Teacher students’ difficulties in doing tasks for pmri online meeting

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Abstract. Doing task for PMRI online meeting is quite new for teacher students that purposed to support them in understanding context and model in Realistic Mathematics Education. This article is aimed to describe teacher students’ difficulties in doing PMRI task for online meeting that included designing a fraction problem using Palembang context, trying out to students, and analysing the result. The research method used is qualitative study and the type is descriptive study. Twenty one master students were involved as research subject who joined PMRI course in even semester 2017/2018 academic year. The result showed that most of teacher students were difficult to understand the command in task given, to choose daily and familiar context for students, to provide questions that explore students’ understanding when they solved fraction problem, to present their works in English, and to analyse students’ answers.

1. Introduction
Technology now plays important role in learning [1]. As one of the use of technology, online course are believed being able to support adult students [2]. Being future mathematics teachers, teacher students need to understand well good context and model because roles of context and model are important for students in learning mathematics [3]. Through context and model, students are invited to investigate mathematics concepts inside [4, 5]. One of teaching and learning approach that has paid attention to the use of context and model in learning mathematics is Realistic Mathematics Education (RME) or in Indonesia version it is called Pendidikan Matematika Realistik Indonesia (PMRI) [6-10]. Therefore, online meeting for PMRI course is assumed as a good way to support them to learn about designing good context and model directly from the experts.

Many prior studies were conducted related to the implementation of digital technologies. One of them stated that digital technologies provide a wide range of tools and functions that can support students’ learning of mathematics [11]. Online meeting, as one form of the use of digital technology in a learning activity, provides a rich arena such as problem solving, learning, decision making and it also enhance collaboration from two or more different places in the world [12, 13]. Berge found that a series online meeting mediated students’ action to construct their knowledge through digital learning resources [14]. In line with those, Zwart [15] found that digital learning material can enhance students’ mathematics learning in vocational education. However, for students who are quite new with an online meeting, they might have some difficulties in adapting this kind of learning environment.

Considering the advantage of online meeting based on previous studies and the use of it to support students especially teacher students in understanding good context and model in mathematics, this study purposed to describe their difficulties in doing tasks for PMRI online meeting.
2. Methods
This study is a qualitative research. Qualitative research is a kind of studies that investigate the quality of relationships, activities, situations, or materials [16]. It emphasizes on describing what happens in situation in detail or describing the behaviours of people rather than comparing the effect of treatment. Fraenkel & Wallen [17] stated that there are five steps in qualitative research: (1) identification of the situation to be studied. This study focused on describing teacher students’ difficulties in doing PMRI online task; (2) identification of the participants in the study. Twenty three mathematics education master students, who joined PMRI course in even semester of 2017/2018 academic year, were involved as research subject; (3) generation of hypotheses. We predicted that teacher students can doing well in understanding good context in learning mathematics and designing fraction problem based on Palembang context; (4) data collection and analysis. Student slide presentations, video recording and interviewed some students were used to get deeper information of their thinking process and data will be analysed by holistic descriptive; and (5) interpretation and conclusion. Indicators of good context of mathematics problem were used given as a guideline to interpret and to make a conclusion.

3. Results and Discussion
The online meetings were conducted 2 times. The first online meeting was held on 19th of March 2018 and the second one was on 14th of May 2018. Before having the first online meeting, teacher students were asked to design the next activity that would help children to have further understanding of solving fraction problems. The description of task for them is showing as follow:

**Task 1.7**

**What activity next?**

You have studied how children did solve the sandwich problem. You have seen how their reasoning about fractions was strongly connected the concrete context of sharing sandwiches.

**Task 1.7**

Describe an activity that would help these children to make the next step.

You are expected to elaborate the activity in a “one-page of A4” which includes:

- A (context-based) fraction problem
- A short lesson plan on:
  - How would you introduce the activity?
  - What would you expect from the children?
  - How would you evaluate the children’s work in order to know to what extent their skill or conceptual understanding developed?

![Figure 1. A task given to teacher students for online meeting](image)

Most of students used Palembang context in designing the next activity. Meanwhile the previous problem for children use fair sharing Submarine Sandwich context, a context from America. The following is teacher student’s work for task 1.7:
Jeki’s group work in figure 2 shows that the student just changed the context in doing task 1.7. It is similar with the previous problem asking the same questions. They do not really answer the question in task 1.7 that ask about designing the next fraction problem to extend children knowledge about fraction, introducing the problem, and evaluating the children work. It showed that the teacher student did not understand well the instructions or problems in task since it was given in English.

