

## STUDENTS' SELF EFFICACY OF GRADE X SENIOR HIGH SCHOOL THROUGH THE IMPLEMENTATION OF RECIPROCAL TEACHING STRATEGY IN CHEMICAL BONDING MATTER

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### Abstract

This research aims to describe students' self efficacy and student learning outcomes in the chemical bonding matter through the implementation of reciprocal teaching strategy. The research design which used was One Shot Case Study. The research was conducted on the grade X SMA Negeri 1 Sidoarjo. A research instrument that used consist of the observation sheet of learning implementation, students' self efficacy questionnaire, and the posttest sheet as data on student learning outcomes. The data of learning implementation, students' self efficacy and students learning outcomes were analyzed using quantitative analysis method. The results showed that (1) The average value of students' self efficacy which obtained during three meetings are 73.21; 77.37; 84.72 with good and very good criteria. (2) The implementation of reciprocal teaching strategy obtained the percentage of three meetings respectively 92.50%; 93.75%; and 93.75% with good and very good criteria. (3) The learning outcomes of chemical bonding matter achieved by students obtained 100% classically.

**Keywords:** reciprocal teaching strategy, student self efficacy, chemical bonding

### INTRODUCTION

The progress of science and technology grow rapidly in the dynamics of globalization. One way of dealing with it can be done through the role of education. Education in schools is basically a process of teaching and learning which is a process of interaction between teachers and students, where students as learners and teachers as educators. This is in accordance with the statements mentioned in UU No. 20, 2003 about National Education System in Chapter I, Article 1 stated that education is a conscious effort and planned to create an atmosphere of learning and learning process so the learners are actively developing their potential to have spiritual strength, self-control, personality, intelligence, noble character, as well as the necessary skills of himself, society, nation and state [1].

Meanwhile, National Education System UU No. 20 Year 2003 article 3 states that the function of National Education to develop the ability and form the character and civilization of dignified nation in order to educate the nation's life, aims to develop the potential of learners to become human beings who believe and cautious to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen [1]. One of the mentioned functions is to develop the potential of learners in order to become the independent students. To realize the independence of students by providing exercises or tasks that make sure students against them.

Confidence in social cognitive theory is known as self efficacy.

Self efficacy is defined as the level of trust of individuals in their ability to perform actions or achieve certain performance outcomes [2]. One study shows that there is a positive and significant causal relationship between self efficacy and academic achievement [3]. Students who have high self efficacy tend to spend more effort when confronted with difficulties and tasks, so that self efficacy needs to be trained in order to students can overcome the existing problems and there is a courage in doing a job. In training students' self efficacy, one of the methods that can be used during the learning process in the classroom is by applying the appropriate learning strategy, for example to make the students actively participate to solve the difficulties during the learning process.

The difficulties during the learning process, such as natural science especially chemistry lessons are difficult. For many students, chemistry matter seen as a difficult, complex and abstract subject that requires special intellectual talent and much effort to understand [4]. One of the chemistry matter is chemical bonding which includes octet rule, Lewis structure, ionic bonding, covalent bonding, covalent coordination bonding, and metallic bonding. The students have difficulties when learning this matter. Based on the questionnaire results of pre-research on October 11, 2017 in SMA Negeri 1 Sidoarjo showed that as much as 61.11% of chemical bonding material considered difficult by students.

The difficulty in studying chemical bonding arises because students only memorize the term but do not understand the true meaning of the term. Other difficulties also stem from difficulties in understanding concepts. The concepts in chemical bonds are abstract and complex so that students are required to understand those concepts correctly and deeply. From this explanation, one effort which can solve by implementing appropriate learning strategies, for example by applying student centered learning.

Student-centered learning is fundamentally based on cognitive and social constructivist theory. Learning with constructivist approach can be applied, one of them through reciprocal teaching strategy. Basically the reciprocal teaching strategy is learning in a group, so that this learning can be applied to materials that have material characteristics consisting of sub-material that many and require deep understanding. Therefore, chemical bonding material with abstract and complex material characteristics requires a good understanding so that it can be taught using reciprocal teaching strategy.

