Enhancing Student’s Learning Outcomes with Different Academic Level Using Metacognitive Strategies

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Abstract. This research was carried out to analyze the effectiveness of the Search Solve Create and Share Learning integrated with metacognitive strategy [SSCS + MS] on the learning outcomes of students. A quasi-experimental design has been used to compare the effect of traditional learning, SSCS, and SSCS + MS learning on the learning outcome of tenth grade students in Kupang, Indonesia, conducted in three schools. Three natural science classes of the tenth grade in the first semester of each school were involved in this study. The rubric of the learning outcomes by referring to Hart (1994). The research data were analyzed by ANCOVA and Least Significant Different test. The results showed that SSCS + MS learning model provides a higher learning outcomes of low academic ability than the SSCS and Traditional learning. As for the percentage learning outcome of low academic ability student’s in SSCS + MS increase 34.06% higher than the high academic ability on the SSCS learning model 35.76% higher than SSCS and 35.76% higher than Traditional learning models and 42.54% higher than the high academic ability on the Traditional learning. These result indicate that SSCS + MS could empower students low academic. The SSCS + MS learning model improve the quality of learning.

1. Introduction
Students’ achievement is one indicator of students’ success in learning. It reflects what the students have achieved on the affective, cognitive, and psychomotor domains. Many factors may contribute to this. They can come from either inside (internal) or outside (external) the students. The internal factors are mainly related to students’ motivations, responses, and discipline while the external factors are normally associated with learning objectives, learning environment, learning media, and learning methods. These factors interact with one another to become the basis of students’ achievement. Learning model which is selected by the teacher constitutes the source of the interaction. An appropriate learning model implemented in the classroom will lead to an improvement in students’ knowledge and achievement. A good learning environment will positively affect students’ learning motivation and as a result promote students’ discipline. High learning motivation is one of the factors that can determine students’ success in achieving learning objectives, as reported by [1], [2].

Students’ cognitive ability will be empowered when they are faced with a problem-based learning condition. According to [3], good learning environment can improve students’ thinking ability. SSCS is a cooperative learning model based on problem solving which helps increase students’ achievement. Therefore, a student-centered learning model, such as Search Solve Create and Share (SSCS), should be implemented in the classroom. Collaboration built among students in a cooperative learning brings
a positive impact on students’ participation in learning. [4] reveals that students’ motivation can be promoted through collaboration. Teamwork in collaborative learning allows all the team members to acquire equal understanding of the learning materials. Once students are motivated and get supports from the team, they can be encouraged to achieve better. The benefits of cooperative learning have been examined by [5], [6]. One of which is to improve students’ achievement. The results of some research conducted by on SSCS suggest that SSCS is effective in improving students’ achievement [7], promoting students’ interaction [8], [9], and enhancing students’ cognitive skills [10]. SSCS can help develop students’ creative thinking skills [11].

Besides implementing an appropriate learning model in the classroom, teacher also needs to teach students how to use metacognitive strategies (MS) in learning. According to [12], MS can be used to develop students’ thinking ability. The result of research on metacognitive strategies have been reported by [13], while research findings by [14], [15] suggest that the combination of SSCS and MS is effective in improving students’ creative and metacognitive skills. In addition, [16] reports that SSCS+MS is able to help students develop their ability in solving problems. The results of the research indicate that students’ cognitive achievement improve because SSCS+MS helps promote students’ higher cognitive level including the ability to think creatively, and solve problem [17].

2. Experimental Details
This research used a quasi experimental research consisting of three treatment models of learning that is traditional learning as control, SSCS, and SCCS+MS learning models. Learning models as independent variable, learning outcomes of student’s as dependent variable, and different academic student (lower and upper academic) as moderator variable. Student’s learning outcomes are measured using an essay test that has been validated prior to use. The rubric of learning outcomes refers to [18]. The determination of different academic student’s refers to [19]. The quasi experimental study follows 3x2 factorial pattern as shown in Table 1. The research design was pretest-posttest nonequivalent control group design [20].

Table 1. The Quasy Experimental 3x2 Factorial Pattern

| Different Academic | Learning Models |
|--------------------|----------------|
|                    | SSCS+MS (X1)   |
| Upper (Y1)         | X1Y1           |
| Lower (Y2)         | X1Y2           |
|                    | SSCS (X2)      |
|                    | X2Y1           |
|                    | X2Y2           |
|                    | Traditional/Control (X3) |
|                    | X3Y1           |
|                    | X3Y2           |

Note: X1Y1 = SSCS+MS upper academic, X2 Y2 = SSCS lower academic, X1Y2 = SSCS+MS lower academic, X3 Y1 = Traditional upper academic, X3 Y2 = Traditional lower academic.

