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# The Effect of Search, Solve, Create, And Share (SSCS) Learning Model towards Student's Critical Thinking Skills

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## Abstract

The aim of this study is determine the effect of search, solve, create, and share (SSCS) learning model on critical thinking skills of hydrocarbons and petroleum material. The method used in this study was quasi experimental design, with research design nonequivalent control group design. The sample was taken by purposive sampling and divided into two groups consist of control group and experimental group. The data gathering techniques in this study was through 8 items of essay test instrument which is analyzed by using t-test. The results of t-test data showed that $t_{count} > t_{table}$ or $16.36 > 1.980$ at significance level 5%, value $t_{count}$ lies in the region reject $H_0$ and accept $H_a$. The result shows that there are significant search, solve, create, and share (SSCS) learning model on student's critical thinking skills.

Keywords: Search, Solve, Create, and Share (SSCS) Learning Model, Critical Thinking Skills; Hydrocarbons and Petroleum.

## INTRODUCTION

The growth and development of technology today has shown remarkable progress. Its presence has had a major impact on the lives of human beings from various aspects and dimensions. One aspect that is affected is the educational aspect. Progress of education aspect becomes one of the advanced factors of a country.

Education in Indonesia today is still relatively low when compared with countries around the world. As a result the quality of Indonesian education is currently very low, it is reinforced by one of the results of a report from Baswedan (2014) according to math and science mapping results in 2011 that Indonesia was ranked 40 of 42 countries in science literacy. The results of survey reports conducted by the Program for International Student Assessment (PISA) in 2012 show that Indonesia is at level 64 out of 65 participating countries, with average math score of Indonesian children 37M5, average reading score of 396, and the average score for science 382, whereas the mean overall scores of 494, 496, and 501 (494, 496, and 501, respectively) of the overall scores of science (PISA, 2012). This is because the ability of Indonesian children's science is still low compared with other children in the world. The cause of the low level of science ability of Indonesian children is none other because the competencies tested in the test are different from those taught in schools and those tested in the National Exam (UN). Competence tested in PISA refers more to understanding, reasoning, problem solving, arguing, critical and creative thinking. Meanwhile, the competencies taught in Indonesian schools have not been referring to the competencies tested in PISA, resulting in a lack of understanding of the concepts that students have that result in the low critical thinking skills that students have viewed from the PISA 2012 results.

The low level of critical thinking skills of students is shown by research (Maulana, et al., 2014) conducted in SMA Negeri 1 Inderalaya, from the interview with the chemistry teacher of 11-grade students IPA2 SMA Negeri 1 Inderalaya that the chemistry learning process in SMA Negeri 1 Inderalaya still focused on writing in books and memorization so that learning only emphasizes on the outcome of student cognitive achievement alone without any understanding of the concept of chemistry. According to (Maulana, et al., 2014) in chemistry learning, students need not only the results of cognitive achievement, but also activities that can build the concept of chemistry itself so as to build students' critical thinking

skills. If the learning process of chemistry continues to rely on writing in the book and memorize it, then the critical thinking skills of Indonesian students will not develop because of lack of applying formulation and solving of a problem, consequently difficult for Indonesian students to compete with students from other countries. Therefore, it is necessary to improve students' critical thinking skills.

The role of teachers is needed in building students' critical thinking skills. Teachers are required to make changes to the learning model that leads to the achievement of students' critical thinking skills. One model that can build students' critical thinking skills is the Search, Solve, Create, and Share (SSCS) learning model.

The Search, Solve, Create, and Share (SSCS) learning model is a learning model which in the learning process requires students to think critically to solve a problem so as to build problem solving skills on students. The purpose of Search, Solve, Create, and Share (SSCS) learning model is to expand students' knowledge through a problem solving (Pizzini, et al., 1988).

