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Implementation of the search, solve, create and share (SSCS) learning model to improve critical thinking skills

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ABSTRACT

Conceptual understanding of science subjects is very important and needs to be instilled and developed in students. The study aims to analyze students' critical thinking skills in learning with the Application of the SSCS (Search, Solve, Create, Share) learning model. The study uses a quantitative approach quantitative methods with the type of causality research experiment (cause and effect research). The design used in this True experiment is the pretest-posttest control group design type. The study results showed that the problem-solving abilities of students who used the Application of the SSCS (Search, Solve, Create, Share) learning model with the experimental class pretest average was 27.09 and the posttest average was 84.97. The t-test results showed a difference in critical thinking skills between the classes that applied and those that did not, indicated by the significance level showing less than 0.05. This means that Ho is rejected, and Ha is accepted. This means there is a difference in the critical thinking skills of students who use the Search, Solve, Create, Share (SSCS) model and those who do not. Based on the N-Gain calculation, it is at a value of 0.83, with the criteria for obtaining the N-Gain Score test being in the high category ($g > 0.8$). Meanwhile, the problem-solving ability using conventional methods in the control group was at 0.27, and the N-Gain Score test was in the low category ($g < 0.4$). The difference in students' critical thinking skills is 0.83, a high category. The impact of using critical thinking stages on learning is that students are expected to have good critical thinking skills in solving the problems faced well.

Keywords: Critical thinking skills, science learning, SSCS (Search, solve, create and share)

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INTRODUCTION

In modern education, critical thinking skills have become essential competencies that students must have to face the challenges of the 21st century. However, various studies show that students' critical thinking skills are still relatively low due to the application of learning models that do not stimulate deep thinking processes. In this 21st century, very rapid changes are difficult to anticipate systematically, structured, and measurable (Makhrus & Hadiprayitno.,

2012). The problems that arise are increasingly complex, so they require individuals who have knowledge and skills in solving problems. However, science learning seems theoretical, mathematical, and far from real life (Jumini, Hidayah, et al., 2020; Priscylio & Anwar, 2019). Learning must be directed at forming skills in facing the challenges of the 21st century. Science essentially underlies the very rapid development of 21st-century technology. Technological developments require human resources to have several skills to meet the demands of the 21st century. Therefore, understanding the concept of science subjects is very important and needs to be instilled and developed in students.

Science learning starts from facts that occur in nature/society in the process through inquiry/discovery to produce principles, laws, or theories and train scientific attitudes such as (1) curiosity, (2) critical attitude, (3) open attitude, (4) objective attitude, (5) attitude of being willing to appreciate the work of others, (6) attitude of daring to defend the truth, and (7) futuristic (Jumini, 2016; Suryantari et al., 2019). Many science learning activities are still not contextual, so students are less able to apply science to the context of everyday life (Nikmatur Rohmaya, 2022). The inability to connect scientific concepts with everyday life has an impact on the inability to think critically and find solutions to social problems that occur in society.

Asri's (2022) states that learning that teachers still dominate causes students' involvement to be active in the learning process to be lacking, which causes low critical thinking skills in students. Based on the Trends in International Mathematics and Science Study (TIMSS) results, Indonesian students' science scores in 1999, 2013, 2007, 2011 and 2015 were always below the international average score. This is supported by Agnafia (2019), who stated that critical thinking skills in Indonesia based on the Program for International Student Assessment (PISA) still look low. Data from 2015, with a score of 397, ranked 62nd with 72 countries participating, while data from 2012 with a score of 396. The implementation of PISA 2018 in Indonesia involved 12,098 students who participated in 399 educational units. The sample represented 85% (3,768,508 students) of residents aged 15 years. Based on these results, it can be said that Students' critical thinking abilities in Indonesia are still low (Rofi'ah, S., & Rokhmaniyah, R., 2024). Research by Priyadi et al. (2018) found that students' critical thinking skills are still low in learning. Liliasari (2011) stated that critical thinking is included in complex thinking, which is included in the high-level thinking process. Critical thinking skills are the ability to analyze and observe something very well.

