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Preservice mathematics teachers’ views about planning the assessment

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The study attempted to investigate senior preservice middle school mathematics teachers’ purposes in preparing the assessment, and their views and suggestions about the assessment part of a lesson plan through employing basic qualitative method. First, the “Incomplete and Improper Lesson Plan Task” prepared by the researchers was administered to the participants (N=27). Then, one-to-one interviews were conducted (N=11). Findings of the study indicated that preservice teachers underlined similar purposes in preparing the assessment part of the lesson plan, all of which related to the teacher actions. They mainly emphasized the kind of feedback gathered by the teachers rather than the students. They also considered the assessment part in the task weak since there were insufficient number and diversity of the questions.

Keywords: Formative assessment, feedback, preservice mathematics teachers.

Introduction

Formative assessment or assessment for learning is utilized deliberately for learning (Laud & Patel, 2013). It includes all activities that provide feedback for adjusting teaching activities and instruction (Black & Wiliam, 1998). Any assessment is formative if it is utilized to collect evidence about students’ learning progress and current level of understanding the concept (Heritage, 2007), and to make instructional adjustments in line with their needs (Wiliam, 2007).

Feedback plays a crucial role in formative assessment (Sadler, 1989). Ramaprasad (1983, p.4) defined feedback as “the information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in some way.” Feedback cannot be differentiated from the instruction and it is formative when the information provided is utilized to enhance learners’ performance (Wiliam, 2007). Information gathered from feedback can be used by both teacher and students (Sadler, 1989). Teachers use it to specify students’ needs and give decisions about the adjustments for further instructions (Wiliam, 2007). Students use it to realize their strengths and weaknesses (Moss & Brookhart, 2009) and to learn how to modify and improve their performances to reach the reference level. Therefore, it affects students’ learning positively.

Wiliam and Thompson (2008) focused on three instructional processes; where students are in their learning, where they are going, and how to get there which are emphasized in Ramaprasad’s (1983) definition of feedback and they suggested a formative assessment framework shown in Table 1. According to the framework, formative assessment is composed of five key strategies and one big idea that the outcome of students’ learning processes can be utilized to make necessary changes in the instruction with respect to students’ needs (Wiliam & Thompson, 2008).
## Table 1: Framework relating strategies of formative assessment to instructional processes (Wiliam & Thompson, 2008, p.63)

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Where the Learner Is Going</th>
<th>Where the Learner Is Right Now</th>
<th>How to Get There</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Clarifying and sharing learning intentions and criteria for success</td>
<td>(2) Engineering effective classroom discussions and tasks that elicit evidence of learning</td>
<td>(3) Providing feedback that moves learners forward</td>
<td></td>
</tr>
<tr>
<td>Peer</td>
<td>Understanding and sharing learning intentions and criteria for success</td>
<td>(4) Activating students as instructional resources for one another</td>
<td></td>
</tr>
<tr>
<td>Learner</td>
<td>Understanding learning intentions and criteria for success</td>
<td>(5) Activating students as the owners of their own learning</td>
<td></td>
</tr>
</tbody>
</table>

The five strategies can be explained in the following way: Teachers are responsible for “engineering” effective learning environment since their role is only to scaffold learning. They provide this environment by generating productive discussion setting, asking deep questions and monitoring the learning process (O'Connor, 2002). Learners’ active participation is associated with challenging tasks and providing feedback for these tasks which assist students’ learning (Black & Wiliam, 1998). Since students need to understand the learning intentions and standards for which they will be assessed, clarifying and sharing learning intentions and success criteria with the students is also very important (Wiliam, 2007). Additionally, activating learners as instructional resources for one another and for themselves is essential for any assessment approach. In this way, learners can improve the ability to judge and decide about what to do next (Berry, 2005).

Formative assessment is a significant process that can be followed in order to have information about students’ progress. Hence, each step of the assessment needs to be decided and planned continuously (Heritage, 2007). Since, as future teachers, preservice teachers need to be qualified in planning and implementing formative assessment practices, teacher education programs play a crucial role in raising the awareness of preservice teachers about the significance of formative assessment and in teaching them how to plan and use it in their classes effectively.