Search model, Solve, Create, and Share (SSCS) according to Chin (1997) is a learning model that has four learning stages in the implementation, namely: the search stage is students looking for or identify a problem, solve stage is the way students to solve a problem, the create stage is the students summarize the solution of a problem given to the students by creating a product, and the share stage is that students share the knowledge they have for both peers and teachers.

Research model of Search, Solve, Create, and Share (SSCS) study ever conducted by Irwan (2011) in one university in Bengkulu city targeting 2nd semester academic year 2011/2012. The result of the research is the improvement of students ability in mathematical reasoning after using problem posing approach SSCS model. Another study was conducted by Maulana, et al. (2014) in one of the schools in SMA Negeri 1 Inderalaya with the target of class XI IPA 2 and the results of his research indicate that there is an increase in learning outcomes after using Search, Solve, Create, and Share (SSCS) learning model. Before using Search model, Solve, Create, and Share (SSCS) percentage of students' learning result 25%, then after using four stages of Search, Solve, Create, and Share (SSCS) learning model increased to 87.50%.

One of the chemicals in the Curriculum 2013 in the odd semester class XI is hydrocarbons and petroleum. In the subject of hydrocarbons, students

are required to classify hydrocarbons based on their saturation, to master and understand the structure of hydrocarbon compounds in order to determine the nomenclature of alkanes, alkenes, and alkaloes and to explain their relationship to the properties of hydrocarbons. In addition, students are also expected to explain the keisomeran of hydrocarbon compounds. On the subject of petroleum, students are expected to master and understand the process of formation of petroleum, petroleum refining, petroleum fractions, and the impact of petroleum combustion. Hydrocarbons and petroleum are materials that require skills, skills, knowledge of high concepts and critical thinking skills in solving problems related to the material, so that teachers are required to improve the quality of learning.

Based on interviews with high school chemistry teacher IT Al-Qur'aniyyah, hydrocarbon material is considered less attractive. Hydrocarbon materials are often considered to be hapalan materials, thus less involving students in learning in the classroom. Students receive only the instruction given by the teacher without giving a good response to the material. When entering the concept of other carbon compounds students will again have difficulty in learning it. Most students are not able to relate what they learn to how the knowledge is applied to solve problems in different situations, both to do the problems and their application in everyday life. This is expressed by high school chemistry teacher IT Al-Qur'aniyyah who feel less maximal in delivering abstract material. Therefore, teachers should look for models that are considered appropriate to make students more easily understand the hydrocarbon material.

Based on the above description, there has been no research on search, solve, create, and share (SSCS) learning model on students' critical thinking skills on hydrocarbon and petroleum compounds, as well as search, solve, create and share (SSCS). Therefore, the researcher is interested in researching "The Effect of Search, Solve, Create, and Share (SSCS) Learning Model toward Student’s Critical Thinking Skills".

## METHOD

The research method used in this research was Quasi Experimental with Nonequivalent Control Group Design design. The research population study was all MAN 11 Jakarta students, the affordable population of the students of class XI at MAN 11 Jakarta in the odd semester of the academic year 2016/2017. The samples were taken by purposive sampling technique to obtain

two classes of XI IPA, one as control class and one as the experimental class. Both classes are class XI MIA-1 consisting of 34 students as experimental class and class XI MIA-3 consisting of 34 students as control class.

Instruments used in this study are: test esay, and Student Worksheet. All the instruments that will be used are tested and calculated the level of validity and reliability. The following is the validation result of the essay test instrument used.

Table 1 Recapitulation of Validity and Reliability Results of Essay Tests

| Data | Score |
|---|---|
| Number of Subjects | 47 |
| Number of Problems | 13 |
| Average | 100,26 |
| Standard deviation | 18,27 |
| Correlation XY | 0,67 |
| Reliability | 0,8 |

Table 1 demonstrate the validation result of the test instrument used, it can be seen that there are 8 valid numbers so it is used for research with the reactivity of 0.8 so it can be said that the instrument has been reabeled.

