Situation-based learning for self-regulated learning on mathematical learning

I Suhaebar* and I Isrok atun

Primary School Teacher Education Sumedang Campus, Universitas Pendidikan Indonesia, Bandung, Indonesia

*imamsuhaebar@student.upi.edu

Abstract. On problem solving in daily life, the students have to need Self-Regulated Learning (SRL), but SRL in elementary school is still low. Students are always ask teacher to direct them, not initiative perform tasks, play on learning process, and do not have the responsibility in carrying out the task. This paper describe how to apply Situation-Based Learning (SBL) for students’s SRL. The method used is Four-D Model (Defining, Designing, Developing, and Disseminating). Research subjects are elementary students, grade five totaling 36 students. The instruments used in this research are self-regulated learning questionnaire, observation sheet of student activity, and field notes. After 4 met using SBL model, level of students’ SRL have been increased. It is caused, because SBL is one of constructivism model and student-centered learning.

1. Introduction

The fact is Self-Regulated Learning (SRL) give positive effect to students’ development academically. Students who have self-regulated learning, complete their learning tasks better, there are more motivated and successful in school [1]. It means that self-regulated learning has high correlation with the success of students’ learning. The students who have self-regulated learning have the impact on academic skills and their affective. Self-regulated learning will be reducing students’ dependency to the teacher, so that students should not be mentored every time. Self-regulated learning is direct the students to continues adjusting on every situation in order to reach the goals. In other context, problem solving, reasoning, and making decision are needed self-regulation. The students who have high self-regulated learning is also have high problem solving ability too. So, self-regulated learning has to need developed as soon as possible so that the students can life wisely.

But, in fact students’ SRL in elementary school is still low, it can be seen when learning process in the class, students are always ask for teacher to direct them, no initiative perform tasks, play on learning process, and do not have the responsibility in carrying out the task, low self-esteem, lack of confidence and expect help from others [2]. Based on the problem, we have to need a model of learning to train students on understanding, presenting, solving the problem and to develop SRL. One of the models is Situation-Based Learning (SBL). Process of SBL into character for the students when faced with another situation or new situation. On process of SBL learning, there has been self-regulated learning on students [3].

The purpose of this study is to improve SRL by applying SBL learning, with SBL learning students will learn more, when they faced on situation that trigger them to find out, think, and construct his own
knowledge. The situation on SBL learning process can challenge and inspire students to construct questions and find out information independently.

2. Method
This research uses Four-D models, namely Defining, Designing, Developing, and Disseminating. In the Defining stage, we provide explanation of Self-Regulated Learning (SRL) and Situation-Based Learning (SBL). At the Designing stage, we design for SBL learning process and create instruments (self-regulated learning questionnaire, observation sheet of student activity, and field notes). In the Developing stage, we carry out SBL learning process. At the disseminating stage, we evaluated and assessed students’ SRL. The purpose of evaluated and assessed is to know level of students’ SRL before and after treatment. The research subjects are elementary students grade five in Indonesia and subjects totaled 36 students (10-12 year old, 20 boys, and 16 girls).

3. Results and discussion

3.1. Defining
Self-regulated learning (SRL) is one of the aspects of metacognition, which includes (1) people’s knowledge or awareness of their cognitive processes, and (2) the ability to use self-regulatory mechanism to control these processes [4]. Self-regulated learning is a complex process, containing cognitive, motivational and contextual elements [5]. Another opinion, that self-regulated learning as metacognitively, motivationally, and behaviorally active participants in their own learning [6]. As according to, The term self-regulated learning (SRL) is used to describe independent, academically effective forms of learning that involve metacognition, intrinsic motivation, and strategic action [7]. Self-regulation is a complex, multifaceted process that integrates key motivational variables and self-processes [8].

Self-regulated learners engage in various processes through three sequential stages: forethought, performance, and self-reflection [9]. Another opinion, indicators of students who have self-regulated learning, they are able to planning, setting goals, organizing, self-monitoring, self-evaluating, selection of learning strategies, environmental structuring, they have self-efficacy, task interest, and self-attributions [10].

