Integrating mathematical literacy toward mathematics teaching: the pedagogical content knowledge (PCK) of prospective math teacher in designing the learning task

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Abstract. To integrate mathematical literacy to Mathematics teaching, a learning task should be designed to activate students’ involvement in gaining the learning experiences and the learning objectives. Therefore, teachers need to possess the Pedagogical Content Knowledge (PCK) as the integration of pedagogical knowledge, mathematics and mathematical literacy teaching methodology, knowledge about mathematics and mathematical literacy. The purpose of this research is to describe the prospective mathematics teacher’s PCK in designing a learning task to integrate mathematical literacy in a math class. One of 157 prospective math teachers who was at least on 5\textsuperscript{th} semester was selected as the subject. There were three selection criteria for the subject: pedagogical knowledge, mathematical knowledge and mathematical literacy. The subject was assigned to design the learning task within 3 weeks. In order to get the profile of his PCK, the subject was interviewed on the basis of the design that he produced. The results of this study shows that the subject had a good PCK which he utilized for designing learning task. He utilized two approached of organizing learning task, i.e. presenting a mathematics problem to teach the mathematics concept followed by presenting mathematical literacy problems to give a deeper understanding of concepts or vice versa.

1. Introduction
Mathematical literacy is an individual's ability to formulate, use and interpret mathematical knowledge in various contexts of real-world problems [1]. Mathematical literacy involves the use of all mathematical content which includes concepts, facts, procedures and mathematical tools [2], mathematical reasoning to describe, explain and predict a phenomenon [3]; [2]. The skills used in mathematical literacy are skills in performing simple operations and making a simple conclusion [2]. Mathematical literacy is aligned with various other terms. The term numeracy was used by Cockcroft [4], while the term quantitative literacy was used by Steen [5] and Hughes-Hallett [6]. Nevertheless, these three terms agree on some basic matters: mathematical literacy emphasizes on the ability to recognize and use basic and simple mathematical knowledge in real life rather than at school so that it alloes students with low mathematics skills be able to solve it.
2. Literature Review

Integration of mathematical literacy

Mathematical literacy is not a subject taught in Indonesia, but it can be taught to students through mathematics learning for several reasons [7]. Firstly, mathematical literacy is in line with the ultimate goal of the implementation of education in Indonesia. Permendikbud no 20 of 2016 on graduation standards of elementary and secondary students states that students who finished elementary and secondary schools must have factual, conceptual, procedural, and metacognitive knowledge related to science, technology, art, and culture; and must be able to use them for themselves and the society. This standard describes the characteristics of mathematically literate person. Secondly, to teach mathematical knowledge, teachers must ensure that mathematical concepts are first developed through the use of correct language, symbols and notations and mathematical reasoning in learning [8]. While the use of language, symbols and mathematical notation is one of the fundamental mathematical skills required in mathematical literacy [1]. Third, mathematics learning should be done meaningfully through the use of real-world contexts as a means to access mathematical knowledge so that students can use their mathematical knowledge and improve their problem-solving abilities [8]. Therefore, mathematical literacy can be an alternative to present problems with the context of everyday life because mathematical literacy is closely related to the ability of the use of mathematical knowledge in everyday life. Fourth, mathematical literacy is a skill that can be taught. This is in line with Shulman's opinion that a teacher can transform the expected understanding, performance skills, attitudes or values into pedagogical representation and action [9].

The content of mathematical literacy is the processes capabilities that involve fundamental mathematical skills [1]. There are three processes capabilities: the ability to formulate situations or problems mathematically; the ability to use concepts, facts, procedures and mathematical reasoning; and the ability to interpret, apply and evaluate mathematical results. Whereas, fundamental mathematical abilities include: communication skills; mathematisation; representation; reasoning and argumentation; design strategy; use of symbols, formal language, techniques and operations; as well as the use of mathematical tools. In a mathematics lesson with appropriate basic competencies, one or more indicators of mathematical literacy skills involving some fundamental mathematical skills can be introduced to students.

