

## Self regulated learning of prospective mathematics teacher in solving linier program problem: a case of visual learning style

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**Abstract.** This research is to knowing self-regulated learning of the prospective mathematics teacher with visual learning style in solving math problem. Self-regulated learning ability of a teacher or prospective mathematics teacher in solving math problem is too important to increase self-regulated learning of the students in solving math problem. The data collected by self-regulated learning questionnaire, problem solving test in mathematics and semi structured interview from prospective mathematics teacher with a visual learning style at Universitas PGRI Semarang. The result showed that the subject of self-regulated learning ability in solving math problem in planning stage, forethought and activation of the subject have understanding of a problem, can identify the information that appears on the problem and can estimate the completion and procedure required. At the stage of monitoring the subject does monitoring activities in the process of solving the problem. At the control stage the subject control in the process of solving the problem. At the reaction and reflection stage the subject does an evaluation in solving the problem.

### 1. Introduction

The educational process is directed at the process of functioning in all the potential learners in a humane way so that they become themselves who have the ability and superior personality [1]. Many things affect that influence one's academic progress in the education process among which learners must believe in their own ability to successfully complete the task and motivated to used self-regulated learning [2,3]. Self-regulated learning refers to the process of self-regulation applied during the learning experience, where the goal is the desired level of achievement [4]. In the context of learning has shown that self-regulated learning process influenced motivated and academic achievement [5,6]. Self-regulated learning is considered one of the most important competencies for lifelong learning [7]. Self-regulated learning is also an important component to mediate success in most learning environments [8,9,10]. Self-regulated learning is defined as a goal-oriented process, continues from the thinking phase through self-control and self-control for self-reflection [11,12]. This is according to with self-regulated learning that is on goal setting planning, and self-monitoring are important aspects of child and youth achievement [13,14]. [12] develop aspects of self-regulated learning into four aspects namely: 1) cognition, 2) motivation and affection, 3) behavior, 4) context. Context and cognition are one of aspect from self-regulated learning load solution to problem. Mathematical problem solving to be studied is on linear program material. NCSM (National Council of Science Museum) puts problem solving as the first order of 12 essential mathematical components.

[15] define that problem solving as an attempt to find a way out of a difficulty. Researchers also have studied problem solving on students that is how the problem-solving ability that is less perfect seen at the time of solving math problems less able to do a review of the results of his work [16]. In addition the researcher examines that a good understanding of the problem will explore the existing information on mathematical problems [17]. [18] state that problem-solving skills are an important aspect of self-regulated learning and help move from educational teaching. [19] describes a mathematics teacher who has a relationship of belief and knowledge of mathematical problem solving. Therefore a teacher or prospective mathematics teacher claimed to be able to design learning that can explore problem solving so that self-regulated learning ability of the teacher or prospective mathematics teacher in solve the problem is too important to increase self-regulated learning ability of the students in solving math problem. Self-regulated learning is a way of learning active learners individually to achieve academic goals. How learners learn is often referred to as learning styles. In this research will focused on prospective mathematics teacher which has the most widely used learning style between Visual, Audio and Kinesthetic learning styles. Based on this, so the problem that put forward in this research is how self-regulated learning student of prospective mathematics teacher in solving the problem?

## 2. Method

The purpose of this research is to explain qualitatively self-regulated learning of prospective mathematics teacher in solving problem linear program. The subject of this research student of mathematics education IV semester Universitas PGRI Semarang year 2016/2017 is selected through questionnaire visual learning style, audio and kinestetik researchers have developed [20]. The subject focused on the prospective mathematics teacher that has the most widely used learning style of visual learning style. Data digging is done in depth by sourced from self-regulated learning questionnaire problem solving task then semi-structured interview to digging information. Self-regulated learning questionnaire used is a questionnaire that has been developed by researchers [21]. The skills that required for self-regulation in academic settings have been researched under the rubric of self-regulated learning [6,10,11,12,22,23,24]. The problem solving question in this research is about linear program. Test data validity of researcher using triangulation method. Data analysis is done to collect data first, data reduction, data presentation and finally draw conclusions and data verification [25].

## 3. Result and Discussion

### 3.1. Stages of Planning, Forethought and Activation

At this stage the subject understands the problem with his own language in solving the problem by changing the story matter to a mathematical model first before finishing it through identifying and write important information in accordance with the problem done such as converting information into variables e.g. variables  $x$  and  $y$  and overall information presented into linear inequality, then resolved using the simplex maximum by creating a standard table first. This is can be seen in figure 1.

