learning process.

Since there are several criteria for feedback to inform students effectively, what teachers make in this process is outlined below: (a) to start with a positive assessment sentence, (b) to determine what student learned in a concise manner, (c) to balance his/her adverse comment with positive statement (d) not to insult his/her student with negative statement, i.e. teacher should give his/her all suggestions in a positive manner to criticize students' responses, (e) to ask questions to the students in order to get student to think on his/her own response, (f) to use personal language instead of impersonal one, (g) to demonstrate students' failures and misunderstandings, (h) to explain how he/she marked student's response, (i) to show how student can eliminate his/her incorrect points and (j) to provide a discussion environment to overcome unclear points.

Knowledge claims reported by the related literature are presented in the following:

(i) If feedback informs students about their performance, they perform higher than those who took only marks or oral praise [26-28, 30-32]
(ii) Instructive feedback, majority of which is acquired by students, is an effective instructional strategy [33].
(iii) Enabling students to capture instructive feedback takes less than a minute [33].

(iv) Using instructive feedback provides students (who have mild disabilities and moderate disabilities) to learn the provided supplemental information [34].
(v) Usage of the elaborated feedback significantly reduces the number of student trials to mastery and the number of student errors in following practice trials [35].
(vi) Teachers could effectively integrate the feedback routines into their teaching [35].
(vii) Personally designed comments are more useful than the others identified by grade assignment [36].
(viii) The communication between higher education students and their teachers not only concentrates on a paper-pencil task but also focuses on feedback-writing and feedback strategies and learning approaches [18].
(ix) Using anonymous peer feedback on student meaningful learning in higher education has no effect on project quality between the control and experimental groups [7].
(x) Peer and self assessment are generally preferred versus tutor one. In details, peer assessment affords students to learn more on specific topics, whereas self assessment enables them to criticize their own mistakes [25].

Under the light of the above literature, it can be deduced that unless teachers give feedback properly, students may fail to comprehend the effect of feedback. Otherwise, they may not understand the message feedbacks informed. Since a newly structured curriculum has been released to enhance students' conceptual understanding and their motivation, alternative measurement and assessment techniques such as portfolio, concept mapping, self assessment, peer assessment, project and so forth are recommended as a result of formative assessment suggested [4, 5, 37]. However, when we look at the related data bases such ERIC, EBSCOHOST etc., there are enormous studies concentrating on formative assessment and feedback, some of which are presented above, but none of them precisely focus on what student teachers consider about feedback and how they give feedback when one examination paper is presented them. Since feedback is a central role for formative assessment, these points should be undertaken to improve our pre-service teaching. Thus, this study fills in this gap.

The present study intends to seek senior mathematics student teachers' views of 'feedback' concept and to determine how they give feedback when one examination paper is presented to them. Research questions are as follows.

- What do senior mathematics student teachers think about 'feedback' and its features?
- Is there any clear evidence as to whether feedback criteria generated by authors work?
- What aspect(s) of feedback do they exploit when one examination paper is handed out them?

MATERIALS AND METHODS

Sample: The sample consists of 56 senior mathematics student teachers randomly drawn from Department of Elementary Mathematics Teacher Education, Fatih Faculty of Education in the city of Trabzon, TURKEY.

Data Collection: To collect data, a four-item survey was used. Whilst the first three questions measures students' views of the concept 'feedback', its features and its effect to learning, the fourth one determines the extent to which student teachers' feedbacks to the examination paper are in a harmony with feedback criteria.

The items used here are as follows:

Item 1: What do you mean by 'feedback'?
Item 2: What features do you think feedback has?
Item 3: Do you consider that feedback influence student's learning? Please explain these effects
Item 4: Please assume that you gave homework for your students. If they answered your questions as presented in Fig. 1, how would you give feedback for them? (Please give feedback for each question separately)

Data Analysis Procedure: In an interpretive manner, the collected data were analyzed qualitatively based on criteria presented under features of feedback, except for Item 1 and Item 2. Item 1 and Item 2 were thematically classified in regard to student responses' similarities and differences [38, 39]. Two of the authors evaluated students' responses separately and all disagreement points were solved by negotiation.