Problems in society are increasingly complex along with the development of science and technology. This requires that learning is not only able to make students understand the concept of science, but students are better able to understand problems and issues that occur in society, especially those around them, and improve critical thinking skills in their surroundings. This shows that the learning model used is still the lecture method, so students do not play an active role in learning and are not required to develop their thinking process. In addition, students cannot analyze and solve existing problems, meaning that students' critical thinking skills are still lacking. Critical thinking abilities are low because teachers still dominate the learning used in schools, so students' critical thinking abilities are still low (Jumini et al., 2020).

Critical thinking skills need to be improved effectively in the science learning process. When students think critically, they are encouraged to question hypotheses, analyze, and

synthesize problems (Solecha et al., 2023). Learning strategies such as applying learning models are very important to help students develop their critical thinking skills (Anggraini et al., 2024). Various alternative approaches have been developed and applied to improve the quality of learning in various educational contexts. Approaches such as project-based learning (PBL), inquiry-based approaches, and cooperative learning models have positively impacted students' critical thinking and problem-solving skills. However, some of these approaches still have limitations in providing a systematic structure to direct students to understand concepts in depth. A contextual learning approach can be realized, among other things, through cooperation, discovery, inquiry, explorative, critical thinking, and problem-solving methods (Purnawanto, A.T., 2019).

One way to improve students' critical thinking skills is to use the problem-oriented Search, Solve, Create, Share (SSCS) model. This learning model is a problem-oriented model that requires students to analyze an existing problem and then find a solution to the problem. The Search, Solve, Create, and Share (SSCS) learning strategy is the right solution because it combines problem-solving with clear and structured stages. Research by Agnesa & Rahmadana (2022) states that the development of critical thinking skills in biology learning can be done with various learning models, one of which is problem-based learning. According to Meika et al. (2021), the SSCS (Search, Solve, Create, Share) learning model is designed to develop critical thinking skills and increase understanding of scientific concepts. The SSCS learning model is a model that directs students to be able to describe, connect and analyze problems until they reach the problem-solving stage, so it requires students to actively discuss in small groups during the learning process (Widyati, F. N., & Irawati, H., 2020). SSCS is a learning model that emphasizes applying a scientific approach or systematic, logical, orderly and precise thinking (Utami, 2011).

Based on the description above, the research entitled "Implementation of the Search, Solve, Create, Share (SSCS) Learning Model to Improve Critical Thinking Skills in Science Learning at SMP Takhassus Al-Qur'an An-Nida' Selomerto" aims to analyze student learning activities in learning with the Search, Solve, Create, Share (SSCS) problem-oriented model on cell introduction material, to analyze the differences in improving critical thinking skills in students who are applied to the Search, Solve, Create, Share (SSCS) problem-oriented model and those who are not applied, and to analyze student responses to the application of the Search, Solve, Create, Share (SSCS) problem-oriented model on cell introduction material.

RESEARCH METHODS

The research approach used in this study is a quantitative method with the type of causality research experiment. Quantitative methods were chosen to measure critical thinking skills objectively through pretest and posttest instruments. The resulting numerical data is analyzed statistically to determine the effectiveness of the SSCS model. Causal research, also known as explanatory research, is conducted to identify the level and nature of cause-and-effect relationships. Causal research can be conducted to assess the impact of specific changes to existing norms, various processes, and others. Causal research explains the causes and effects of a phenomenon (Efendi, I., & Sesmiarni, Z., 2022). The Causality research method was

chosen because the research was conducted at SMP Takhassus Al-Qur'an An-Nida 'Selomerto using two different classes where class VIIA was the control class and class VIIC as the dependent class with the number of students in each class 28 students. The independent variable in this study is the use of the Search, Solve, Create, Share (SSCS) model. The dependent variable in this study is the improvement of critical thinking skills.

The design used in this True experiment is the pretest-posttest control group design type, as shown in Table 1. Both classes before and after the treatment were given the same test questions. The experimental class was given learning using the Search, Solve, Create, Share (SSCS) learning model, while the control class learned as usual using lectures.