Ibu membeli 6 loyang martabak yang berukuran sama dan beda rasa ada variasi coklat dan keju, untuk dimakan bersama keluarga besar, yang terdiri dari kakek, nenek, ibu, ayah, dan 4 orang anaknya.

a. Berapa bagian yang akan didapatkan oleh masing-masing anggota keluarga?

b. Siapa yang mendapatkan martabak rasa coklat dan keju paling banyak?

Amalia’s group work in figure 3 is looked like suitable with the instructions in the task. They made context problem, they described how they introduce the problem to student, they predicted students’ possible answers, and they gave evaluation of students answer. However, the fraction problem designed also looked similar with Submarine Sandwich problem, it was a kind of fair sharing problem purposing to determine the fraction number showing which parts is the most or the least. They were also not sure if the fraction based context problem designed was a good problem. After teacher students completed
the task, they presented their work in online meeting, in front of all students, their lectures, and also some lectures from Freudental Institute. Here is the photograph when one group of students in presentation.

![Figure 4. One group of students presented their work in online meeting](image)

Figure 4 shows the students’ session for presentation, there was next session for feedback from some lectures in Utrecht. The students need to answer the questions that were asked to them. The following is a fragment of conversation when they had question and answer session.

**Frans**: ...and why do call this low category? I think if they really understand what they are doing, they need a lot understanding about fraction, about division and so on. So why do you say low category?

**Student**: Low category just only for student seven divided six just only equals one point a sixteen.. Maybe my team can help me.. (Discussing together in team). Ok.. (Offering microphone to her friends). Ok, maybe differently about high category middle category and low category in here is the answer for high category the answer is complete.. so the concept and the.. ee complete answer and for the kojo cake in here is show the all.. the kojo is divided like this (pointing the slide presentation) for middle category and low category different that in cording the skill the student middle category the ability know the concept

**Prof Zul**: just use Indonesia... (Giving direction in Bahasa)...

**Frans**: anyway whatever the term you use. There is a different between the solutions. Is that what you mean?

**Student**: ok... yes..

**Frans**: yes, if the answer yes then..

**Student**: Sorry Sir, ok I choose try to answer in Indonesia. Maybe later my professor can help me

From the conversation above, it showed that the teacher student had difficulty speaking in English so that they could not explain well their reason in designing and analyzing children answers to the fraction problem they designed. The following are the teacher student's judgment for children answers:
In figure 5, it denotes that teacher students classified children answers into 3 categories namely high, middle, and low category. However, they looked confused when they are asked to explain the reason behind their judgment. It also showed that the teacher student classified the ability of children who answer formally into the low category although children can answer the fraction problem correctly. What they did indicated their understanding that children must solve problems through making pictures or models to be categorized as students with high abilities.

Previously, context was used at the end of learning, as additional material. In mathematical instructional activity using PMRI approach, context plays major role starting from at beginning of activities [18]. It implies that students would not learn formula directly in learning using context [19]. Furthermore, through context problem, students develop and apply mathematical concept inside the situation that makes sense to them [20]. However, not all of mathematical problems using context is categorized as good problems. A context problem is called a good problem if it is meaningful and interesting and stimulates students to think [21]. From the result of this study, it was still difficult for teacher students, who had no experience in designing context problem, to design a good problem using context. It is almost similar with what Anna [6] investigated about primary school teacher students’ perception showing that the context used in learning mathematics must be a real context in daily live although it is a fake context, a context made by teacher that does not naturally stimulate students to learn. In this study, the fraction based context problem that teacher students designed was still similar with context problem in the prior task. If the same children got the similar fraction problems, it did not invite them to extend their knowledge through those context problems. They only use their standard procedure in solving the problem. Meanwhile, the process to get mathematical knowledge that is called mathematizing happens while they are engaged in deep thinking to solve the problem using unusual procedure and come up with their own solution [21].

4. Conclusion
Underlined by the result of this study, the difficulties of teacher students, who had no experience in designing context problem in task for PMRI online meeting, include understanding the command in task given, choosing daily and familiar context for students, providing questions that explore children’s understanding when they solved fraction problem, presenting their works in English, and analyzing children answers.
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