RESULTS

Three fourths of the students responses fell into the criterion 'Feedback should indicate students failure and

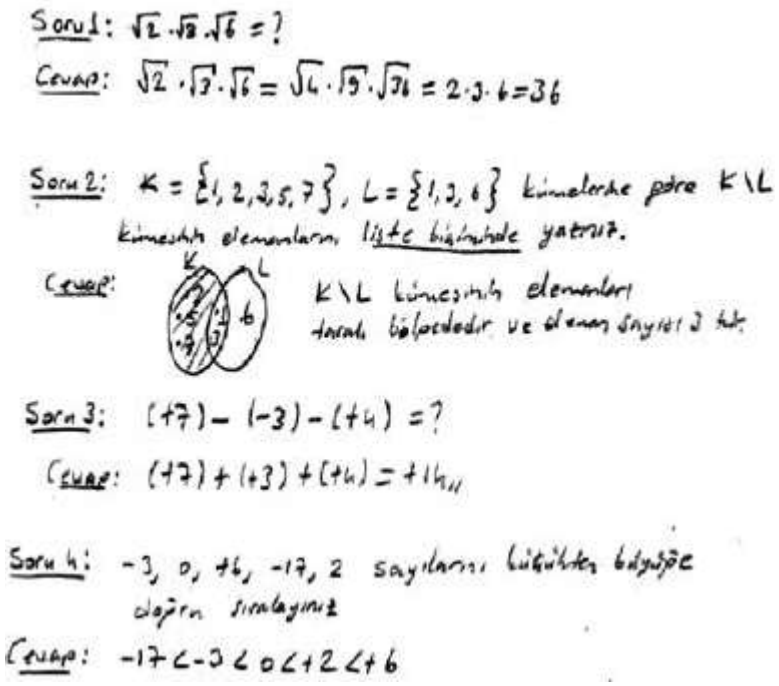

Fig. 1: A sample examination paper presented for senior mathematics student teacher's consideration

Table 1: Frequencies and percentages of students' responses for Item 1*

Criteria	N	%	Student's number	A sample student response
Feedback should indicate student's failure and misunderstanding	43	76.8	S1, S4-S6, S8, S10, S12, S13, S15, S17-S23, S25-S36, S38, S40-S50, S52, S53, S55	Feedback overcomes student's misunderstanding and unclear points
Feedback should be given immediately after measurement	10	17.9	S2, S4, S7, S14, S15, S36, S37, S42, S49, S50	After completing his/her task or assignment, feedback is given immediately
Feedback should inform student about topic	17	30.4	S3, S7, S9, S11, S16, S17, S21, S24, S27, S28, S30, S36, S40, S41, S44, S49, S52	Informing student about his/her task or assignment is feedback
Feedback should indicate student's correct response	22	39.3	S8, S10, S12, S13, S18-S20, S23, S25-S27, S29, S32, S34, S35, S38, S42, S43, S46-S48, S50	Feedback not only inform student's misunderstanding but also student's correct response
Feedback should activate student's motivation	4	7.1	S25, S29, S33, S53	Feedback should incorporate in the statement that encourages student to engage in the topic and arouses their motivation
Feedback should interact teacher with his/her student	3	5.4	S39, S51, S56	There is a communication between teacher and student. Unless feedback is available, a communication problem emerges
Feedback should become reasonable and understandable	1	1.8	S54	Student is able to comprehend feedback clearly

*: Since students' responses can be labeled under more than one criterion, the percentage may exceed 100%.

misunderstanding' one fifth of them referred to the feedback timing as given immediately after measurement. Also, whilst three tenths of the students reported that feedback should inform student about topic, about two fifths of them stated that feedback should indicate students correct (Table 1). Furthermore, while four of them depicted that feedback should activate student's motivation, three of them referred to the interaction between teacher and student. Only one student (S54) described feedback as reasonable and understandable.

Nearly half of the students' responses referred to student's failure and misunderstanding, about two fifths of them pointed out that feedback should be reasonable