Table 1. Research Design

Class	***Pretest***	**Treatment**	***Posttest***
Experiment	O_1	X_1	O_2
Control	O_3	X_2	O_4

Information :

O_1: Ability of beginning participant to educate class experiment

O_3: Ability of beginning participant to educate class control

X_1: Treatment learning with learning model *Search*, *Solve*, *Create*, *Share* (SSCS)

X_2: Treatment learning method conventional

O_2: Ability of end participant to educate class experiment

O_4: Ability of end participant to educate class control

The test was given to measure the ability of students to improve their critical thinking skills in the form of a question description. There are five questions to complete with guidelines for scoring (rubric)—ability to improve critical thinking skills. According to Anderson, the level of critical thinking is Critical thinking skills, including cognitive levels C4 (analyzing), C5 (evaluating), and C6 (creating) at the cognitive level based on Anderson's formulation (Revised Bloom's Theory). This critical thinking ability is known as high-level thinking skills or HOTS (higher-order thinking Skills). Instrument question test improves critical thinking skills from indicator to material learning, namely Science Objects and Their Observations. Instruments validated internally and externally. Internal validation is performed on expert material, expert learning, and expert evaluation to see construction, grammar, and conformity with objective learning. Validation is external with a trial of the question instrument test on students. Then, the validity, reliability, level of difficulty, and power differences were analyzed. This obtained instrument question for test measurement ability improves critical thinking skills.

The reliability test aims to determine the instrument's consistency level in measuring critical thinking skills on various occasions, which was tested using Cronbach's Alpha technique. The reliability test of knowledge, attitude and behaviour analysis question items regarding knowledge, attitudes and behaviour showed a Cronbach Alpha value > 0.60 so that the instrument tested could be declared reliable or consistent (Anggraini et al., 2022). A valid and reliable instrument ensures that the difference in pretest and posttest scores truly reflects changes in students' critical thinking skills due to implementing the SSCS learning model, not due to other factors such as measurement error or instrument inconsistency.

The data study results were analyzed by calculating the student scores and the total score

of the critical thinking ability improvement test. The following formula-1 can be used to Calculate the percentage to improve students' critical thinking skills.

$$Np = \frac{R}{SM} \times 100\% \quad \text{(Hidayat et al., 2017)} \qquad (1)$$

Information :
Np: Percentage value sought
R: Raw score obtained by the student
SM: Ideal maximum score of the test in question

After giving a score with the achievement aspect improvement ability to think critically, convert the score to an in-form percentage and categorize the ability breakdown problem of the student as in Table 2.

Table 2. Interpretation ability breakdown problem

Presentation achievement aspect	Category
76% - 100%	Very good
51% - 75%	Good
26% - 50%	Not good
0% - 25%	Not good

Meanwhile, to see the differences in students' problem-solving abilities in the experimental and control classes, an *independent sample t-test analysis was carried out.* Then, I continued with the Gain test to see how big the difference was.

RESULTS AND DISCUSSION

The results of the test instrument trial to measure students' critical thinking skills are four valid descriptive questions out of 5 descriptive questions that were tested. Then, for the reliability test results of 0.82, it can be concluded that the instrument used is reliable. Furthermore, only 1 question is categorized as easy at the difficulty level. Then, in the discrimination power test, there are two questions categorized as very good, as many as two are categorized as good, and no questions are categorized as bad. Furthermore, prerequisite tests and ability analyses are conducted for students with critical thinking skills. The results of the recapitulation of the test results show that students' critical thinking skills are first converted into percentages before data analysis is carried out. Next, a difference test was conducted to compare class experiments and control. *Pretest* and *posttest* data on the critical thinking ability of students in class experiments and class control can seen in Table 3 and Table 4.

Table 3. Class *Pretest Results* Experiments and Classes Control

Class	Amount	Mean	Maximum Value	Minimum Value
Experiment	673	27.09	49	0
Control	368	12.07	31	0

Based on the results analysis of test data in Table 4, the Use of *Search, Solve, Create, Share* (SSCS) model class experiment's *posttest* mean score of 84.97 and the average ability To think critically in class control of 29.90. So, that can concluded that the average result is the average ability breakdown problems in class experiments more big than class control.