Misal		$x$ : villa	$y$ : bungalow					
Maksimum	$Z$	$2.5x$	$+ 3y$					
fs. kendala		$500x$	$+ 400y$	$\leq$	$12000$	$2y$		
		$360x$	$+ 160y$	$\leq$	$90$	$0.25$		
		$x \geq 0$	$y \geq 0$					

  

Tabel Standard							
$C_b$	$x_B$	$x_1$	$x_2$	$x_3$	$x_4$	$b_k$	$\theta_k$
0	$x_3$	400	1	0	12000	$2y$	
0	$x_4$	160	0	1	90	$0.25$	
	$x_2$	0	0	0	0	0	
	$x_1$	2.5	2	0	0	0	

Figure 1. The subject changed the information from the problem into the mathematical model

Figure 1 shows that the subject is able to identify and change information obtained from existing problems into variables that have been defined into mathematical models and then solved using the maximum simplex method through the standard table first by determining the pivot. Learners must believe in their own ability to successfully complete the task [2]. In addition the subject does estimate

the problem solving by making a guess about the problem solving is using the simplex method in solving. The subject has also done the procedure planning used in solving the problem once, i.e. at the beginning of the lecture. It is intended that the subject is always reminded of the procedure to be done. Subjects do the planning in solving the problem before working with reading the material on the record first evaluate the problem and then work with the parable to complete and provide a simple example of any given concept but still on changing the redaction and numbers. At this stage self-regulated learners plan and organize their learning activities [26]. Planning, forethought and activation are the use of metacognitive skills that can improve significantly in the learning environment with increased self-regulated learning opportunities [27].

### 3.2. Stages of Monitoring

At this stage the subject in solving the problem by rectifying what is written, the accuracy of the calculation, the accuracy of the mark and the accuracy of the operation as the sign is less than or equal to that of the left segment plus the slack variable (+ s), if the signals are more than or equal to the left-hand segment reduced by the surplus variable (-s), this can be seen in figure 2.

Penyelesaian :	
Max $Z : 2,5x + 2y + 0s_1 + 0s_2$	
Kendala : $500x + 400y + s_1$	$1200 \rightarrow 500x + 400y + s_1 + 0s_2 = 1200$
$360x + 160y + s_2$	$90 \rightarrow 360x + 160y + 0s_1 + s_2 = 90$

Figure 2. Correcting about accuracy of marks and operations

Figure 2 shows that the subject is able to correct the accuracy of the mark and operation when finishing by adding the slack variable (+ s) as it uses the maximum simplex method. In the context of learning has shown that the process of self-regulated learning affect the motivation in solving the problem [5,6]. Subjects pay less attention to comparing settlement solutions with estimated settlements because at the time of working because it flows just like that. In addition the subject checks the results of the completion before being collected one by one with the coherence from the beginning to the end then if there is still time will be corrected again from the beginning. Based on the explanation it is concluded that the subjects does monitoring activities in the process of solving the problem well. This monitoring activity on self-directed learning refers to the process of self-regulation applied during the learning experience, where the goal is the desired level of achievement [28].

### 3.3. Stages of Control

At this stage the subject in solving the problem rarely does the graph drawing to make it easier to illustrate the problem but he changed the problem to his mathematical model. The subject knows the error that arises in defining the variables by correcting again the parable of the problem after reading. Subjects rarely predict the percentage of correct answers which done but he did check on the problem solving procedures he did and check the answer back thoroughly every step that worked coherently from the first row (top) to the last row (bottom) but less precise in the calculation and do not forget to fix it. Self-regulation of cognition and behavior is an important aspect of learning and affects their academic success [6,10,29,30].

### 3.4. Stages of Reaction and Reflection

At this stage the subjects in solving problems evaluate the accuracy of existing formulas in problem solving when obtaining wrong answers starting from the beginning by looking at the linear program module book and notebook. The subject also corrects his work first in solving the problem and then adjusting the plan or a change of initial settlement plan before completing the matter after knowing what to do is not effective. In addition, the subject can ask friends who understand or also can ask the lecturer if you have not obtained the solution. Based on the explanation it is concluded that the subject

of evaluation in solving the problem well. Evaluation undertaken Learners must believe in their own ability to successfully complete the task and be motivated to use independent learning skills [2,3]

#### **4. Conclusion**

Based on the result of the research and discussion can be conclude that the context is an important aspect for prospective mathematics teacher so that in this research the mathematical content arises in the form of solving linear matter mathematical problem material. At the planning stage, forethought and activation of the subject have understanding of problems, can identify the information that appears on the problem and can estimate the settlement and required procedures. The use of metacognitive skills can be significantly improved in the learning environment [27]. At the stage of monitoring the subject to conduct monitoring activities in the process of solving the problem. At the control stage the subject control in the process of solving the problem. At the reaction and reflection stage the subject does an evaluation in solving the problem. Subjects in this case have self-regulated learning on problem solving well. Self-regulated learning is a key component to mediate success in most learning environments [8,9,10]. The cognitive, metacognitive, behavioral, motivational, and affective processes that occur has the potential to advance understanding and produce short-term and long-term benefits for learners [31].

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