Table 2: Frequencies and percentages of students' responses for Item 2*

Criteria	N	%	Student's number	A sample student response
Content				
Feedback should demonstrate the difference between existing performance and desired one	3	5.4	S7, S14, S32	Feedback should demonstrate the difference between existing performance and expected one
Feedback should include some suggestions about next step	6	10.7	S10, S12, S47, S48, S50, S53	Feedback should lead student about 'what to do'
Feedback should indicate student's failure and misunderstanding	26	46.4	S4, S6, S7, S10, S12, S14, S15, S17-S21, S25, S27, S32-S36, S38, S41, S44, S48-S50, S52	By noticing his/her difficulty feedback should show his/her fault
Feedback should have explanatory characteristic rather than testing or controlling	8	14.3	S16, S17, S27, S33, S43, S44, S49, S52	Feedback should possess explanatory feature and incorporate in reasons
Feedback should focus on behaviors in place of the student	5	8.9	S2, S4, S10, S15, S43	Feedback should not focus on student but concentrate on measurable behaviors
Feedback should compare student's existing performance with previous one, not other students' ones	-	-	-	-
Feedback should concentrate on specific recommendation instead of general proposals	-	-	-	-
Feedback should be reasonable and understandable	20	35.7	S3, S8, S9, S16, S21, S25-S28, S32, S35-S38, S41-S44, S51, S55,	Feedback should be understood by student and its language/context should be clear
Feedback should refrain from implicit comments	-	-	-	-
Timing				
Feedback should be given immediately after measurement	10	17.9	S1, S4, S13, S14, S20, S22, S30, S46, S47, S53	Feedback should be provided immediately after completing his/her task
Feedback should be permanent as a natural part of learning process	1	1.8	S13	Feedback should be given regularly using assignment and quiz
No response	11	19.6	S5, S11, S23, S24, S29, S31, S39, S40, S45, S54, S56	-

*: Since students' responses can be labeled under more one criterion, the percentage may exceed 100%.

Table 3: Frequencies and percentages of students' responses for Item 3*

Criteria	N	%	Student's number	A sample student response
Students have an opportunity to assess their own knowledge or ability	3	5.4	S8, S14, S32	Feedback makes a contribution for student learning. Therein, student makes self-assessment, notice his learning extent and consider how he/she can do better
Students have an opportunity to see both their weak and strong aspects	37	66.1	S1, S3-S6, S12, S13, S15-S22, S25-S28, S31, S33-S36, S38, S40-S42, S44, S47-S50, S52-S55	Feedback makes a contribution for student learning. As a result of feedback, they can become aware of their correct and incorrect points, thereby, they can correct their failures
Student can notice difference between his/her performance and the expected one	1	1.8	S30	Feedback makes a contribution for student learning. Student who took feedback notice how he/she can perform better, i.e., the difference between his/her performance and the expected one
Feedback informs student about his/her learning process/progression	16	28.6	S3, S7-S9, S15, S17, S21, S27, S34, S36, S40, S41, S43-S45, S49	Feedback makes a contribution for student learning. Feedback enables student to become aware of what he/she knows or not know. Also, it informs the student about the points he should pay more attention
Feedback motivates student for learning process	16	28.6	S2, S8, S10, S11, S17, S21, S23, S29, S30, S33, S35, S38, S39, S42, S46, S48	Feedback makes a contribution for student learning. Since student is aware of his/her fault, feedback encourages him/her to engage in the related topic and enhances his/her motivation
No response	1	1.8	S56	-

*: Since students' responses can be labeled under more one criterion, the percentage may exceed 100%.

and understandable (Table 2). Also, whilst approximately one fifth of them dealt with the feedback timing as given immediately after measurement, about the same percentage of them referred to feedback's explanatory feature. Further, whereas one tenth of them depicted that feedback should include some suggestions about next step, about the similar proportion of them addressed that feedback should focus on behaviors in place of the student. Furthermore, three of them mentioned that feedback should demonstrate the differences between

Table 4: Frequencies and percentages of students' responses for Item 4*

Criteria	N	%	Student's number	A sample student response
Teacher should start with a positive assessment sentence	4	7.1	S2, S3, S31, S43,	Human sometimes makes mistakes. If you become careful, you will achieve this
Teacher should determine what student learned in a concise manner	-	-	-	-
Teacher should balance his/her adverse comment with positive statement	1	1.8	S43	There are a little mistakes, however, you can eliminate them by revising the related topics
Teacher should not insult his/her student with negative statement, i.e. teacher should give his/her all suggestions in a positive manner to criticize students' responses	-	-	-	-
Teacher should ask questions to the students in order to get student to think on his/her own response	25	44.6	S4, S6, S10-S14, S18, S21, S22, S24, S28, S30-S32, S40-S43, S47, S48, S51-S53, S56	If you go seven steps backwards and then 2 steps to your front, how many step do you go to your rear?
Teacher should use personal language instead of impersonal one	56	100	S1- S56	All of the participants preferred using personal language and directions
Teacher should demonstrate students' failures and misunderstandings	51	91,1	S1-S10, S12-S30, S33-S36, S38-S55	You assumed that $\sqrt{2}$ is equal to $\sqrt{4}$. Is 2 equal to 4?
Teacher should explain how he/she marked student's response	-	-	-	-
Teacher should show how student can eliminate his/her incorrect points	5	8.9	S2, S9, S13, S37, S51	Asking similar questions to the ones that students made mistakes, I get students to solve them. If they make similar mistakes, I inform them how to eliminate their incorrect points
Teacher should provide a discussion environment to overcome unclear points	-	-	-	-