The research hypothesis was analyzed by using t-test with significant level $\alpha = 0{,}05$. The percentage of skill level is categorized in 5 criteria, namely: very good (81-100), good (61-80), enough (41-60), less (21-40), and very less (0-20) (Arikunto , 2005).

## RESULT AND DISCUSSION

The test instrument validation results showed that there are 8 numbers that will be used as research instruments that will measure students' critical thinking skills. Based on the pretest and posttest data on the analysis of critical thinking skills indicators in the control class can be seen in table 2 below:

Table 2 Percentage (%) Achievement of Pretest and Posttest Critical Thinking Skill of Control Class

| Critical Thinking Indicator | *Pretest* (%) | *Posttest* (%) |
|---|---|---|
| Analyze argument | 47.98 | 73.53 |
| Focused the question | 62.68 | 85.67 |
| Deciding an action | 12.59 | 35.94 |
| Making induction and considering the induction result | 15.05 | 45.17 |
| Identify assumptions | 21.57 | 52.45 |
| Explain the credibility (criteria) of a source | 11.21 | 48.35 |
| Average | 28.51 | 57.19 |
| Category | Less | Enough |

Table 2 shows the average of pretest and posttest in the control class on critical thinking skills. The average pretest in the control class showed average percentage of 28.51% with less category and posttest average showed average percentage of 57.19% with enough category. It is seen that there is a slight increase in the critical thinking skills of students that is equal to 28.68%.

The lowest critical thinking skill indicator at the time of pretest is deciding an action and explaining the credibility (criteria) of a source. The indicator decides an action lies in the problem analysis section and the indicator explains the credibility (criteria) of a source lies on the part making the reason of the selected source.

The highest critical thinking skill indicator at the time of pretest is focusing on the questions that lie in the section on formulating questions. The lowest critical thinking skill indicator at the time of posttest is deciding an action located in the problem analysis section. The indicator of the highest critical thinking skill at the time of posttest is to focus the question which lies in formulating the question.

The pretest and posttest data on the analysis of critical thinking skills indicators in the experimental class can be seen in table 3.

Table 3. shows the average of pretest and posttest in the experimental class on critical thinking skills. The average pretest in the experimental class shows average percentage of 27.81% with the less category and the average posttest shows average percentage of 70.73% with good category. It can be seen that there is a considerable increase in students' critical thinking skill which is 42.86%.

Table 3 Percentage (%) Achievement of Pretest and Posttest Critical Thinking Skills of the Experiment Class

| Critical Thinking Indicator | *Pretest* (%) | *Posttest* (%) |
|---|---|---|
| Analyze argument | 38.41 | 82.54 |
| Focused the question | 45.22 | 87.87 |
| Deciding an action | 1.97 | 48.99 |
| Making induction and considering the induction result | 19.75 | 65.65 |
| Identify assumptions | 36.52 | 69.85 |
| Explain the credibility (criteria) of a source | 25 | 69.49 |
| Average | 27.81 | 70.73 |
| Category | Less | Good |

The lowest critical thinking skill indicator at the time of pretest is deciding an action, making inductions and considering induced results and explaining the credibility (source) of a source. The indicator decides an action lies in the problem analysis section. Indicators make inductions and consider induction results lie in the section make conclusions. While the indicators explain the credibility (criteria) of a source lies part of the ability to give reasons.

The highest critical thinking skill indicator at the time of pretest is focusing on the questions that lie in the section on formulating questions. The lowest critical thinking skill indicator at the time of posttest is deciding an action

located in the problem analysis section. The highest critical thinking skill indicator at the time of posttest is focusing the question and analyzing the argument. The indicator analyzing the argument lies in the identifying part of the statement statement and the focusing of the question lies in formulating the question section.