The current study aimed to investigate preservice mathematics teachers’ (PST) purposes in preparing the assessment part, and their views and suggestions about the assessment part of the lesson plan. Aforementioned framework guided the researchers in the process of both preparation of the task used for as the data collection instrument and analysis the participants’ responses.

**Methodology**

In this study, basic qualitative research method was employed in order to reveal PSTs’ views about planning the assessment part of the given lesson plan.

**Context and participants**

The study was conducted in a four-year middle grades mathematics teacher education program (MTE). The program offers mainly mathematics and introductory education courses in the first two years and mathematics teaching courses in third and fourth years. A total of 27 senior PSTs who were
enrolled in MTE program participated in the study. They were selected among PSTs who completed the Methods of Mathematics Teaching and Measurement and Assessment courses, and who were taking the Practice Teaching course. The first data collection instrument, Incomplete and Improper Lesson Plan Task (LPT) was implemented to 27 PSTs. Then, 11 PSTs were selected for the interviews with respect to their diverse answers to the questions in the given task.

**Instruments and data collection**

Data were collected by LPT and a semi-structured interview protocol. LPT consisted of incomplete and improper lesson plan with three 6th grade objectives on equivalent fractions and a case where PSTs assumed to be in-service mathematics teachers implementing this lesson plan. A basic lesson plan template which addressed the lesson in beginning, middle, end, and assessment parts was used because participants were familiar with the template in the MTE program courses. The plan was incomplete because there were not any expression implying any formative assessment strategy. PSTs were expected to realize the nonexistence of these strategies and integrate one or more strategies in the given lesson plan. The plan was improper also because the first objective was unmeasurable and unobservable, there were inconsistencies between objectives and questions in the assessment part, there was no rubric for fair scoring, and questions had a weak structure in the assessment part. Certain multiple choice questions were selected because PSTs were expected to realize that feedback gathered through these questions about students’ learning was limited. PSTs were anticipated to notice and eliminate these reasons of improperness of the lesson plan. Figure 1 presents the lesson objectives and 4 yes-no questions in the assessment part of the lesson plan.

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**Objectives:**

- Students should be able to develop a conceptual understanding of equivalent fractions.
- Students should be able to explore the same quantity can have different fractional names.
- Students should be able to look for patterns in equivalent fraction.

**Assessment:**

For each equivalence please write T in the given blank if it is correct; write F if it is false.

- A) \( \frac{3}{4} = \frac{6}{8} \) (___)
- B) \( \frac{46}{14} = \frac{23}{6} \) (___)
- C) \( \frac{5}{12} = \frac{20}{36} \) (___)
- D) \( \frac{37}{74} = \frac{1}{2} \) (___)

**Figure 1: Objectives and assessment part of the incomplete and improper lesson plan**

LPT asked PSTs to write the strengths and weaknesses of the assessment part, and give suggestions about how to improve it with regard to weaknesses they found. During the interview, PSTs commented on how they would have designed the beginning, middle, end, and assessment parts if they had prepared the given lesson plan. They responded the questions by assuming to be in a hypothetical classroom environment; they did not implement the lesson plan in their teaching. The current research report, a part of a broader study which addressed all indicated features, focused only on PSTs’ views about the assessment part of the given lesson plan.

LPT was implemented in a course where PSTs attended after necessary permissions were granted. PSTs were asked if they would like to volunteer to participate in the study and those who volunteered completed the task in about 50 minutes. After one-month of data analysis period, 11 PSTs were
selected to be interviewed in one-on-one setting. They all participated in the interviews voluntarily. Interviews took 30-80 minutes and were audio-recorded with the permission of the participants. PSTs’ answers to the task were reminded with the purpose of eliciting whether they wrote the responses for formative assessment purpose or not when they did not advert to the same issues during the interview. Data were analysed through content analysis. PSTs’ expressions which imply the action of gathering evidence about students’ current knowledge and their own competence in teaching were grouped under the “providing feedback that moves learners forward” subdomain of the formative assessment framework (Wiliam & Thompson, 2008). PSTs’ purposes in preparing this part were examined under the categories of “feedback for teacher” and “feedback for students” (Sadler, 1989). One researcher, other than the authors, examined the data and they agreed that the categorization was conceivable regarding to the data. Preservice teachers’ intended further actions, views and suggestions about the assessment part were also reported.

