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Development of a Learning Module Based on Search, Solve, Create, and Share (SSCS) to Improve Students' Critical Thinking Skills

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Abstract: This study is a Research and Development (R&D) project employing the 4D model to develop an SSCS-based learning module. The primary focus of this research is to create a learning tool that is valid, practical, and effective in enhancing the critical thinking skills of tenth-grade students at SMAN 9 Gowa for the 2025/2026 academic year. Based on the validation results from three experts analyzed using the Aiken's V formulation, the module was declared valid, with average scores of 0.71 for content feasibility, 0.89 for presentation, and 0.85 for language. Furthermore, the module demonstrated a high level of practicality based on teacher assessments, covering instructions 0.71, component coverage 0.73, and language 0.89. In terms of effectiveness, the N-Gain test results showed an improvement in critical thinking skills with a score of 0.59, placing the module in the effective category. Consequently, it can be concluded that the developed SSCS-based learning module meets all feasibility criteria and has proven successful in improving the quality of learning at the school.

Keywords: Critical Thinking Skills; Learning Module; Search solve create and share (SSCS)

Introduction

The 21st century is characterized by technological advancements and rapid developments across various fields. The learning paradigm has also shifted, requiring students to be equipped with skills and competencies relevant to the modern world (Hanipah et al., 2023). In this era of globalization and rapid information technology growth, instructional methods and media must adapt to meet dynamic and complex learning needs. One of the current challenges in education is how to create learning experiences that are effective, interactive, and motivate students to learn both independently and collaboratively (Nastiti et al., 2018).

In facing the complexity of global problems and rapid technological advances, students are not enough to just memorize facts, but must be able to solve problems, make the right decisions, and filter information objectively. Critical thinking skills are very important for students to have because there is a mental activity process in receiving, processing, analyzing, synthesizing, and evaluating the information obtained by students to make decisions or actions in solving problems (Falah et al., 2018). Critical thinking equips students with the ability to become lifelong learners who are independent, adaptive, and ready to face challenges in the world of work and everyday life (Trilling & Fadel, 2009).

Physics learning should ideally encourage students to think critically through various active activities (Armandita et al., 2023). Physics learning should provide opportunities for students to actively participate in the learning process, through group discussions, experiments, and practical work (Kinasih et al., 2018). This process requires the ability to classify and compare relevant criteria, as well as high-level skills in interpreting, synthesizing, and hypothesizing information. Finally, these skills include the agility to

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sort through diverse data to produce objective and valid conclusions (Arafah et al., 2021).

Each student has a different learning style, so teachers must have varied learning abilities according to student characteristics, so that students do not get bored in learning and so that learning objectives are achieved (Cynthia et al., 2023). Educators need several supporting variables to create an interesting and challenging learning atmosphere. A supportive learning environment, methods, strategies, appropriate approaches, and support for facilities and infrastructure are supporting factors for the success of the learning process. Through interesting learning, students will have more motivation in learning. Conditions like this in physics learning can be an ideal forum for developing students' creative thinking skills (Akhiruddin et al., 2019).

Instruction must provide opportunities for students to participate actively in the learning process through group discussions, experiments, and laboratory work (Kinasih, 2018). Furthermore, contextual physics problem-solving—which allows students to relate physics concepts to real-world situations—can also stimulate critical thinking. Educators require several supporting variables to create an engaging and challenging learning atmosphere. A supportive learning environment—along with appropriate methods, strategies, and approaches, as well as adequate infrastructure and facilities—are key factors in the success of the instructional process. Through engaging learning experiences, students will develop greater motivation. In physics education, such conditions can serve as an ideal platform for developing students' critical thinking abilities (Akhiruddin, 2019).

Currently, the teaching materials used at SMAN 9 Gowa generally follow the independent curriculum and refer to government-designated textbooks. These textbooks provide students with a strong foundation of knowledge. However, students at SMAN 9 Gowa still ignore the importance of learning, and a lack of enthusiasm and independence in learning hinders their learning. Therefore, a physics teaching material is needed that can address this issue. It is hoped that such teaching materials will encourage students to learn independently, thus reducing the burden on lecturers.