Pedagogical Content Knowledge (PCK)

Shulman grouped the knowledge needed for teaching into three categories: Subject Matter Content Knowledge (SMCK), Pedagogical Knowledge (PK), and Pedagogical Content Knowledge (PCK) [10]. Shulman argues that PCK is a special and interesting knowledge, because it is a collection of typical knowledge for teaching. In mathematics learning PCK is an integration of pedagogical knowledge in general, mathematical teaching methodology and knowledge of mathematical disciplines. The knowledge represents the integration of content and pedagogy into the understanding of specific topics, problems or issues that are organized, represented, and adapted to the interests and abilities of learners [9]. Thus, what is meant by PCK to teach mathematical literacy through mathematics learning is the knowledge of the presentation of mathematical literacy through Mathematics learning on a topic effectively, in order to support students’ understanding, diagnose and eliminate students’ misconceptions and difficulties when studying mathematical literacy and mathematical knowledge on a particular topic. Teachers need to recognize whether an answer is correct or incorrect, to analyze the source of the error and then to fix it. In this study, PCK of prospective mathematics teachers in teaching mathematical literacy through mathematics learning will be explored through the lesson plan and the practice in the classroom [11][12].

There are several opinions about aspects of PCK knowledge by some experts such as Shulman [9][10]; An, Kulm, & Wu [13]; Ball, Thames and Phelps [14]; Hill, Ball and Schilling [15]; Killic [16]; Kunter et al.[17]. In this research PCK aspects used are aspects of knowledge as described by Balls, Thames, & Phelps [14] which includes the knowledge of content and student, knowledge of content and teaching, and knowledge of curriculum. There are two reasons of choosing the PCK classification by
Ball, Thames, & Phelps. First, they have clearly classified PCK aspects compared to PCK theory from Shulman. Secondly, they link the interrelation between students, content and teaching while the PCK aspects of other experts do not do this.

This paper describes aspects of PCK in designing the learning tasks that integrate mathematical literacy into the teaching of relation and function. It also describes to what extent the prospective mathematics teacher utilized PCK in designing a learning task to integrate mathematical literacy in a mathematics class.

**Knowledge of Content and Students (KCS) in teaching mathematical literacy.** KCS is a type of pedagogical content knowledge that combines both the knowledge of students and the knowledge of content [14]. Hill, Balls & Schilling describes this incorporation by defining KCS as knowledge of content related to knowledge of how students think, know or learn about certain content [15]. In relation to the teaching of mathematical literacy through mathematics learning, the "content" by Ball, Thames, & Phelps [14] and Hill, Balls, & Schilling [15] is associated to mathematical content and mathematical literacy content. Thus, KCS can be stated as a knowledge that connects mathematics and mathematical literacy knowledge to the knowledge of how students think, know or learn mathematical topics and mathematical literacy.

... an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics. If those preconceptions are misconceptions, which they so often are, teachers need knowledge of the strategies most likely to be fruitful in reorganizing the understanding of learners, because those learners are unlikely to appear before them as blank slates and lessons. [10]

According to Shulman a teacher needs to know what makes learning on a particular topic difficult, as well as the preconceptions and conceptions that students already have. If student preconception is a misconception, then the teacher must be able to find a way to reorganize that knowledge. It means that teachers must find the source of possible mistakes, and find ways to eliminate these difficulties and misconceptions [16].

KCS knowledge is needed when the teacher chooses an example or when the teacher designs a task in planning and then presents it to the teaching practice. According to Ball, Thames & Phelps, an interaction between mathematical understanding, student recognition and the introduction of mathematical thinking is required in designing tasks and examples. Furthermore, he argued that in giving examples, teachers need to predict whether students will be interested and motivated by the example, while in assigning tasks, teachers need to anticipate what students typically do with the task and whether they will feel that the task is difficult or not [14]. KCS includes teacher knowledge about mistakes that students often make on a particular subject, or on some topics that are often perceived as difficult by students, or about some representations that are often useful [15]. Therefore, teachers often have to reason about students’ mathematical knowledge by looking at students' work, hearing student statements, and looking at student problem solving. This activity is useful to predict what students are doing or thinking based on their knowledge on the topic.