**Findings**

**Feedback for teacher and students**

Findings of the interviews indicated that all interview participants agreed that the assessment part provided feedback for the teacher. PSTs mainly stated that they would perform this part to gather feedback about students’ level of knowledge and their own competence in teaching. PST4 emphasized both aspects as in the following conversation:

**Researcher (R):** What is your purpose in preparing the assessment part of the lesson plan?

**PST4:** In order to learn about whether I could teach the concept or not. Did I have students achieve the objectives? There can be some points that the students did not get. I prepare [the assessment part] in order to determine these points [as well].

PST13 also underlined the necessity of providing feedback about students’ learning as follows:

I think the [assessment] part is necessary in order to provide feedback about what the students have learnt or have not learnt… I think using exit card is very beneficial in order to understand whether the students have learnt the concept or not.

Only one participant mentioned that this part also provided feedback to the students about their learning:

**PST23:** Definitely I will not grade students’ work. Here, grading is so ridiculous. I check whether they understood the concept or not. I think it should provide me feedback.

**R:** Why do you not grade their works?

**PST23:** We implement it in last five minutes [of the lesson]. The students have learnt the concept in that lesson. Their knowledge is so fresh. I think there is no need to grade the exit card if the students have a perception that the assessment part serves for testing themselves. The teacher will use it to learn about what the students understand (and) also the students will realize whether they understand the concept or not through the assessment part.

Remaining ten interview participants also preferred not to grade students’ responses to the questions in the assessment part since they thought that this part would be used to check students’ current level
of understanding of the concept or to have them comprehend the concept better.

All interview participants expressed that feedback they obtained by means of the assessment part would affect their further instructional plans. They indicated that they would make some instructional changes according to the feedback about students’ needs. They mostly preferred changing the next class’s activities or teach the lesson again. However, some of the participants claimed that they probably would not have time to repeat the lesson since they need to keep the pace of the national curriculum:

I would decide what to do according to the answers of the majority of the class. If the students made major errors, I would think that I was responsible for their mistakes. Maybe, I would repeat the lesson or I would probably teach another lesson in which I could emphasize the points that the students misunderstood. However, I do not know whether I have time to do it when I would be a teacher because there is a curriculum [need to follow]. These plans are only utopia. (PST15)

**PSTs’ views and suggestions about the assessment part of the lesson plan**

In both task implementation and the interview, PSTs expressed similar ideas with different frequencies. In the LPT implementation, more than half of the PSTs commented on the strength of the assessment part and mainly emphasized the consistency of the questions in the assessment part with the lesson content (n=5). PST12 expressed that “it is a good activity [since] the students can implement what they have learnt into the assessment part.” Two PSTs claimed that the assessment part was strong since “it is efficient in assessing whether the students understand the second objective” (PST8) and “the indicated questions can measure easily whether the students understand the relationship between two equivalent fractions.” (PST15). PST11 and PST27 reflected on different features of the questions. They indicated that this part was useful since there were questions related to both enlargement and simplification of the fractions. On the other hand, there was not any coherence within other PSTs’ expressions. For instance, PST9 stated that she liked the questions in the assessment part because “they have uncontroversial and single answer” whereas according to PST23, “the questions do not have specific answer and they prompt students to think.”

Only four interview participants mentioned the strength of the assessment part by commenting on only the specific options. Two participants stated that they would keep the option c since it could assist to detect some misconceptions or errors. PST17 expressed that she liked the questions in the assessment part since they included numbers such as 37 and 46 which were not much used.

Regarding to the weaknesses of assessment part, in both LPT implementation and interviews, PSTs addressed the questions in the assessment part as insufficient in number and diversity. In LPT implementation, 6 among 27 PSTs commented on and suggested ways to improve such weaknesses:

There is only one type of question. There should be (questions) which are supported by the shapes. Not only true-false questions, but also some interpretation questions and the questions that the students can write equivalence of the indicated fractions should be added. (PST21)

According to five participants, assessment part was weak since it included questions that students had fifty per cent chance to answer them correctly. They recommended to add different types of questions to reduce students’ guessing. For instance, PST19 suggested to “add some open ended questions in order to see how much the students understand the concept in an easy and reliable way.” Adding verbal and daily life questions, and questions with shapes was also recommended.
During the interview, PSTs mostly underlined similar weaknesses of the assessment part and proposed suggestions to deal with them as they did in the task implementation:

I think, whether the students understand the concept or not is not assessed exactly here because there is fifty per cent chance. If I write all of them true, I will answer one or two of them correctly. (PST18)

To overcome this weakness, PST18 also recommended to add different type of question as:

If I were… I would give them and want them write an equivalent fraction to this one rather than asking true-false [questions]. Even, I can ask the same questions with the one that I asked in the beginning part of the lesson. I change its numbers. “If such a number of pieces of cake were eaten, how many pieces were eaten?” and “Is there another fraction which represents the (same) amount?”

On the other hand, none of the participants mentioned the inclusion of the rubric for fair scoring which was one of the reasons for the improperness of the given lesson plan.

**Discussion and conclusion**

Findings of the study showed that all PSTs planned to prepare assessment part of the lesson plan in order to gain feedback about students’ current knowledge level and their own competence in teaching, all of which related to teacher actions. Only one interview participant stated that assessment part would also provide feedback to the students about their own learning. PSTs mainly emphasized the kind of feedback gathered by the teachers although they were expected to comment on that students can also obtain feedback about their own learning and needs through the assessment. This tendency towards teacher-centred assessment was the action which provided feedback only to the teacher in order to determine the problematic areas that required more emphasis and practice (Antoniou & James, 2014). It might be due to PSTs’ views that the students may not benefit from the assessment part to determine their needs and take necessary actions to meet these needs.

PSTs were against grading the assessment part of the lesson plan since their purpose in the preparation of the assessment part was only to check students’ learning or to have them understand the concept well. This finding was congruent with the idea that the main purpose of utilizing formative assessment was to facilitate and improve students’ learning instead of simply assigning a grade (Marshall & Drummond, 2006). When it is considered that the formative assessment serves its purpose when the teacher avoids grading students’ performance (Elawar & Corno, 1985), it might be deduced that the PSTs planned to use this part for formative purpose.

PSTs indicated that feedback gathered from the assessment part assisted them to adjust their further instructional plans according to students’ needs. This finding might indicate that PSTs used the assessment part of the given lesson plan formatively because they would make some changes in the next class’s instruction and planned further instructional steps (O’Connor, 2002). PSTs generally preferred to repeat the previous lesson or teach another lesson by changing the existing activity in case the students had difficulty in learning the content. However, some PSTs indicated that they probably would not have such time since they needed to keep track of the national curriculum. Similar types of adjustments and lack of time issues were also reported previously (Antoniou & James, 2014). Although all PSTs talked about teachers’ further actions, they did not mention students’ possible further actions to enhance their own learning. The reason might be PSTs’ disposition towards teacher-
centred assessment. They might not consider students’ further actions because they disregarded the fact that the students could also obtain feedback through assessment part to monitor their progress and enhance their learning.

In both task implementation and interview, majority of the PTSs were able to detect the improperness of the assessment part resulted from the structure of the questions. They emphasized that they could not know whether students had learned the concept or not through these questions since students had fifty per cent chance to answer them correctly. PSTs generally recommended adding open-ended questions to eliminate this weakness. Being able to detect improperness might be due to their awareness of the requirement of the alignment between objectives and the questions in the assessment part. They might have suggested adding different questions to eliminate the inconsistency between the objectives and questions. PSTs also suggested increasing the number of the questions in the assessment part. The reason for this might be attributed to the demand of introducing students with wide range of questions to prepare them for high-stake national examinations, as reported for beginning Turkish middle grades mathematics teachers (Haser, 2006).

Due to the fact that the measurement and assessment course stresses mainly the assessment tools rather than focusing on the whole picture of the lesson plan with regard to the utilization of the formative assessment strategies, PSTs might have had difficulty in examining and integrating the intended formative assessment strategies in the lesson plan. Therefore, courses on assessment can be offered with the methods of mathematics teaching courses or lesson contents of these courses can be associated with each other so that PSTs can integrate what they have learnt about assessment into the lesson plans they prepared in the methods courses. Hence, they can have a chance to look at the whole picture of the lesson plans in terms of employing the formative assessment practices.

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