Reciprocal teaching is a teaching strategy in which students and teachers take turns leading the discussion of reading material and practicing four cognitive strategies: summarization, question asking, clarification, and prediction [5]. Reciprocal teaching has been shown to help students develop interpersonal communication skills as they have to interact with other students and teachers. Because the student teams are helping each other, this teaching strategy involves students to help and teach other students. This allegedly encourages student self efficacy [6]. Teachers teach students important cognitive skills (knowledge) by creating learning experiences [7]. Then the students' self efficacy are trained by learning that gives opportunity and freedom to the students to use all of their thinking ability.

Based on the problems that have been described above, then it will be conducted a research entitled "Student Self efficacy of Grade X Senior High School through the Implementation of Reciprocal Teaching Strategy in Chemical Bonding Matter".

## METHOD

The type of research which used is Pre-Experimental or quasi-experimental [8] because it uses only one class for sample research without any comparison class. The main purpose of this research is to improve students' self efficacy through the implementation of reciprocal teaching strategy. This design research used One Shot Case Study. The

explanation of the design research described as follows.

**X → O**

Explanation:

- X: the implementation of reciprocal teaching strategy to train self efficacy grade X of SMA Negeri 1 Sidoarjo on chemical bonding matter  
O: students' self efficacy and student learning outcomes of grade X SMA Negeri 1 Sidoarjo after applied reciprocal teaching strategy in chemical bonding matter

Data from observation sheet of the implementation of reciprocal teaching strategy used to determine the percentage of implementation of reciprocal teaching during the learning process. Student self efficacy measured using self efficacy questionnaires given to students at each meeting. Students must make a mark on checklist (√) on some points of the statement related to the student self efficacy itself. Then the questionnaire filled by the students analyzed using Likert scale. After trained self efficacy with the implementation of reciprocal teaching strategy, students learning outcomes can be seen by posttest. The posttest value used to describe student learning outcomes in chemical bonding matter after given the implementation of reciprocal teaching strategy to train students' self efficacy.

The assessment of learning implementation analyzed by using the following formula:

$$\text{Learning implementation (\%)} = \frac{\sum \text{score obtained}}{\sum \text{maximum score}} \times 100\%$$

After calculating the percentage of learning implementation, then the next step is determine the criteria based on Table 1.

**Table 1** Percentage or Value Criteria

| Percentage/Value | Criteria  |
|------------------|-----------|
| 0 – 20           | Very Low  |
| 21 – 40          | Low       |
| 41 – 60          | Enough    |
| 61 – 80          | Good      |
| 81 – 100         | Very Good |

[9]  
Learning strategy is good if the percentage which obtained is  $\geq 61\%$ .

The questionnaire results are analyzed descriptively quantitative. The questionnaire data will be analyzed through the Likert scale with 4 choices as shown in Table 2.

**Table 2** Likert Scale Guidelines of Positive and Negative Statement Criteria

| Statement Criteria | Student Response | Score |
|--------------------|------------------|-------|
| Positive           | Very Agree       | 4     |
|                    | Agree            | 3     |
|                    | Disagree         | 2     |
|                    | Very Disagree    | 1     |
| Negative           | Very Disagree    | 4     |
|                    | Disagree         | 3     |
|                    | Agree            | 2     |
|                    | Very Agree       | 1     |

[9]

Scores obtained by students used to find the value of students' self efficacy through the calculation as follows:

$$Value = \frac{\text{the number of scores obtained}}{\text{maximum score}} \times 100\%$$

Then determine the average value of student self efficacy using the formula:

$$Average\ value = \frac{\text{the number of self - efficacy value}}{\text{the number of students}}$$

Furthermore, the data converted into students' self efficacy value with the provisions in Table 1. Self efficacy students are said to be good if the percentage obtained is  $\geq 61\%$ .

