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The Impact of Self-Regulated Learning to Wards on The Ability to Understand A Concept of Pratical Chemical Engineering Operation

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***Abstract*—The purpose of this research is to reveal the impact of self-regulated learning on the result of a learning, especially the ability to understand the concept of practical chemical engineering operation. Self-regulated learning is an ability that can be measured through the level of participation, it is a metacognition motivation, or behavior. Furthermore, understanding a concept is the ability to build a meaning from any information gathered from the learning process. The methodology used quasi experiment because this research is using a group of students who have been in their own classes and it is more applicable for real learning. In conclusion, this research showed that there is a significant impact of students with high self-regulated learning have a high understanding towards on a concept compare to those with low self-regulated learning.**

Keywords*— *Concept; Pratical Chemical; Enginnering Operation

I. INTRODUCTION

Polytechnic Malang is one state polytechnic in east java, Indonesia. The education system in Polytechnic Malang focuses on preparing the graduates with skills and competence needed by the industry. The ratio is 40% theory and 60% practical. It emphasize in the soft skills area which is directed to reach specific characteristics such as discipline, leadership, intelligence, teamwork, integrity as well as problem solving, according to Dr. Harjono, as the Kaprodi Chemical Engineer Polytechnic Malang.

In the program study at Polytechnic Malang there is a module of practical operation Chemical Engineer 2. This module is a practical in the laboratory which applies several processes required in the laboratory tools. One of the practical is Batch Distillation which is a chemical process to separate the composite component of the mixture or solution based on the difference of the boiling point or the mixture. Usually, one group consists of 4-5 students. Students will receive this course in the odd semester of the third year, so it is the last practicum before they graduate.

Based on the results of field observations and interviews with Lecturers and students of the fourth semester in Chemical Engineering Polinema, it gets an input problem that students' learning outcomes show less understanding of the concept of the practicum. There is a problem in the process of learning in the form of laboratory experiments or distillation process. As a result, the obstacle faced learning will take a long time because it must be repeated and the results are different from learning practicum.

The expected condition of the distillation practicum are: first, the student is able to use the existing working procedure with correct and safe steps. So it can operate the distillation equipment. Second, the students are able to understand the distillation process in the fractionation column. Students are expected to have the ability of these two things after the completion of the learning process distillation laboratory which is 10 hours of lectures. Learning practicum is done in the form of groups. So, it is expected that each student has a condition of learning outcomes according to the purpose of learning.

Self-regulated learning (SRL) in students can be illustrated through levels or degrees that include active participation in both metacognitive motivational and behavioral learning (Zimmerman, 2012). From the background above, researcher to be able to improve student learning outcomes in the ability to use the procedure and understand the concept of distillery practicum, will be conducting research the Impact of self-regulated learning towards on the ability of understanding concepts on Chemical Engineering Operations Practice in Polinema. The purpose of this study is to reveal the differences in competence to understand the concept of students who have high SRL with students who have low SRL in studying distillation laboratory.

II. METHOD

This research is a quantitative type of quasi experiments with pretest design and posttest [8]. The type of self-regulated learning (SRL) are grouped into 14. Based on the interviews with students about the variety of strategies commonly used in the context [12]. Those are as follows; 1) self-evaluating; 2) organizing and transforming; 3) goal-setting and planning; 4) seeking information; 5) keeping records and monitoring; 6) environmental structuring; 7) self-consequence; 8) rehearsing and memorizing; 9) seeking social assistance-peers; 10) seeking social assistance-teachers; 11) seeking social assistance-

adult; 12) reviewing records-tests; 13) reviewing records-textbooks; 14) A form of statement that indicates learning behavior is proposed by others such as learners or parents and all verbal responses are not clear.

In accordance with the characteristics of the SRL described above, students have the ability to manage themselves against the learning process then they will have the ability to learn more motivated, more confident, and able to evaluate themselves. This is in accordance with research that has been done by Pintrich, Paul R & de Groot, Elisabeth V (1990) stated that motivational and self-regulated learning (SRL) are the components of classroom academic performance [10]. The consideration of using the SRL is that the instrument has been referred from various studies and has been validated by Carlo Macnodari De La Salle University, Manila, Philippines with the number of responses and students from different Universities with validation results there is a significant correlation ($p < 0.001$). Then the instrument used towards Chemical Engineering students to measure the SRL using the above research.

The sample consisted of learners whose average age was 17 years with details of 17 men and 20 women in the experimental class. This research was conducted at Polytechnic Malang located at. Jl. Soekarno-Hatta No. 9 Malang; Malang 65145, Malang.

Instruments consist of questionnaires, interview, test of Student Worksheet 1, Student Worksheet 2. In all instruments, faculty validity and construct validity are determined by feasibility study by examiner. The data analysis used as the collection data shows a valid and reliable result.

Implementing SRL research used these steps as follows;

1) Prepare a SRL questionnaire according to the characteristics written by Zimmerman, each SRL consists of 15 statement items.
2) Students fill out a daily questionnaire by applying a checklist to one of the answers columns are very similar, agree, neutral between agree and no, disagree, and strongly disagree.
3) Calculate the score of the student / student answer by giving a score of 5 for the answer strongly agree, score 4 for the answer agree, score 3 for neutral answer between agree and no, score 2 for answer disagree, score 1 for answer strongly disagree.
4) Determining a student SRL with a provision if the amount of values for SRL is high in the control class rather than the sum of values for low SRL in the experimental class.