Teaching materials are a set of systematically arranged materials, both written and unwritten. Teaching materials are crucial in the teaching and learning process to achieve learning objectives. Quality teaching materials will help realize quality and efficient learning (Bahri et al., 2017). As a complete learning unit, a module integrates a series of planned learning experiences—from information delivery, activities, to assessment—designed to enable students to master certain competencies independently (Muhajir & Arafah, 2021). Kamaruddin et al. (2023) stated that SSCS learning has a significant impact on students' cognitive abilities. The results of research conducted Diani et al. (2019) showed that the SSCS learning model was effective in improving students' creative problem-solving abilities, with a high category. Based on the results of statistical analysis, the SSCS learning model with scaffolding was effective in improving students' critical thinking (Saregar et al., 2018).

According to (Lukitasari & Winarti, 2016), the SSCS learning model is a learning model that uses a problem-solving approach and is designed to develop and apply scientific concepts and critical thinking skills. Wulan & Antika (2021) stated that SSCS-based modules can train critical thinking skills. Through the use of appropriate teaching materials, students will be able to develop critical thinking skills. According to Putra et al. (2022), the SSCS model is a learning model that provides freedom and flexibility for students to develop creativity and thinking skills in order to gain scientific understanding by conducting investigations and finding solutions to existing problems. Several studies have shown the positive implications of learning with the SSCS model in improving critical thinking skills (Arisa et al., 2021).

The SSCS model is a problem-solving learning model with four stages: search, solve, create, and share (Lartson, 2013). According to Yasin et al. (2020), the SSCS learning model requires student involvement in each phase. The search stage is to explore information, followed by a solution. Students understand the problem or condition given to them, including what is known, what is unknown, and what is being asked (Khoirifah et al., 2013). Solve is to solve the problem, then create to produce work or solutions, and finally share to disseminate the knowledge gained (Septiani, 2021). Students are involved in the process of concluding answers to problems, and at the sharing stage, students are required to present their responses interactively to the audience (Zulkarnain et al., 2021). In the sharing phase, the required skill is for students to be able to articulate the identified concepts themselves (Nastiti et al., 2019).

Rahmatika & Alimah (2014) stated that teaching based on the Search, Solve, Create, and Share model improves students' reasoning skills. Developing a Search, Solve, Create, and Share (SSCS)-based learning module can be an effective tool for training and developing these skills (Maulatin et al., 2025). This model provides students with the opportunity to comprehensively represent problems in physics (Prayogo et al., 2023).

The development of a learning module based on the Search, Solve, Create, and Share (SSCS) model for kinematics at SMAN 9 Gowa not only aims to improve students' understanding of physics concepts but also to develop students' critical thinking skills. It is hoped that the results of this study can make a real contribution to improving the quality of education at the school and inspire other educational institutions to adopt technology to improve learning effectiveness. With an orientation towards active learning, the SSCS model is expected to create meaningful learning experiences and produce satisfactory achievement (Dianti, 2017).

Therefore, this research aims to develop a learning module based on the Search, Solve, Create, and Share (SSCS) model to enhance students' critical thinking skills at SMAN 9 Gowa. The development of this module is expected to serve as an innovative solution to increase the effectiveness of physics instruction at the school, while contributing positively to the improvement of conceptual understanding and student engagement in the learning process.

Method

Type of Research

This study is a Research and Development (R&D) project utilizing the Four-D (4-D) Model, which consists of four stages Define, Design, Develop, and Disseminate.

Define

This stage describes the results of the assessment in the form of an objective analysis of the kinematics material boundaries developed to establish and define learning requirements. This stage consists of five steps: front-end analysis, learner analysis, concept analysis, task analysis, and the formulation of learning objectives.

The front-end analysis aims to identify in depth the problems and needs underlying the module's development, as well as to analyze its alignment with the current curriculum. This analysis is conducted to understand the significant gap between the ideal conditions—where students possess high-level critical thinking skills and a profound understanding of kinematics—and the actual conditions at SMAN 9 Gowa, where students remain passive, lack initiative, and face difficulties in critical thinking regarding kinematics materials.