The old theories said that elementary students do not have self-regulated learning, most theorist assume that young children cannot self-regulated their learning in any formal manner [6]. But, more recent of research and investigations are found that young children can and do regulate their engagement in learning activities [7,11]. It concluded that elementary students already have self-regulated learning and we can develop it with learning process that direct students to act full of motivation, initiative, and active.

Situation-Based Learning is a model that was adapted or modified from Situated Creation Problem Based Instruction (SCPBI), it is a learning which growing in China. Situation-Based Learning is a strong, flexible, and new learning approach intended to develop constructive learning paradigm. That is caused by students will learn more when they faced on situation that trigger them to find out, think, and construct his own knowledge. The purpose of SBL is to develop student’s ability on problem posing, problem understanding, and problem solving independently [12].

3.2. Designing
SBL consist of four process stage, namely: 1) creating the situation; 2) posing problem; 3) solving problem, and 4) applying the concept, being described on Figure 1 [13].
Figure 1. Situation-based learning.

For format instrument, the main instrument used in this research is self-regulated learning questionnaire. Self-regulated learning questionnaire is used to know level of self-regulated learning before and after treatment.

3.3. Developing

On SBL learning, creating the situations are prerequisite, posing problem is core, solving problem is goal, and applying the concept is the application of learning process to new situations [14]. There are four SBL learning strategies, such as:

3.3.1. Teacher creates situation. Teacher creates situation. It is expected that there are some mathematical or science question asked by students through activities of observing and analyzing. Here, the situation starts from firstly simple one toward complex situation. An example of the situation can be seen on Figure 2.

Figure 2. Situation.

Situation

Look a picture below!

Jati forest is rectangular with area 2400 m². Two month ago, there was a fire that caused a half of forest burned.
3.3.2. Students pose problems. By investigating and guessing independently, students posing mathematical or science problem. It is intended to increase their awareness on problems of situation they have faced. Teacher’s classifying problems that proposed by students based on difficulty grades.

| Posing Problem |
|----------------|
| **A.** Write interesting information from the picture! |
| 1. .......................................................... |
| 2. .......................................................... |
| 3. .......................................................... |
| 4. .......................................................... |
| 5. .......................................................... |
| **B.** From some interesting information, change it into mathematical or science question that can be solved! |
| 1. .......................................................... |
| 2. .......................................................... |
| 3. .......................................................... |
| 4. .......................................................... |
| 5. .......................................................... |

Figure 3. Posing problem stage.

3.3.3. Students practice problem solving. In this step, teacher and students sort existing problem levels, whether the problems need to be followed up or not. Solved problems start from simple ones to complex ones. As learning materials, the main goal is to emerge problems that require problem solving until they find the mathematical and science concept. In this strategy, teacher’s roles are to guide, to direct, to stimulate students by implementing scaffolding techniques.

Figure 4. Students trying to find formula of rectangle area.

3.3.4. Applying the concept. The step of applying the concept is applying mathematical or science concept on the new situation. So, students can understand that mathematical or science concept often encountered in everyday life. In other thing, students are learn independently in facing all the new problem.
3.4. Disseminating
Students are received SBL learning during 4 time meeting. As a result, SBL learning can improving students’ SRL. The improvement can be seen on increase mean score of SRL on Figure 5.

![Figure 5. Mean Score of Students’ SRL.](image)

Based on the picture above, It can concluded that Situation-Based Learning can improve self-regulated learning of students in elementary school. It can be seen on the increase of mean score of SRL. It happened because the teacher can be used a flexible strategic learning in leading and directing students to learn independently (self regulated) [14]. The increase of students’ SRL using SBL learning is caused by students’ response. The learning process are continue making fun and can motivate the students, it can be seen from students’ enthusiastic on find out informations from the situation that displayed by infocus and find out mathematical or science concepts. The conducive learning and fun will growing students’ confidence so that the students will be trying to find out the informations independently. In addition, SRL had increased, it caused by the learning process always using students center approach. SBL learning is a learning based on constructivism, which emphasize process of way of thinking activities and physical on construct knowledge independently. With learning based on constructivism and students center approach, it can also improving students’ SRL. Constructivism education not only help to improve students’ cognitively, it can also to improve self-regulated learning in their development process [15].