The student's value of learning outcomes calculated by the formula:

$$Value = \frac{\sum \text{score obtained}}{\sum \text{maximum score}} \times 100$$

A student passes if he/she has reached minimum criteria which set by SMA Negeri 1 Sidoarjo on chemical bonding matter that is  $\geq 75$ . Then the value analyzed classically by using the formula:

$$\text{Classical mastery}(\%) = \frac{\text{the number of passed students}}{\text{the number of students}} \times 100\%$$

The classical mastery must be achieved is 75%.

## RESULT AND DISCUSSIONS

### Implementation of Learning Strategy

The implementation of reciprocal teaching strategy done through observation. Observations at each meeting using the observation sheet of the implementation of the reciprocal teaching strategy.

Reciprocal teaching strategy is an instructional procedure developed to teach student learning strategies to improve reading comprehension. Students are taught four strategies: summarization, question asking, clarification, and prediction [5].

#### a. Asking questions

Students are instructed to write down the main idea after reading the text. Then students ask questions related to the main idea that has been determined and provide answers to questions that have been asked. Questions arising in the next learning process will develop and students will find the answers to solve problems [10]. Through the making of questions (questioning) and answering questions, then students will know the elaboration of the main idea. Students also get a further explanation of the concept that has been obtained previously, so that from this explanation can help students understand the understanding of chemical bonding matter.

#### b. Clarification

Students with their group search for the term that considered important in the text. Then students are asked to clarify and provide an explanation of the term. Through this step, students will understand the text content well because the students are no longer confused with difficult terms.

#### c. Summarization

Students asked to summarize what has been done in the previous strategies. Students summarize using their own language and then communicate in front of the class. When students are able to summarize and conclude correctly, it can be said that students have understood well.

#### d. Prediction

The next strategy students asked to predict what subject or topic will be discussed in the next text. Through this strategy, students are taught to predict that students understand that in a text with subsequent texts interrelated and related to each other. When students are able to predict well and correctly, then students can connect the concepts and get the whole concept and comprehensive.

The main activities of the reciprocal teaching strategy are basically in accordance with the strategies described above, for more details the core activities undertaken at meetings 1, 2, and 3 can be explained as follows. The first meeting consists of 8 rounds discussing ionic bond, covalent bond, single covalent bond, double covalent bond and triple covalent bond. The second meeting consists of 4 rounds discussing covalent bonds based on

polarity, polar covalent bonds, nonpolar covalent bonds and laboratory activities on identifying the characteristics of ionic compounds and covalent compounds. In the third meeting consists of 2 rounds discussing the coordination covalent bonds and examples. The implementation of learning during 3 meetings can be seen in Table 3.

**Table 3** Implementation of reciprocal teaching strategies

| Meetings | Implementation |           |
|----------|----------------|-----------|
|          | Percentage     | Criteria  |
| 1        | 92.50%         | Very Good |
| 2        | 93.75%         | Very Good |
| 3        | 93.75%         | Very Good |

Based on the Table 3 shows the percentage of implementation from the first to the third meeting is 92.50%; 93.75%; and 93.75%, all of them included in the very good category. The implementation of reciprocal teaching strategy is very useful in helping students overcome the challenges in reading text that are typically associated with compact or complicated textbooks and writings, too much detail, difficulty in separating important information from unimportant, or unreasonable information from the whole structure of the text [11].

Based on the description, it can be explained that the implementation of reciprocal teaching strategy to train the students' self efficacy of grade X on chemical bonding matter from the first meeting to third meeting included in the very good category. Observation of the implementation of reciprocal teaching strategy is supported by observation data of student activities which conducted during the learning process.

### Self Efficacy

Self efficacy is a value that will be needed for the individual and for the actions necessary for success [12]. As proposed by social cognitive theory, self efficacy in a self-interested person capable of mobilizing and sustaining the effort required to achieve the goal [13]. The existence of self efficacy students more confident in doing the tasks they have. Self efficacy consists of 3 dimensions:

- Magnitude is a dimension associated with the difficulty of individual tasks, the belief of a person believing the action that he can do. This dimension refers to the difficulty level of a problem that perceived differently from each individual.