Based on the opinion of the experts above, in this study KCS is the knowledge of how the students’ understanding, conception and preconception, misconception, mistakes or difficulties, interest and motivation in order to design the learning task of functions and relations. The categories and indicators of KCS are as shown by Table 1.
Table 1. Descriptions of KCS categories and indicators in designing learning task.

| Categories                                                                 | KCS Indicators                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Knowledge of students’ understanding (conception and preconception) about the content on the learning task | Predict students’ preconceptions about the learning task prerequisite materials (mathematical and mathematical literacy). Predict mathematical knowledge and mathematical literacy skills that students will be able to understand from the learning task. Predict how students will be able to understand the learning materials through the use of representation, reasoning or mathematical tools selected on the learning task. Anticipate what students usually do after the learning task is given. |
| Knowledge of student interest and motivation                              | Predict students’ interest and motivation about the mathematical literacy issues, examples or tasks to be assigned. Understand how to motivate students to actively participate in learning tasks.                                                                                                                                                                                                                       |
| Knowledge of misconceptions, mistakes, or student difficulties             | Understand how to identify mathematical material and mathematical literacy on a learning task that often creates difficulties, misconceptions or student errors. Predict the preconceptions or conceptions that lead to misconceptions. Predict mathematical material, mathematical literacy skills or fundamental mathematical abilities that are difficult to understand or master in the learning task. Predict the source or cause of difficulties, errors / misconceptions that often occur in students. Anticipate difficulties, mistakes or misconceptions of students, in connecting, using mathematical knowledge, reasoning, problem solving. |

Knowledge of content and teaching (KCT). KCT is a teacher’s knowledge that integrate both knowledge of teaching and knowledge of mathematics. KCT help the teacher to transform the content knowledge in a form that is strongly pedagogical yet adaptive to the varied abilities and backgrounds of the students [18]. KCT was implicitly described as the most influential representation of ideas, analogies, illustrations, examples, explanations and demonstrations [10]. Teachers should be able to analyze the benefits and obstacles of representation used to teach a particular content to fit the needs of students [14] [16]. In addition, teachers also should be able to present the content in a variety of ways, organize the content for students learning [14] [19], choose to use examples to start or examples to deepen understanding [14] so that they can be understood by others [10].
By KCT, teachers will able to choose and implement appropriate strategies, approaches and learning materials for learning, and decide the tasks or assessment for learning [20]. The task designed for teaching mathematical literacy should be able to present mathematical literacy in multiple contexts at a level so that students can understand it logically. Therefore, teachers need to improve effective communication between students and teacher [21]. Based on the above description, KCT in designing the learning task to teach mathematical literacy through mathematics learning is a knowledge that integrates both the knowledge of teaching, and the knowledge of mathematics and mathematical literacy in designing learning task such that the learning task is able to engage students in the learning activity. The KCT Indicators are adapted from [22], and are described in Table 2 below.

| Categories of KCT                  | Indicators of KCT                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------|
| Organizing learning tasks         | choose the prerequisite materials that match the learning task to be provided organize and sort the presentation of learning tasks to facilitate learning activities. choose mathematics and mathematical literacy tasks in accordance with the strategy used choose an example appropriate for the purpose of sampling is to motivate, clarify or deepen the material. Select an contextual examples or learning tasks for students |
| Selection of representation       | know and use representations, analogies, illustrations, and examples that support the material to make it easier for students to understand. understand the weaknesses and advantages of using representation in assigning tasks |

3. Methods
This research is a qualitative that aims to describe to what extent prospective mathematics teacher possesses the mathematical literacy and how their PCK is performed in designing a learning task to integrate mathematical literacy in a math class. Qualitative research is appropriate for this purpose, because qualitative research is naturalistic which reveals a phenomenon as it is [23].