Posttest data is also t-tested to find out the difference of mean of students' critical thinking skill between experiment class and control class. The following test results hypothesized posttest data using $t_{test}$ in table 4

Table 4. Posttest Hypothesis Test Class Experiment Class and Control Class

| $T_{count}$ | $t_{tab}$ | Sum | Conclusion |
|---|---|---|---|
| 16,36 | 1.98 | $T_{count} > t_{table}$ | Then reject H0 means there is difference of posttest result of average between experiment class student and control class student. |

The $t_{test}$ on posttest is done to know the difference of mean of students' critical thinking skill between control class and experiment class before being treated. Based on table 4.8 shows that $t_{count} > t_{tab}$ or 16,36> 1,980 at 5% significance level, tct value lies in reject area $H_0$. Thus it can be said that search, solve, create, and share (SSCS) learning model influence critical thinking skill students on the matter of hydrocarbon and petroleum compounds.

Based on the result of posttest hypothesis test which shows the rejection of $H_0$ and $H_a$ acceptance with 5% significance level, it can be interpreted that the average of students' critical thinking skill in the experimental class with Search, Solve, Create, and Share (SSCS) learning model is higher than control class with conventional learning model. It means that there is influence of Search, Solve, Create, and Share (SSCS) learning model to students' critical thinking skill. In accordance with the theory of Pizzini (1991), explains that the advantages of Search, Solve, Create, and Share (SSCS) learning model for students when applied in classroom learning that students gain direct experience in solving problems, strengthen the concept of science, process information, think high, develop the method of science, and have an interest to learn. A study conducted by Maulana, et al. (2014) in SMA Negeri 1 Inderalaya shows that there is an increase in student learning outcomes in the concept of buffer solution through Search, Solve, Create, and Share (SSCS) learning model, because through the learning model of Search, Solve, Create, and Share (SSCS) students build the

chemical concept independently so that students understand what is learned.

At the beginning of the experimental class learning using the Search, Solve, Create, and Share (SSCS) learning model, the teacher provides apperception by providing instructional videos concerned with hydrocarbon and petroleum material material so that students get an idea of the material they will be studying. Teaching videos were given by teachers from the first meeting until the fourth meeting. The learning video at the first encounter contains the naming of alkanes, alkenes, and alpha, the learning video at the second encounter contains the physical properties of alkanes, alkenes and alpha, the learning video at the third meeting contains a stratified distillation process, and a learning video at the fourth meeting containing combustion effects hydrocarbon compounds to the environment and how to cope. After the learning videos were given, the students were formed in groups and given Students Worksheet containing cases in the form of questions relating to the material being studied, after which the students worked in groups. Student's worksheet consists of 4 phases: search phase, solve phase, create phase, and share phase.

In the student's worksheet in the Search phase, there are 3 indicators of critical thinking skills that arise. Indicators of critical thinking skills that arise among others, the indicators analyze the argument when students perform activities to analyze information that is known from the problem, at this stage students are allowed to find information from books or other sources related to the material being studied. The indicator focuses on the question: when the student understands the problem given in the Students Worksheet then raises his ideas to identify and develop a statement into a small question, and the indicator identifies assumptions arising when students find an idea to focus on solving the problem.

In the solve phase, there are questions that lead to the completion of the students, the questions contained in the students worksheet guiding students to work on the problem with correct steps and coherent. In the Solve phase, there are 2 indicators of critical thinking skills emerging. Indicators of critical thinking skills that arise among others, the indicators decide an action that arises when the student performs the case settlement activities in the Students Worksheet in accordance with the appropriate steps of completion with the teacher as a facilitator. The indicator explains the credibility (criteria) of a source arises when the student plans a

problem solving with the method chosen. A study (Averkieva, et all, 2015) states that if a teacher gives a problem to the student and then the student seeks steps to solve the problem, the teacher also facilitates the student until the student finds a solution to the problem the teacher is giving. It can develop students' critical thinking skills.
Then Create phase, students develop or create innovative products as a way to solve the problem. In the Create phase there is 1 indicator of critical thinking skills that arise. The indicator of critical thinking skill that emerges is the induction indicator and considering the induction result, the indicator occurs when the student performs the examining and reviewing the findings and puts them into the report form as creatively as possible. According to Facione (1990) to identify and reinforce the things needed to draw conclusions, establish allegations and hypotheses, consider relevant information and to reduce distrust from data can use reports, principles, evidence, ratings, beliefs, opinions, concepts, descriptions questions or other forms.