Table 4. Class *Posttest Results* Experiments and Classes Control

Class	Amount	Mean	Maximum Value	Minimum Value
Experiment	3142	84.97	96	45
Control	983	29,90	87	0

The differences in critical thinking skills between the experimental and control classes were analyzed using the t-test. The results of *the independent sample t-test* calculation for both groups, which were reviewed based on the differences in students' critical thinking skills, can be seen in Table 5 below.

Table 5. Results of the t-test (*Independent Sample T-test*)

Critical Thinking Skills	t-test		
	T	Df	Sig
Equal Variances Assumed	12.80 1	14 3	0,000
Equal Variances Not Assumed	12.80 1	49,095	0,000

Based on Table 5, a significance value of 0.000 was obtained, where this result is < 0.05. The significance level is not enough from 0.05 things. This means that H_o is rejected and H_a is accepted. There are different critical thinking skills for students who use the *Search, Solve, Create, Share* (SSCS) model compared to those who don't. This indicates that implementing the Search, Solve, Create, Share (SSCS) model increases students' critical thinking skills based on their scores before and after implementing the SSCS model.

Model *Search, Solve, Create, Share* (SSCS) is a learning model in which students will be facilitated to find a problem, conduct an investigation, and solve the problem. The SSCS model involves students summarizing the answers they get from their experience of solving problems that require higher thinking (Syafri et al., 2020). Researchers apply all the Search, Solve, Create, Share (SSCS) model steps in the learning process. The first step is to *search*. At this meeting, the educator asks students to find information relevant to the learning material. The second step is *Solve*, where the educator directs students to be able to solve an existing problem, such as making a temporary answer to a problem found. Then, students were asked to collect relevant information about solving the problem. The third step is *Create*, where students are asked to formulate or create solutions for existing problems in groups. Students can obtain relevant information to answer the previous hypothesis through mind mapping. In the last step, namely Share, the educator facilitates and directs students to be able to present the results of their discussions in front of the class.

Meanwhile, gain test analysis is used to see the magnitude of the increase in each class, both experimental and control. The results of the Gain test analysis are shown in Table 6.

Table 6. Class N-Gain Test Experiments and Classes Control

Class	Average *N-Gain Score*	Category
Class Experiment	0.83	Tall
Class Control	0.27	Low

Based on the N-Gain test calculation in Table 6, it is known that the improved ability to

think critically about problems *Search, Solve, Create, Share* (SSCS) model in groups experiment is at a value of 0.83. Based on criteria N-Gain Score test results, the improvement ability breakdown problems in the class experiment are high (g > 0.8). In contrast, the ability breakdown problem uses a conventional method in group control at a value of 0.27. Based on criteria N-Gain Score test results, improvement ability breakdown problems in class control is in the low category (g < 0.4).

Based on the Gain test, it is known that the average gain for the experimental class is at a value of 0.83, with the criteria for obtaining the N-Gain Score test in the high category (g> 0.8). Meanwhile, the problem-solving ability using conventional methods in the control group is at 0.27, and the N-Gain Score test is in the low category (g <0.4). This value can be said that the average gain test of the experimental and control classes has a difference. In the experimental class, the average is greater than the control class. The results of this study are in line with the research of Hanifa, Setiono, & Nuranti (2021), which states that the SSI model that displays social problems affects students' problem-solving skills (Azizah et al., 2022)

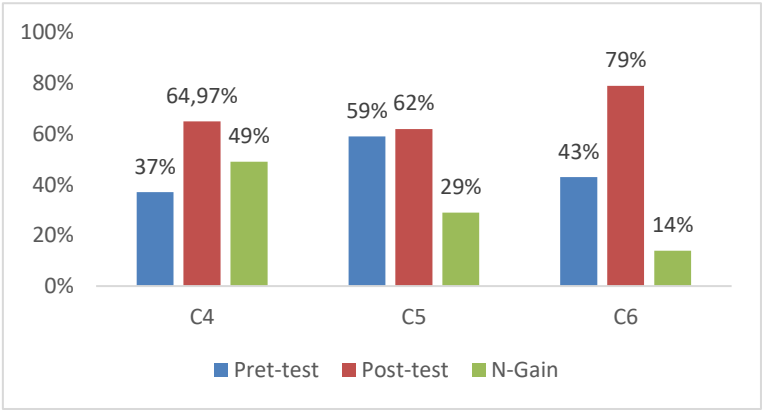

Figure 1. Graph of Students' Critical Thinking Abilities for each indicator in the Experimental Class