Participant of the research
The participant of this research was a prospective mathematics teacher who was on the 5th semester, and had a good mastery on three elements: pedagogical knowledge, mathematical knowledge and mathematical literacy. In order to select the subject, 157 prospective mathematics teachers who were on the 5th semester from three universities at East Java, Indonesia participated in a mathematical literacy test. The three universities were University A, University B, and University C (names of universities anonymized). University A was a state university with a mathematics education program, University B was a private University with a mathematics education program, and University C was a teacher training college with a study program of mathematics education. The mathematical literacy test was used to categoryze the mathematical literacy of prospective math teachers into three categories, i.e. low, moderate or high level. A prospective mathematics teacher was considered to have a good mastery in math literacy if he/she was categorized in high level of mathematical literacy. In addition, the prospective mathematics teachers transcript were collected from their universities. The grades of pure mathematics subjects and grade of educational subjects were separated from the transcripts. Then, each GPA of pure mathematics courses and GPA of educational courses were
calculated. A prospective mathematics teachers was considered to have a good mastery in mathematical knowledge if he/she achieved GPA of at least 3.5 (scale 4) in pure mathematics subjects, while a prospective mathematics teachers was considered to have a good mastery in pedagogical knowledge if he/she achieved GPA at least 3.5 (scale 4) in educational subject. The research participant who satisfied the criterias was chosen and addressed by S1

Methods of data collection
Data collection methods used in this research were assignments, documentation and interviews. There were three assignments for S1. Firstly, S1 was instructed to find out information about mathematical literacy through any source since mathematical literacy may not familiar for him. Secondly, since S1 is a prospective mathematics teacher who does not have his own class, S1 was instructed to dig up information about students background from the actual mathematics teacher in the class. In addition, S1 was also allowed to do some class observation if it was necessary. Thirdly, S1 was assigned to design some learning task to teach and integrate mathematics literacy in a math class on relation and function topic. S1 was given about 3 weeks, after the two first assignments, to complete the third assignment and submit the documents of the learning task. In the next steps, the documents were observed using the observation sheets. Some in-depth semistructured interviews were conducted to confirm and complete the PCK data of S1 in designing the learning task. In addition, the reasoning communication ability also be considered as the subject need to express his thinking [24].

Data analysis
To reveal the S1’s PCK, the assignment result of designing the learning task was analyzed by descriptive analysis. S1 performance on each PCK indicators of KCT and KCS were described by elaborating and triangulating the data of assignment result documents and data of interview.

4. Result and Discussion
In this research PCK of prospective mathematics teachers were categorized into Knowledge of Content and Students (KCS) and Knowledge of Content and Teaching (KCT). Based on the results of the data analysis, prospective mathematics teachers PCK in designing the learning task to integrate mathematical literacy in mathematics class is presented as follows.

Knowledge of Content and Students (KCS) of prospective math teacher in designing the learning task
In this research, the prospective math teachers’ KCS were presented based on their categories. They are knowledge of students’ understanding (conception and preconception) about the content on the learning task, knowledge of students’ interest and motivation and knowledge of student misconceptions, mistakes, or difficulties.

Knowledge of students' understanding (conception and preconception) about the content on the learning task. Based on the analysis of S1’s submitted assignment documents and the interviews, S1 seemed to have a good knowledge of students understanding on the content in the learning task. He listed the prerequisite materials to learn mathematical literacy on relation and function topic are sets, equality system and operating procedures. Based on the class observation and the actual teacher’s information, S1 argued that students had a good understanding about the prerequisite materials. However, S1 predicted that students would only memorize the concept of function and easily forget the concept if the teaching was conducted by their actual teacher methods. These predictions were based on his experiences of attending junior high school some years ago. S1 argued that direct approach was not suitable to teach the concept of function and mathematical literacy. Therefore, S1 decided to design a learning task that aimed to construct the concept of function. According to S1, the students in the school were not familiar with the concept construction activities. Therefore, S1 predicted that students would be confused to decide where they should start. By this opinion, S1 anticipated the condition by designing the learning task in the form of students’ worksheet through a
scientific approach so that each steps could be guided in detail and the content would be easily understood by the students.