This study used a sample of 226 student’s coming from three senior high school in Kupang city that were determined randomly. The homogeneity of samples based on the placement test result. The research data were analyzed by using ANCOVA followed by post hoc test of Least Significant Different (LSD). The prerequisite test (the normality test and the homogenity test) for ANCOVA are presented Table 2.

Table 2. The Result of Normality and Homogenity Test

| Test     | Pretest | Posttest |
|----------|---------|----------|
| Normality| Skewness| -0.529   | -1.926   |
|          | Kurtosis| -1.427   | -1.735   |
| Homogeneity|       | 0.314    | 0.460    |

Note: The data is normally distributed when the t test between -1.96 and + 1.96.
If p value level sig >0.05, the data is homogeneous.
3. Results and Discussion

Summarizes the results of covariant analysis showing the effect of learning models, different academic level and interaction of both on student’s learning outcomes are showed in Table 3. The Table 3 shows that the level significance of variable learning models (0.000) is smaller than the alpha value ($\alpha = 0.05$), while different academic level (0.165), interaction learning models and different academic level (0.078) did not show a significant effect. Based on Tabel 3, could be concluded that students learning outcomes are significantly influenced by the learning models. Because there is significant effect on learning models, then continued with LSD test. The results of LSD test showed in Table 4.

Table 3. Summary of Result of Covariant Analysis Showing the Effect of Learning Models, Different Academic Level and Interaction of Both On Students Learning Outcomes

| Source                  | Sum of squares | df | Mean Square | F   | Sig. |
|-------------------------|----------------|----|-------------|-----|------|
| Corrected Model         | 19128,745      | 6  | 3188,124    | 77,334 | 0,000 |
| Intercept               | 1592,479       | 1  | 1592,479    | 185,438 | 0,000 |
| Learning Outcome        | 6078,163       | 1  | 6078,163    | 113,825 | 0,000 |
| Learning Models         | 5253,775       | 2  | 2626,887    | 115,503 | 0,000 |
| Academic Level          | 105,408        | 1  | 105,408     | 16,648  | 0,165 |
| Model * Academic Different | 280,558       | 2  | 140,279     | 0,825   | 0,078 |
| Error                   | 11878,264      | 219| 54,239      |         |      |
| Total                   | 875128,000     | 226|             |         |      |
| Corrected Total         | 31007,009      | 225|             |         |      |

Table 4. Summary of Results of LSD test Learning Outcomes on Different Learning Models

| Different Learning Models | Pretest Learning Outcomes | Pretest Learning Outcomes | Difference Learning Outcomes | Corrected Learning Outcomes | Improvement (%) | Notation LSD |
|---------------------------|---------------------------|---------------------------|-------------------------------|-------------------------------|-----------------|-------------|
| Traditional               | 26,47                      | 53,08                     | 26,61                         | 54,01                         | 104,04          | a           |
| SSCS                      | 27,11                      | 64,42                     | 37,32                         | 64,41                         | 137,59          | b           |
| SSCS+MS                   | 27,67                      | 65,31                     | 37,64                         | 64,46                         | 132,96          | b           |

Table 4 shows that SSCS+MS learning model provides a higher learning outcomes than the SSCS and Traditional learning. As for the percentage learning outcomes increase in SSCS 0.365% higher than SSCS+MS although notation LSD are the same (b). The learning outcomes on SSCS+MS learning 21.75% higher than Traditional learning.

According to Table 3, interaction between learning models with different academic level although not significant, but LSD test results need to be presented to see how much influence of the both on learning outcomes students. The summary of results of LSD test of interaction between different learning models with different academic level on student’s learning outcomes are showed in Table 5

Table 5. Summary of Results of LSD Test Showing interaction between Different Learning Models with Different Academic Level on Student’s Learning Outcomes

| Different Learning Models | Different Academic Level | Pretest Learning Outcomes | Posttest Learning Outcomes | Difference Learning Outcomes | Learning Outcomes Corrected | Improvement (%) | Notation LSD |
|---------------------------|--------------------------|---------------------------|---------------------------|------------------------------|-----------------------------|-----------------|-------------|
| Traditional               | Lower                    | 24,44                     | 47,78                     | 23,33                        | 51,72                       | 111,62          | a           |
|                           | Upper                    | 28,50                     | 58,39                     | 29,89                        | 56,31                       | 97,58           | b           |
| SSCS                      | Lower                    | 24,10                     | 59,18                     | 35,08                        | 63,62                       | 163,98          | c           |
|                           | Upper                    | 30,16                     | 68,47                     | 38,32                        | 63,93                       | 111,97          | c           |
| SSCS+MS                   | Lower                    | 24,05                     | 60,37                     | 36,32                        | 64,89                       | 169,81          | c           |
|                           | Upper                    | 31,23                     | 71,44                     | 40,21                        | 65,30                       | 109,09          | c           |