III. RESULTS AND DISCUSSION

Bandura defines SRL as a condition in which individuals are learning as controlling their own learning activities, monitoring motivation and academic goals, managing human and material resources, and becoming behaviors in decision-making and implementing processes in the learning process (Filho, 2001). In this research, the student's SRL is measured by the questionnaire SRL instrument using the following indicator;

1) Plan learning objectives and strategies.
2) Instruct yourself.
3) Evaluate learning activities.
4) Believe in yourself.
5) Emotional reactions.
6) Utilizing the environment.
7) Interact with the environment.

Student Self-Regulated Learning Question Sheet

A. Determine the Construct Validity

Referring to the SRL instrument that has been done construct validity test by Carlos Macno from De La Salle University, Manila, Philippines, the researcher writes the questionnaire in such a way as to measure the construct of self-regulated learning (SRL) variable through indicator. Here is a self-regulated learning questionnaire (SRL) indicator table I.

TABLE I. INDICATOR OF SRL QUESTION SHEET

No	Dimensions	Indicator
1.	Rehearsal Strategy	The effort to memorize the material through repeating constantly
2.	Elaboration Strategy	Using own sentence to summarize the study material
3.	Organization Strategy	Have a strategy to record, draw a diagram or chart to organize the subject material
4.	Metacognition regulation	Be able to coordinate planning, monitoring and regulating learning such as, determining the purpose of reading or making changes so that the task is on progress

B. Determine the content of validity

Content validity is performed to determine hether the contents of the self-regulated learning (SRL) questionnaire are in accordance with the objectives of the study. By formulating the subject and indicators embodied in the instrument grid, validity testing can be done easily and systematically. The following is a self-regulated learning questionnaire (SRL).

TABLE II. CONTENT VALIDITY

No	Dimensions	Indicator	Question Number
1.	Rehearsal Strategy	The effort to memorize the material through repeating constantly	1, 5, ,8, 14
2.	Elaboration Strategy	Using own sentence to summarize the study material	2, 3, 9, 13

3.	Organization Strategy	Have a strategy to record, draw a diagram or chart to organize the subject material	4, 7, 11, 15
4.	Metacognition Regulation Strategy	Be able to coordinate planning, monitoring and regulating learning such as, determining the purpose of reading or making changes so that the task is on progress	6, 10, 12

The validity of the self-regulated learning questionnaire test (SRL) is determined by means of expert validation covering the field of fashion experts, educational experts and Indonesian experts. Face Validation aims to gain input on the assessment of expert validator against research tools that researchers have made. Assessment is done by assessing each component of test questionnaire skill test of design elements that have been prepared by researchers cover material aspects, construction, and language / culture.

TABLE III. THE AVERAGE OF PRETEST AND POST-TEST

Test	Learning Model	Mean	Std. Deviation	N
Pretest	Theory	29.5429	4.65481	35
	Practice	30.1081	5.48120	37
	Total	29.8333	5.06854	72
Posttest	Theory	69.0286	9.22428	35
	Practice	58.5135	9.13668	37
	Total	63.6250	10.53958	72
Total	Theory	49.2857	21.16679	70
	Practice	44.3108	16.13889	74
	Total	46.7292	18.85136	144

Table III shows that basic learning abilities treated with theory and practice tend to be the same. Furthermore, comparing the average pretest and posttest can be seen that there is progress of competence after being treated in each class, posttest practice value shows higher number.

Increasing the value of pretest to posttest is the influence of the SRL on the competence concept, which through the technique of controlling the learner has never received the previous treatment. Differences in competence are also caused by the self-regulated can give in doing the absorption of teaching materials at the time and the most appropriate place

Several continuous studies with the effect of SRL on learning outcomes especially on the ability to understand concepts are the research of Ana Maria Cazan (2012), self-regulation is not a personality trait, but students can control their own behavior in improving academic learning and practice. In another study, Ana Maria (Cazan, 2013) also states that her research is the result in accordance with previous research [4]. Academic outcomes are related to the SRL which has many benefits from learning, as it involves learning motivation and ability to perform practical tasks. SRL is an integral part of academic achievement / student learning outcomes.

Based on the theories and some research results can be said that the SRL affects student learning outcomes. For students who can apply these skills to self-regulate in learning, they will get better results than those who do not have the ability to self-regulate.

IV. CONCLUSION

Refers from some continues research to the effect of SRL on the ability to understand the concept is from academic results associated with the SRL that has various benefits of learning, because it involves learning motivation and ability to perform practical tasks. SRL is an integral part of academic achievement / student learning outcomes, then with high SRL will be followed also the ability to understand high concepts in students. Also supported from the theories and some research results can be said that the SRL has a high influence on the ability to understand the concept. For students who can apply these skills to self-regulate in learning, they will get better results than those who do not have the ability to self-regulate.

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