**Knowledge of students’ interest and motivation.** Based on S1 opinion, the students in the school were not accustomed to getting problem solving in the form of story problem. Students often complained if the learning task required a long step. Therefore, S1 choose to present mathematical literacy issues that were closely related to the students. The problems were presented at the very beginning of the learning task by scientific approach, discovery learning (on the task of first meeting) or problem based learning and contextual teaching and learning (on the task of second meeting). Thus, problems could be presented attractively and could motivate students to engage in learning activities. In the learning task designed by S1, the problem of mathematical literacy was placed at the end after the construction of function concept (in the first meeting) as application of function concepts. S1 argued that it was done due to two purposes: to clarify the concept of function, and to motivate the students by showing the benefits of function concept in real life.

**Knowledge of students’ misconceptions, mistakes, or difficulties.** Based on S1 previous experiences as a student, S1 predicted that the content of mathematical literacy would be difficult to be understand and to master by students. In addition, a learning task that requires problem solving skills would become a difficult learning task. It was based on the result of the S1 observation in the school and S1 interview to the teacher who taught the students. The students in the school were not accustomed to getting problem solving in the form of story problems. He also argued that students often failed in understanding the problem and using the reasoning ability that may lead to some error in solving the problem. Related to mathematical topics on relation and function, S1 predicted that some students may have some misconceptions and difficulties to find the concept of function at the first meeting. Students often misunderstood the definition of function. They often thought that a relation was a function if every element in the domain were paired (even to more than one elements of codomain) or the element of domain (even not every element) was paired to an element of codomain. To anticipate this difficulties S1 designed the learning task by posing a contextual example of a function as a bridge to connect students experiences to function concepts. Then it was followed by posing some examples and non-examples of function in an arrow diagrams.

While at the second meeting, S1 assumed that the content of the function formula was difficult for the student because student needed to find the relationship between the two sets in order to write the function formula. However, the mathematical literacy task could not be said to be easier. Therefore, S1 designed a learning task that aims to help students get used to it by giving three mathematical literacy problems with almost similar content. Thus, students would be able to use the first problem as an example for the next problem. In addition, S1 planned to design a problem that could be used to teach mathematical literacy content and mathematical content by giving mathematical literacy tasks prior to math tasks. S1 argued that students are often experienced some difficulties and mad mistakes in formulating the function. If the learning task began with the presentation of everyday problems, it could lead students to use the strategies and reasoning about relationship pattern between two sets. When the pattern of relationships had been obtained then the students would be easier to do reasoning for generalization.
Knowledge of Content and Teaching (KCT) of prospective mathematics teacher in designing learning task

As mentioned earlier, there were two categories to describe KCT of the prospective math teachers in designing learning tasks that integrate mathematical literacy learning through mathematics learning i.e., organizing learning tasks, and selecting the representations.

Organizing learning task. Based on the analysis of the learning tasks that have been designed by S1, S1 had good knowledge of organizing and sorting the presentation of learning tasks to facilitate learning activities both for the task of learning mathematics and the task of learning mathematical literacy. S1 organized mathematical content of relations and functions in two meetings. At the first meeting, S1 used to teach mathematical content on the definition of relations and functions, while the second meeting was for the mathematical material of the function formula. S1 argued that the separation of the materials in two meetings was appropriate because it took extra time to teach mathematical literacy. Without teaching mathematical literacy, then it may take only one meeting. As for the content of mathematical literacy, S1 planned to teach the all three content of mathematical literacy for each meeting in the design. In the design of the first meeting task, S1 designed the task of learning in two sets of learning tasks, i.e. the mathematics learning tasks and the mathematical literacy learning tasks. The presentation of the task of learning mathematics to construct the concept of function was presented first rather than the task of learning mathematical literacy. According to S1, in this study the mathematical literacy was used as an example of the application of the concept of function so that it presented the task of mathematical literacy at the end. This was in contrast to the design of learning tasks at the second meeting. At the second meeting, S1 made three similar learning tasks. Each learning task began with a presentation of contextual problems used to teach mathematical literacy first and then to teach the concept of function formula, domain, codomain and range. According to S1, the presentation of tasks that prioritize the assignment to teach mathematical literacy in the beginning aimed to motivate students to be ready to learn the next difficult task of learning.