Table 5 show the variation an improvement on learning outcomes student’s caused interaction between different learning models with different academic level. The learning outcomes on traditional
learning model different between of the upper and lower academic (notation LSD a and b). Improvement of learning outcomes of the traditional learning of lower academic level 16.33% higher than the traditional of upper academic level. In SSCS learning shows that learning outcomes students are the same (notation LSD c) with lower and upper academic level. Although it is the same, however improvement of learning outcomes of lower academic level 31.72% higher than that of the upper academic level. The same case occur also in the SSCS + MS learning, it’s shows by notation LSD is the same (c); however the improvement of the learning outcomes’s of the lower academic level is 35.76% higher than that the upper academic level. These results show that the learning outcomes of lower academic level in the SSCS+MS learning can improve 34.06% higher than the upper academic level on the SSCS learning model and 42.54% higher than the upper academic level on the Traditional learning. These result indicate that SSCS+SM could empower students low academic level.

The results on the Table 5 suggest that there is an interaction between SSCS and MS learning model and students’ cognitive achievement. Students with lower academic level were at an advantage learning with SSCS model and metacognitive strategies. Learning model is an important aspect in the learning process. Different models can have different effects on students, in this case is their learning outcomes. Integrated metacognitive strategy in SSCS learning model was able to increase the percentage of students’ learning outcomes of lower academic level value above the SSCS and traditional models. The lower academic are further empowered by the addition of metacognitive strategy in SSCS learning model. The percentage of increase in student’s learning results of lower academic the rise far above the upper academic on the SSCS and Traditional learning. The percentage of their cognitive ability improvement is significantly higher than of the upper academic. In line with this finding, [22] states that some particular learning strategies are able to improve low-ability students’ thinking skills even to surpass the ability of the high achievers. [23] also adds that students’ academic achievement can improve if they are given an opportunity to regulate themselves and apply metacognitive strategies in learning.

The use of metacognitive strategies in SSCS (SSCS+SM) allows the low achievers to learn independently. As a result, the students are able to position themselves as the decision maker, and the controller to determine their success in learning. On the other hand, metacognitive strategies encourage the students to build their curiosity, and confidence. Similarly, metacognitive strategy applied to students had made them self-imposed learners. According to [24] metacognitive strategies is directed to foster learning awareness. [25] defines metacognitive strategies as a series of processes which control someone’s cognitive activities and make sure that his/her cognitive goals are achieved. Metacognitive strategies to learning objectives and methods to accomplish the objectives. [26] reported that students who explained with metacognitive strategy greater understanding compare to students who did not explain metacognitive strategy.

Metacognitive strategies defined in this research include underlining and self-assessing strategies. Underlining strategy basically aims to stimulate students’ reading interest. It encourages students to read more in order to obtain more information. When students are equipped with abundant information, their cognitive achievement is believed to improve because they can use the information to solve learning problems. As is stated by [27], [28], underlining involves students in knowledge construction by underlining important points in a reading text.

Furthermore, self-assessing strategy helps students monitor, evaluate, and as a result improve their learning quality. Self assessing is considered to be a very important component of a learning as a self motivation in learning. According to [29], self-assessing strategy comprises students’ ability and awareness to control their thoughts and behaviors. Self-assessing strategy therefore allows students to evaluate their progress to achieve learning targets. Additionally, [30], [31] state that the purpose of self-assessing strategy is to identify students’ strengths and weaknesses. [32] reported that self-assessing by students on their learning could increase interest and motivation level of students, enhanced learning and better academic performance, helping them in development of critical skills for analysis of their own work.
According to [33], students who are given an opportunity to decide their own learning strategies will be able to control their own learning. [34] has reported that students’ learning control is usually associated with their high creativity and initiative. Therefore, a conducive learning environment which puts forward students’ freedom in exploring their thinking is vital to enhancing students’ performance.

4. Conclusion
Implementation metacognitive strategy in learning through SSCS learning can increase learning outcomes students. Metacognitive strategy in SSCS learning provides a high learning outcomes of the lower academic student’s than the SSCS and Traditional models. As for the percentage learning outcomes of the lower academic increase in SSCS+MS 34.06% higher than the upper academic on the SSCS and 35.76% higher than SSCS and 42.54% higher than the upper academic on the Traditional learning. These result indicate that integration of metacognitive strategy on SSCS could empower students lower academic. Metacognitive strategy in learning model enhanced and better academic performance students.

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