*: Since students' responses can be labeled under more one criterion, the percentage may exceed 100%

existing performance and desired ones, only one student (S13) implied that feedback should be permanent as a natural part of learning process.

Seven tenths of the students under investigation implied that feedback affords student to see both their weak and strong aspects. Whereas three tenths of them pointed out that feedback informs student about his/her learning process/progression, the same proportion of them depicted that feedback motivates student for learning process (Table 3). Also, whilst three of them stated that students have an opportunity to assess their own knowledge/ability, only one student (S30) mentioned that after feedback student can notice difference between his/her performance and the expected one.

All of the participants preferred using personal language and directions rather than impersonal one (Table 4). Also, while nine tenths of them tended to demonstrate students' failures and misunderstandings, about half of them asked questions to the students in order to get student to re-think on his/her own response. Moreover, whilst four of them (7.1%) started with a positive assessment sentence for feedback, nearly one tenth of them tried to show how student can eliminate his/her incorrect points. Further, only one student (S43) had an inclination that balances his/her adverse comment with positive statement.

DISCUSSION

A larger proportion of the students believed that feedback indicates student's failure and misunderstanding even though two tenths of them pointed out that it demonstrates student's correct point. Similarly, for Item 2 about half of students' responses fell into the category 'feedback should indicate student's failure and misunderstanding' while nine tenths of them exploited practically in their feedback for Item 4. Despite the fact that feedback informs to each student clearly, only one student referred to this idea. In case of Item 2, percentage of students' responses under this criterion was 35.7%. This shows that when the question is directly asked for features of feedback, there is a clear increase for this criterion. Moreover, since the feedback timing is very crucial for a formative assessment, only about two tenths of the student teachers mentioned from this knowledge claim for Item 1 and Item 2. As a matter of fact, Bedford and Legg [25] pointed out that feedback given rapidly is appreciated by their sample.

All of students' responses revealed that most of the senior mathematics student teachers lacked of capturing 'a scientific definition of feedback'. Majority of them tended to use only one aspect of feedback. Such a tendency may result from our educational system where students are accustomed to answer to multiple-choice or short-answer questions. Therefore, they may prefer responding or explaining each question concisely. Furthermore, for Item 2 some of the feedback criteria produced by the authors did not unfortunately work to label students' responses.

For Item 3, most of the student teachers had an idea that since feedback makes a contribution for student learning, they have an opportunity to see both their weak and strong aspects. Also, a significant ratio of them emphasized that feedback informs student about his/her learning process/progression and motivates student for learning process. Since feedback is a part of formative assessment, student teachers should have possessed a better notion about how to use it for learning process. At least, student teachers knew some functional aspects and usage of feedback for student learning.

The fact that all of the student teachers tended to use personal language and directions is an outstanding outcome. Using personal language points out that student teachers may have preferred creating a friendly interaction. This result may stem from the idea that personally designed comments are more useful than the others identified by grade assignment [36]. Also, asking follow-up or directive questions for examination paper, about half of them tended to get students to re-consider about their own responses. This indicates that they had an idea that formative assessment has a complementary role for further learning attempts. On the other hand, this claims that senior mathematics student teachers were able to effectively integrate the feedback routines in their future teaching to some extent. This knowledge claim is in a harmony with Kline *et al.'s* [35] one.

To highlight the extent to which feedback criteria used here work, further investigation should be undertaken with a larger sample. Also, how student teachers use feedback in their schooling practice should be observed since they attend schooling practice through three semesters. Since senior student teachers have deficiency in comprehending feedback, its features, its effect to student's learning, further efforts should be theoretically spent in measurement and assessment course in order to overcome such deficiencies and difficulties. Likewise, we should also revise our own instruction of formative assessment as well as alternative methods of measurement and assessment.

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