In choosing the prerequisite materials in accordance with the task of learning, S1 seemed to have sufficient knowledge to determine the prerequisite of mathematics learning tasks but less knowledge in choosing the prerequisite task of learning mathematical literacy. Through the interview activity, it was found that S1 specified the set material such as registering the membership of a set, and declaring the set as a prerequisite of the concepts of relations and functions on the first meeting task and the function formula, domain, codomain, and range at the second meeting. However, in the second learning design S1 added the material at the first meeting as a prerequisite for the second meeting learning task. Furthermore, S1 were unable to mention in detail the prerequisite materials for the learning task related to mathematical literacy. However, S1 could mention the prerequisite materials during the interview for the second time. He mentioned that the prerequisite materials for the task of learning mathematical literacy at the first meeting were algebraic operation, comparison and linear equations, while for the second meeting were algebraic and linear equations.

Associated to the selection of learning tasks in accordance with the learning approach, S1 seemed to have a good ability to choose the appropriate learning tasks. Based on the interview result, S1 stated that the learning task would be given in scientific approach setting, and discovery learning for the first meeting. Meanwhile, in the second meeting S1 used contextual teaching and learning and problem based learning. However, S1’s task design either scientific approach or discovery learning were both used only to teach mathematics content, at the first meeting. S1 argued that the task of mathematical literacy was intended to deepen the materials through problem solving.

Based on the characteristics of the chosen learning approach by S1, the selection of the approach was closely related to the selection of examples/problems. At the first meeting, the task consisted of two tasks. The first task was asking the students to construct the concept of function through 5-steps of scientific approach, i.e. observing, questioning, hypothesis, experimenting, and communicating.
Observing. In this activity, a contextual problem about pairing various kitchen spices and the flavour, as the illustration of a function, was presented. By this illustration, students were then asked to complete the arrow diagrams that were appropriate to the problem. Next, they were asked to answer two questions to explore the characteristics of the diagram. Then, the task went more mathematically by the presentation of various examples and non-examples of function or relation (see fig 1) in a box. They were asked to observe the diagrams and to seek the difference between the pairs of example and non-example of function. Questioning. In the questioning activities, students were encouraged to pose some questions related to their observations. Hypothesis. In hypothesis activities students were asked to make a conjecture about the function characteristic based on their previous activities. Experimenting. Students were invited to test the truth of their hypothesis. Then, in communicating activities, students were asked to write the definition of function by using their own words. Thus the design of the task of learning in this first activity involved the teaching of mathematics materials on the concept of function and relations, but also included teaching the fundamental mathematical abilities of reasoning, representation, modelling, devising strategies for solving problems, and communication. The second task in the first meeting was a task about mathematical literacy. S1 presented two problems of mathematical literacy with occupational context about chicken farming (see fig. 2) for first problem and personal context about shopping at stationery stores (see fig. 3) for the second problem. S1 argued that the contexts used were familiar to students since certainly every student had the experience about buying stationary and that they often heard or read about chicken farming on their social environment. On this task, S1 planned to teach the students the ability to formulate situations mathematically; to employ mathematical concepts, facts, procedures and reasoning; and to interpret, apply and evaluate mathematical outcomes as the mathematical literacy content on both problems. S1 seemed to think that to possess all mathematical literacy ability targeted from the task, students needed to use the fundamental mathematical capability such as communication, mathematisation, representation, reasoning and argumentation, and devising strategies for solving problems. In the second meeting, the chosen approach was contextual teaching and learning and problem based learning so that at the second meeting the selected learning task begins with the presentation of the problem. Based on the documentation of instructional tasks designed and the interviews, it was found that S compiled three mathematical literacy problems with different contexts. The context in the first problem was societal context about taxi fares, personal context about telephone rates in the second problem, and societal context about lodging cost in the third problem. The students were asked to solve contextual problems to teach the mathematical literacy. Furthermore, the problem was next developed to teach domains, codomain, range and function formula. S1 believed that he did not need other examples to clarify or deepen students’ understanding because the CTL or PBL approach used was sufficient to explain the content.