For the first indicator, namely analyzing (C4), in the experimental class listed in Figure 1, the pretest score was 37%, which was categorized as lacking, and the posttest score was 64.97%, which was categorized as high, so it can be concluded that the *pretest score* in the experimental class on the analyzing indicator (C4) was higher. There was an increase after the SSCS learning method was applied compared to the pretest score. Then, in the second indicator, evaluating (C5), in Figure 2, the posttest score was 62% in the high category. At the same time, the pretest score was 59%, which was categorized as low, so it can be concluded that for the second indicator, namely evaluating (C5), there was an increase after the SSCS method was applied. Furthermore, in the third indicator, namely creating (C6), for the experimental class listed in Figure 3, the pretest score was 43% in the low category, and the posttest score was 79% in the high category for the experimental class listed in Figure 2, it was obtained in this case that the SSCS learning model had been implemented in the experimental class. During the learning process, students in the experimental class are facilitated by educators to analyze the problems in the LKPD.

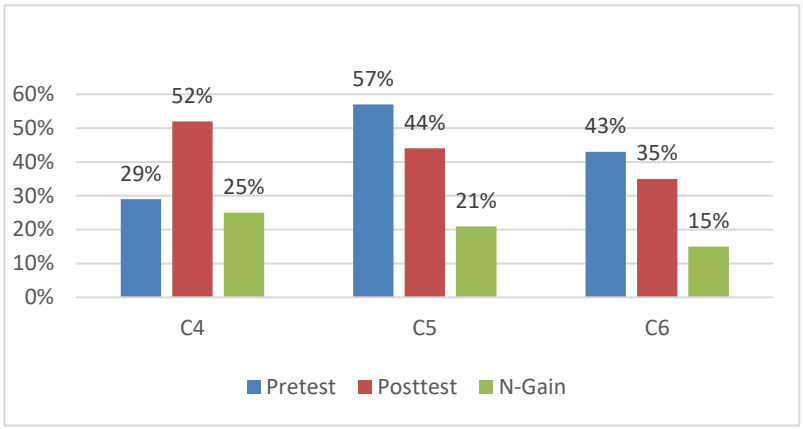

Figure 2. Graph of Students' Critical Thinking Ability for each indicator in the Control Class

Meanwhile, in the control class based on Figure 1, the first indicator, namely analyzing (C4), obtained a pretest score of 29%, which is categorized as low. In comparison, the posttest score obtained was 52%, which is categorized as sufficient. The posttest score on the evaluating indicator (C5) was 44% with a sufficient category, and the pretest score was 57% with a moderate category. In this indicator, the pretest score was higher than the posttest score. Furthermore, in the third indicator, creating (C6), the pretest score was 43% with a low category, and the posttest score was 35% with a low category. During the learning process, there was no implementation of the SSCS learning model where educators facilitated students in the experimental class to evaluate the problems contained in the LKPD that educators had given. In the control class, they were only given learning with the lecture method.

Based on Figure 1 and Figure 2, it can be concluded that the posttest score on the first indicator, namely analyzing (C4), evaluating indicator (C5), and creating indicator (C6) in the experimental class is higher than the control class, where in this case the experimental class applies the *Search, Solve, Create, Share* (SSCS) model. During learning, students in the experimental class are facilitated by educators to create or create alternative problem-solving solutions to the problems contained in the LKPD that the educator has given. According to Erlistiani *et al.* (2020) who stated that students are trained to be able to carry out critical thinking processes in the learning process because the *Search, Solve, Create, Share* (SSCS) model has steps that later students will be given a problem, then students are allowed to collect information to solve the problem. Students will have group discussions related to the problem, the results of which will be presented in front of the class.