- Strength is a self-belief that exists within a person that can be realized in achieving certain results (performance). This dimension refers to individual resilience in solving problems. Individuals who have strong confidence in their ability to solve problems will continue to survive in their efforts despite many difficulties and challenges.
- Generality is how someone is able to generalize tasks and previous experiences when confronted with a task. This dimension is a dimension related to the wide range of areas of behavior in which an individual feels confident in his ability, depending on his or her limited ability to an activity and a certain situation.

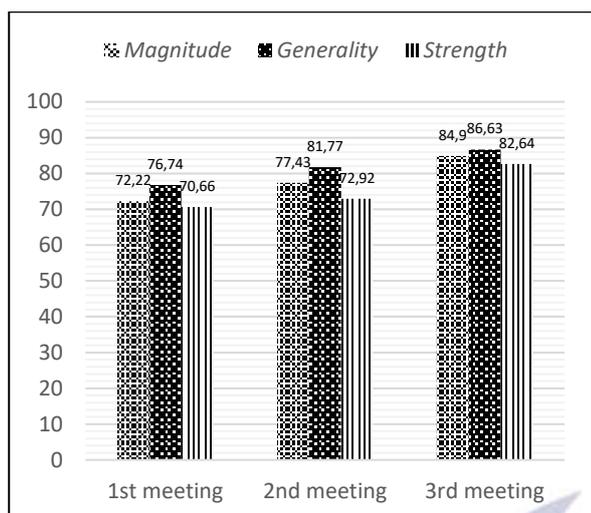
Students' self efficacy were analyzed from the value of self efficacy questionnaire which given to the students at the end of each meeting. Self efficacy questionnaire used as the main data, it also supported by self efficacy observation which observe student activities in each dimension of self efficacy. The self efficacy questionnaire consists of 12 statements which can be a positive and negative statements. Assessment that used for self efficacy questionnaires using Likert scale. Student self efficacy value obtained during three meetings can be seen in Table 4.

**Table 4** Students' Self efficacy Value

| Self efficacy Value      | Criteria  | The number of students in each meetings |    |    |
|--------------------------|-----------|---|----|----|
|                          |           | 1                                       | 2  | 3  |
| 0-20                     | Very Low  | 0                                       | 0  | 0  |
| 21-40                    | Low       | 0                                       | 0  | 0  |
| 41-60                    | Medium    | 0                                       | 0  | 0  |
| 61-80                    | Good      | 30                                      | 22 | 7  |
| 81-100                   | Very Good | 6                                       | 14 | 29 |
| Total number of students |           | 36                                      | 36 | 36 |

Based on the Table 4 the number of students who have value with good criteria for three meetings are getting fewer, but students who have value with very good criteria are increasing for 3 meetings. This shows that the students of grade X in SMA Negeri 1 Sidoarjo can be said to have a good self efficacy. From the self efficacy questionnaire value for three meetings there are some increasing value.

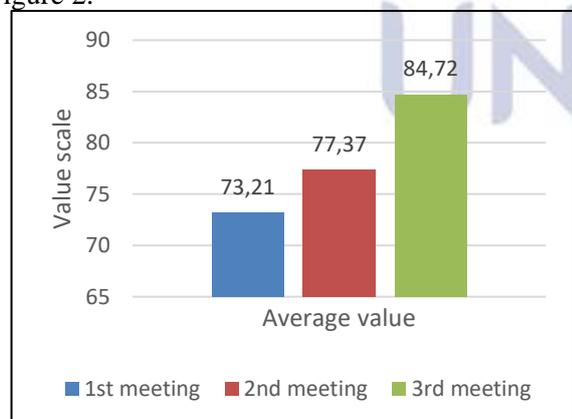
Student self efficacy questionnaire value also seen from the average value in each dimension of self efficacy, namely dimension of magnitude, strength, and generality. The average value of these three dimensions is presented in Figure 1.