4. Conclusion
Based on the results of this study, it can be concluded that situation-based learning that based on constructivism and students center approach, can improve self-regulated learning significantly. Situation-based learning is direct students to find out information by investigating and observing independently. In general, self-regulation involves learners who proactively direct their behavior or strategies to achieve self-set goals.

References
[1] Jakešová J and Kalenda J 2015 Self-regulated learning: Critical-realistic conceptualization *Procedia - Social and Behavioral Sciences* **171** 178-189
[2] Umar I N and Aziz Z A 2015 The Effects of Multimedia with Different Modes of Presentation on Recitation Skills among Students with Different Self-Regulated Learning Level *Procedia-Social and Behavioral Sciences* **197** 1962-1968
[3] Isrok’atun and Tiurlina 2016 *Model Pembelajaran Matematika Situation-Based Learning di Sekolah Dasar* (Sumedang: UPI Sumedang Press)
[4] Mulyadi S, Basuki A M, and Rahardjo W 2016 Student’s Tutorial System Perception, Academic Self-Efficacy, and Creativity Effects on Self-Regulated Learning Procedia - Social and Behavioral Sciences 217 598-602

[5] de Boer H, Donker-Bergstra A S, and Kostons D D N M 2012 Effective Strategies for Self-regulated Learning: A Meta-Analysis (Groningen: Gronings Instituut voor Onderzoek van Onderwijs)

[6] Zimmerman B J 1990 Self-Regulated Learning and Academic Achievement An Overview Educational Psychologist 25 3-17

[7] Perry N E and Vandekamp 2000 Creating Classroom Contexts That Support Young Children's Development of Self-Regulated Learning International Journal of Educational Research 33 821-843

[8] Cleary T J and Zimmerman B J 2004 Self-Regulation Empowerment Program: A School-Based Program to Enhance Self-Regulated and Self-Motivated Cycles of Student Learning Psychology in the Schools 41 537-550

[9] Zimmerman B J 2000 Self-Efficacy: An Essential Motive to Learn Contemporary Educational Psychology 25 82-91

[10] Vandevelde S, Vandenbussche L, and Keer H V 2012 Stimulating Self-Regulated Learning in Primary Education: Encouraging Versus Hampering Factors for Teachers Procedia - Social and Behavioral Sciences 69 1562-1571

[11] Whitebread D, Bingham S, Grau V, Pasternak D P, and Sangster C 2007 Development of Metacognition and Self-Regulated Learning in Young Children: Role of Collaborative and Peer-Assisted Learning Jurnal of Cognitive Education and Psychology 6 433-455

[12] Isrok’atun and Tiurlina 2015 Enhancing Students’ Mathematical Creative Problem Solving Ability Through Situation-Based Learning in Elementary School International Journal of Education and Research 3 73-80

[13] Isrok’atun, Maulana, and Irawati R 2017 Model Situation-Based Learning (SBL) untuk Meningkatkan Kemampuan Creative Problem Solving (CPS) Matematik Siswa Sekolah Dasar Laporan Tahunan Penelitian Hibah Bersaing (Bandung: not published)

[14] Isrok’atun, Kusumah S Yaya, Suryadi D and Sabandar J 2014 Situation-Based Learning to Improve Students’ Mathematical Creative Problem Solving Ability Far East Journal of Mathematical Education 12 119-131

[15] Büyükduman I and Şirin S 2010 Learning Portfolio (LP) to Enhance Constructivism and Student autonomy Procedia Social and Behavioral Sciences 3 55-61