After that phase of the Share, students complete and make a report solution of problem solving, students explain the results of their work to teachers and friends. In the Share phase there is 1 indicator of critical thinking skills that arise. The critical thinking skill indicator that emerges is explaining the credibility (criteria) of a source, the indicator arises when students explain their work to the teacher and their friends, because in this activity the students develop their ability to make the reason why they answer the chosen solution. According to Chin (1997) in the Share Phase students communicate their findings, solutions, and conclusions they made to their teachers and friends, then arose questions from colleagues to find out further investigation of the sources they found.

Students worksheet on search, solve, create, and share (SSCS) learning model in addition to aiming for students to understand the material of hydrocarbon and petroleum compounds with their own understanding, also can see how students understand with the flow or phase of search, solve, create, and share (SSCS) learning model. If the student has understood or understood the phases or the flow in the search, solve, create, and share (SSCS) learning model phase, then the student can easily understand the case given to the students worksheet. According to Maulana, et al (2014), Search, Solve, Create, and Share (SSCS) learning model can improve students' concept of understanding and student activeness because students are directly involved in solving a problem.

The following shows the implementation of the Search, Solve, Create, and Share (SSCS) learning model from the 1st to 4th meeting in Figure 1.


Figure 1 Average percentage of learning model implementation of Search, Solve, Create, and Share (SSCS)

In figure 1, the average of Students Worksheet assessment from Students Worksheet 1 to Students Worksheet 4 shows that there is an increase in each learning meeting. The average percentage of Students Worksheet at the first meeting was 65.89% with good category, at second meeting 74.83% with good category, third meeting 81,85% with very good category, and at fourth meeting 87,78% with very good category.

This study measures critical thinking skills based on six indicators of critical thinking skills. The results of the analysis of the achievement of critical thinking skills can be seen in table 1. to see the results of the achievement of the pretest critical thinking skills indicator on the control class posttest. As for to see result of achievement indicator of pretest and posttest critical thinking skill in experiment class can be seen in table 2.

## CONCLUSION

The purpose of this research is to know the effect of Search, Solve, Create, and Share (SSCS) learning model to students' thinking skill on hydrocarbon and petroleum material. Based on the results of data analysis and discussion can be concluded that the learning model Search, Solve, Create, and Share (SSCS) influence students' critical thinking skills on hydrocarbon and petroleum compounds. This is supported by the result of hypothesis test, it is obtained that thitung> ttable or 16,36> 1,980 at 5% significance level, tcount is located at reject area H0 and received Ha.

The influence of the Search, Solve, Create, and Share (SSCS) learning model on students' critical thinking skills on hydrocarbon and petroleum compounds is based on the steps of the student-focused Learning, Solve, Create, and Share (SSCS) model using the application of knowledge coupled with problem-solving that makes learning more meaningful. Studying and reinforcing concepts to solve problems through direct experience, can develop students

'thinking so as to enhance students' critical thinking skills.

**SUGGESTION**

Based on the research that has been done, the suggestions that can be given by the researcher are as follows: 1) Search model of Learning, Solve, Create, and Share (SSCS) is one of the learning model that can develop students' critical thinking skill. Thus, the learning model of Search, Solve, Create, and Share (SSCS) can be used as an alternative model of learning in chemistry learning. 2) Implementation of Search, Solve, Create, and Share (SSCS) learning model takes considerable time. So, for teachers applying Search, Solve, Create, and Share (SSCS) learning model should be able to manage time well so that all stages in Search, Solve, Create, and Share (SSCS) learning model is done optimally. 3) For researchers, it is necessary to do other chemistry learning which also have the potential to develop students' critical thinking skills.

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