**Figure 1** The average value of students' self efficacy in each dimension during three meetings

Based on Figure 1 shows that the magnitude dimension has the average value of three meetings respectively, that is 72.22; 77.43; 84.90 with the good criteria at 1<sup>st</sup> and 2<sup>nd</sup> meeting, while 3<sup>rd</sup> meeting in very good criteria. Dimension of strength obtained average value of three meetings are 70.66; 72.92; 82.64 with the good criteria at at 1<sup>st</sup> and 2<sup>nd</sup> meeting, while 3<sup>rd</sup> meeting is very good criteria. Generality dimension obtained by the average value of three meetings respectively that is 76.74; 81.77; 86.63 with the good criteria at 1<sup>st</sup> meeting, whereas the 2<sup>nd</sup> and 3<sup>rd</sup> meetings are very good criteria. From Diagram 1 shows that the students of grade X in SMA Negeri 1 Sidoarjo have a good self efficacy and very good criteria.

Self efficacy underlies people's belief in their ability to perform certain tasks or produce desired results [14]. Overall grade X students of SMA Negeri 1 Sidoarjo have a good and very good self efficacy. The average value of self efficacy questionnaire for three meetings is presented in Figure 2.



**Figure 2** The average value of students' self efficacy during three meetings

Based on Figure 2 shows that the average value of students' self efficacy questionnaire for three meetings obtained an average value of 73.21; 77.37; 84.72. The average value at meetings 1 and 2 are good category whereas meeting 3 is a very good category. These results indicate a tendency to increase self efficacy behavior. Students with high self efficacy always show the more comparative performance compared to lower self efficacy, thus emphasizing the relationship between self efficacy and learning achievement with students [15]. In this case the self efficacy of the students has an impact on student learning outcomes.

### Student Learning Outcomes

The learning outcomes is the value obtained after the implementation of reciprocal teaching strategy. Students cognitive abilities in learning can be seen from the value which obtained by using posttest. The results test consists of 25 items which include chemical bonding matter, ionic bonds, covalent bonds, and the characteristics of ionic and covalent compounds. This posttest value used to describe student learning outcomes to know the mastery of matter that has been studied.

All of students passed with classical mastery results of 100%. It can be seen that the mastery of chemical bonding matter can be done well. No student who passes under the minimum criteria. It indicates that the students have achieved good learning objective. The minimum criteria which has been determined by SMA Negeri 1 Sidoarjo is  $\leq 75$ .

In the previous discussion on the implementation of reciprocal teaching strategy is known that the percentage obtained is in very good category. The accomplishment of learning achievement is supported by the implementation data through the application of learning [16]. If the implementation of learning strategies done well, then it will help students obtain good learning outcomes are also greater. In addition to the strategy of reciprocal teaching provides a broad opportunity for students to move through the activities of understanding the discourse by way of group discussion. Various activities undertaken by students on the implementation of reciprocal teaching strategy will make them experience of learning directly, thus helping students in understanding about what they learn and train students independently and have confidence in the ability they have.

In the discussion of self efficacy has been mentioned that the existence of a good self efficacy owned by students, then this will have a good impact on learning outcomes. The success in mastering a

material is due to his beliefs. The source of confidence is self-confidence in self efficacy [17]. Furthermore, academic self efficacy is the determinant of the success of students in learning, through the feeling of self efficacy students will be able to undergo a variety of student learning activities both at school and home and will ultimately affect student learning outcomes [18]. The result of this study is proved by the value of the student's posttest result indicates no one who have the value under minimum criteria, in other words the students have obtained the completeness on chemical bonding matter. From the implementation of learning strategy during the three meetings showed that after given the treatment by applying reciprocal teaching strategy and training self efficacy of class X SMA Negeri 1 Sidoarjo has achieved mastery of learning outcomes.

## CLOSURE

### Conclusion

After analyze and make discussion of research results it can be concluded that self efficacy which trained to students using reciprocal teaching strategy on chemical bonding matter obtained the average value for three meetings are 73.21; 77.37; 84.72 with good criteria for meeting 1 and 2, very good criteria for meeting 3. The implementation of learning strategy using reciprocal teaching obtained percentage at meeting 1, 2, and 3 respectively 92.50%; 93.75%; and 93.75%. The learning outcomes achieved by the students on the chemical bond material classically obtained 100%.

### Suggestion

Before carry out the research should be checked from any preparation in the classroom to avoid the occurrence of constraints during the research.

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