Based on Table 3, it can be seen that the results obtained are sig 0.000 < 0.05, so it can be concluded that the implementation of the SSCS learning model affects increasing critical thinking skills of students significantly. This is in line with the study's results by Sanaky & Maghfirah (2023), which found that students' scientific literacy skills increased after implementing the *Search, Solve, Create, Share* (SSCS) model. The results of the study by Hatari et al. (2016) stated that during the learning process, there was an increase in students' critical thinking skills. This was because the Search, Solve, Create, Share (SSCS) model had been implemented in learning. Students will be invited to think critically during the learning process by implementing the SSCS learning model (Susilawati & Rosidah, 2020). Model *Search, Solve,*

Create, Share (SSCS) is a learning model expected to facilitate students' critical thinking skills by collecting relevant information during the learning process to solve a particular problem (Trisnawati et al., 2016).

This SSCS approach requires students to be active in every stage of learning. Students must collect and analyze information in the search stage to practice evaluation and problem-solving skills. The Solve stage encourages them to apply the knowledge they gained in constructing solutions, strengthening their analysis and synthesis skills. In the Create stage, students develop innovative solutions, improving divergent and reflective thinking skills. Finally, the Share stage allows them to convey the results of their thoughts to others, strengthening communication and argumentation skills. Meanwhile, conventional methods tend to be teacher-centred with a lecture approach and practice questions that emphasize memorization rather than exploration and problem-solving, so they are less effective in honing critical thinking skills in depth.

SSCS's more interactive, problem-solving-based approach increases students' curiosity and engagement, motivating them to think critically and find creative solutions. Additionally, the collaborative environment in SSCS allows students to discuss and exchange ideas, which enriches their understanding through social interaction. Increasing self-confidence is also important because students are allowed to explore and convey their thoughts, so they are braver in proposing and defending arguments. The teacher's role as a facilitator in SSCS also helps students be more independent in thinking and making decisions, in contrast to conventional methods that focus more on lectures. In addition, learning in SSCS is often linked to real contexts, which makes students more interested in understanding concepts in depth and applying them in everyday life. Thus, combining interactive learning methods, learning environment support, and higher motivation makes the SSCS model more effective in improving critical thinking skills than conventional methods.

The SSCS model is effective in improving students' critical thinking skills. Several previous studies also found that problem-solving and active learning approaches, as applied in SSCS, could increase students' involvement, understanding of concepts, and analysis and synthesis abilities. Other research also emphasizes that the Search, Solve, Create and Share stages in SSCS provide a deeper learning experience than conventional methods, which generally focus on memorizing and practising questions. The *Search, Solve, Create, Share* (SSCS) model has a role in being able to facilitate critical thinking, creative thinking, and having an independent attitude in students so that this model will improve students' critical thinking skills, which also affect the spirit of thinking possessed by students (Li, TL, 2009). Learning using the *Search, Solve, Create, Share* (SSCS) model can also positively influence students' attitudes in solving a problem, thinking, group work, and communicating (Akinohlu, O. & Tandagon, RO, 2007). According to Perkins and Murphy, it includes clarification, assessment, inference, and strategies (Azzahra et al., 2023). The author found that the SSCS learning model can improve students' critical thinking abilities, especially in solving their problems. Students are more active and can use their reasoning skills to solve problems by applying the SSCS model (Meilindawati et al., 2021).

CONCLUSION

Implementation of the Search, Solve, Create, Share (SSCS) model in learning main Science Objects and Their Observations Applied at SMP Takhassus Al-Qur'an An-Nida, Selomerto can increase the critical thinking ability of participant educate with very good category. There is a difference in ability breakdown problems in class experiment class control, as shown from the significance level results, which show insufficient from 0.05 things. This means that Ho is rejected, and Ha is accepted. There is an improvement in the critical thinking ability of participant-educated students of 0.83 with category high. The impact of learning using stages of critical thinking is that students have the critical thinking ability to solve the problems faced, so learning to use critical thinking can be applied. The suggestions based on the results of this study are as follows: 1) Educators should be able to implement the SSCS learning model to improve students' HOTS, and 2) Students should make efforts in the learning process to improve their critical thinking ability.

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