Understanding student characteristics is essential for designing modules that are relevant, engaging, and effective according to their needs and potential. Based on interviews, the majority of students at SMAN 9 Gowa tend to have visual (learning through images, graphs, videos) and kinesthetic (learning through physical activities, experiments, simulations) learning styles. This indicates a need for modules rich in visualizations, interactive simulations, and practical activities or projects. While students have studied basic concepts of motion at the junior high school level—including distance, displacement, velocity, and simple acceleration—their deep understanding of vector concepts, two-dimensional motion analysis, and more complex applications of motion remains limited. Furthermore, they frequently hold common misconceptions, such as assuming velocity and speed are identical or struggling to distinguish between distance and displacement, which must be addressed in the module.

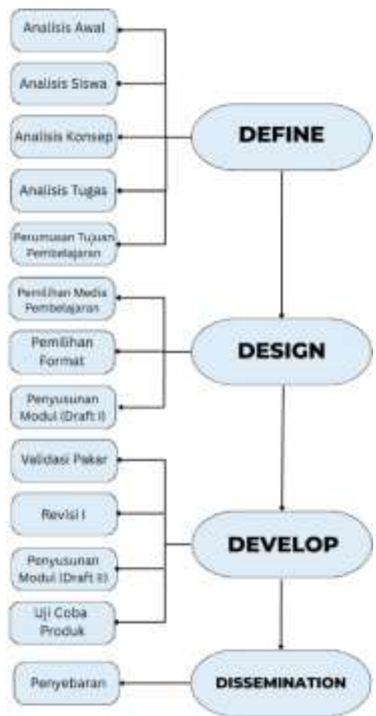

Figure 1. Stages of the 4D model development

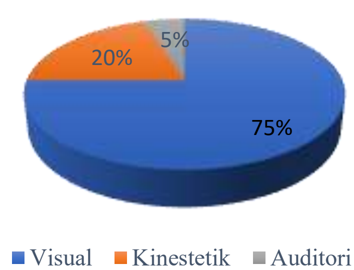

Figure 2. Learning Styles of Grade X Students at SMAN 9 Gowa

Based on the results of the learning style assessment, 75% of the students possess a visual learning style, 20% are kinesthetic, and 5% are auditory. Furthermore, students perceive kinematics as a difficult subject to understand due to an excessive focus on formulas and a lack of clear connections to real-life phenomena or everyday life. Therefore, teacher-designed learning requires more interactive, challenging, and contextual learning methods. The SSCS model can address these challenges by placing students at the center of learning through real-world problems. Modules should be rich in visualizations, simulations, and experimental activities. Analyze the kinematics material in detail to identify key concepts, necessary prerequisites, and potential difficulties students may encounter. This helps in structuring the material sequence and teaching strategies.

Task analysis is conducted to detail the series of activities and specific competencies that students must master in order to achieve kinematics learning objectives and improve critical thinking skills. Hierarchically, this analysis maps tasks starting from the basic level, namely understanding physical quantities in straight motion (position, velocity, and acceleration), increasing to the analysis of the relationship between wheels in circular motion, up to the complex task of decomposing vectors in parabolic motion. These tasks are arranged systematically so that students are not only memorizing formulas, but are able to understand the logical relationships between these motion concepts.

Design

The design stage is the planning phase for the SSCS-based learning module to be developed. This stage involves designing the product according to the identified requirements. It is a critical phase in the research because the structure of the SSCS-based learning module is established here. The product design in this stage is inherently linked to the previous definition stage. The activities in this phase include:

Media Selection

The selection of learning media aims to identify the specific tools to be utilized in the research. The media used in this study consists of a learning module structured by integrating the Search, Solve, Create, and Share (SSCS) model. The primary objective is to facilitate a better understanding of the physics material among students.

Format Selection

The design of the physics teaching material format includes selecting appropriate fonts, attractive color combinations, and line spacing to enhance readability. It also involves determining the paper format and utilizing specific markers or icons to highlight key information and clarify the content. Furthermore, the instructional material is organized systematically, ensuring a proportional layout between titles, subchapters, and the core content of the module.

Construction of the Learning Module Based on the SSCS Model

The primary step in the design stage before the learning module is developed involves preparing the necessary components. Essential instructional elements such as the layout design, images, content materials, assessment questions, frames, and other supporting features—must be prepared prior to the development phase.