Figure 1. Design of examples and non-examples in constructing the function concept.
In relation to choosing examples through learning tasks, at the first meeting S1 used variations of examples and non-examples to direct students to the concept of function as shown in Figure 1 above. S1 confirm that the purpose of presenting the arrows diagram of examples and non-examples function in pairs was to construct students’ understanding of the characteristics of the function. Considering the first two diagrams in the first line of the figure, the examples and non-examples were intended to explain that on a function each member of the first set A (the new term domain was introduced in the second learning task) needed to have a partner (the term “image” was not introduced). Then, the pair of the next arrow diagram on the first line, was used to explain that on a function each member of the first set could only have one pair (or exactly one pair) in the second set. While the presentation of the examples or non-examples in the second and third rows were intended to deepen students' understanding of the functional requirements by enriching the variation of examples and non-example.

Selecting of representation. In the first meeting, S1 used contextual problems to represent the intended concepts such as pairing of kitchen spice to introduce the concept of function. S1 also used the representation of the arrow diagram to help students to understand the rules to make a pairing for relation or function. To help students construct function concepts S1 show variety of arrow diagrams that illustrate examples and non-examples. At the second meeting, S1 also used contextual problems for mathematical literacy task and foll owed by the arrow diagram to represent the material “formula of the function”. For example, there was a problem related to the payment of the taxi cost analogous to construct the formula about multiples. S1 argued that modelling of this function formula could be difficult for students because they were not used to being involved in the reasoning. Therefore, S1 planned to use two equal problems with different contexts. By these problems, students were able to analogize the second problem solve through the first problem, the third problem through the first and second, and so on. However, the idea offered by S1 had a weakness. Problems which were presented repeatedly would soon become a routine. Hence, students would memorize the solution with minimal reasoning. This may not support the achievement of mathematical literacy [22]

5. Conclusion
The results shows that high achiever prospective mathematics teacher has a good PCK in designing learning task. His KCT on designing learning task to integrate mathematical literacy through function and relation teaching was good. He knew well how to choose the learning tasks that fit to the selected learning approach; to organize and order the content and the learning task; to choose a contextual problem; to select examples to motivate, clarify or deepen the context; and to choose the most appropriate representation so that it may facilitate students to learn. Furthermore, he seemed to have good KCS. He was able to predict the level of students' understanding of the content to be taught through the learning task. In this case, he was able to predict preconceptions, misconceptions related to prerequisite materials, and material in the task of learning; predict what students would understand easily and how they would understand it; predict what materials would be difficult for students and find the source of the cause of the difficulty or error and find a way to overcome it. This research also obtained a finding that there were two types of learning task organisations. First, by presenting a mathematics problem or activity to teach the mathematics concept and then followed by presenting mathematical literacy problems to give a deeper understanding of concepts. Second, by giving the mathematical literacy problem at first to motivate students then followed by giving some problem to construct mathematics concepts. However students’ task design that presented a differentiation part of task reflect that S1 have not enough knowledge how to blend the mathematical literacy and mathematical teaching. Therefore, this result and finding indicated the need to investigate for more subjects to confirm these findings goods that it can provide better suggestions for the higher education to develop the prospective mathematics teachers’ ability to teach both mathematical literacy and mathematics.
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