(a) (b) (c) (d)

Figure 3. Initial Design (Prototype I): (a) Learning Module Cover; (b) Content; (c) Worked Examples; (d) Evaluation Questions

Development

This stage aims to produce a revised learning module based on expert feedback and data obtained from field trials. The results of expert validation serve as a primary criterion for determining whether the developed learning module is suitable for use. The experts' assessments consist of specific notes and suggestions on the necessary sections of the module.

The initial design of the learning module (Prototype I) is validated by experts, and the validation results are used as a basis for revising the module to produce Prototype II. This version is then field-tested in the classroom. The data obtained from these trials are analyzed, and the results serve as a reference for refining Prototype II into the final learning module, which will subsequently be distributed during the dissemination stage.

In the implementation stage, the application of the learning module begins with a small-scale trial. This trial aims to obtain initial feedback regarding student understanding, identify potential obstacles, and plan necessary improvements. The primary focus is the direct observation of student interactions and their responses to the module. The research design employed for this trial is the one-group pretest-posttest design. The pretest (O_1) is administered before the treatment, and the posttest (O_2). The research design can be represented by the following design.

$$O_1 \quad X \quad O_2$$

Key:

X = The treatment provided involves the implementation of a learning module based on the Search, Solve, Create, and Share (SSCS) model during the instructional process.

O_1 = The critical thinking pretest scores of students before the implementation of the Search, Solve, Create, and Share (SSCS) based learning module.

O_2 = Critical thinking posttest scores after the implementation of the Search, Solve, Create, and Share (SSCS) based learning module (Fraenkel & Wallen, 2009)

Dissiminate

The dissemination stage is conducted to promote, provide training for, and support the implementation of the learning module based on the Search, Solve, Create, and Share (SSCS) model at SMAN 9 Gowa, specifically for Grade X students. Furthermore, this stage aims to share information concerning learning experiences and outcomes with a broader audience.

Validity Analysis

Validity Analysis of the Learning Module

The calculation is performed by converting the assigned scores into an assessment index

Table 1. Validator Assessment Criteria

Criteria	Score
Very Poor	1
Poor	2
Good	3
Very Good	4

The Aiken's V calculation is intended to measure the validity ratio based on the consensus of the validators. The formula used is as follows:

$$V = \sum \frac{S}{[n(c-1)]} \quad (1)$$

Key:

S : r-lo

r : Score given by the validator

lo : The lowest possible score

n : The number of validators

c : The highest possible score

The criteria for Aiken's test state that if V ≥ 0.4, the expert consensus index is considered valid.

The validator's assessment is analyzed through the feasibility percentage using the Formula 2.

$$P = \frac{f}{n} \times 100\% \quad (2)$$

Key:

P : Feasibility percentage

f : Total score obtained for the assessment aspec

n : Maximum possible score for the assessment aspect

The results of the media feasibility percentage used to measure media validity can be categorized into the assessment criteria shown in the following table:

Table 2. Assessment Criteria for Media Feasibility Percentage Ranges

Score Range	Criteria
$81.25\% < skor \leq 100\%$	Very Good
$62.50\% < skor \leq 81.25\%$	Good
$43.75\% < skor \leq 62.50\%$	Fair
$25.00\% < skor \leq 43.75\%$	Poor

Source: (Sudijono, 2011)

Table 3. Interpretation Criteria for Questionnaire Scores

Percentage (%)	Category	Decision
80-100	Very Practical	The new product is feasible and ready to be utilized in the field for learning activities.
60-79	Practical	The product can proceed by adding missing elements based on specific considerations; the additions required are not extensive or fundamental.
50-59	Less Practical	Revision is required by carefully re-examining and identifying the product's weaknesses for improvement.
<50	Not Practical	Not feasible for use; requires major and fundamental revisions regarding the product content.

Source: (Mardikaningtyas et al., 2016)

Analysis of Development Trial Data

The data analysis from the development trial consists of the results from teacher response questionnaires regarding the learning module. By accumulating the teacher's responses, a percentage for each feedback item is obtained. The criteria used to categorize the accumulated teacher responses refer to the Table 3.

Analysis of Learning Module Effectiveness

To determine the improvement in students' critical thinking skills, an analysis is conducted using pre-test and post-test data through gain and N-gain scores. The N-gain (normalized gain) is used to measure the enhancement of critical thinking skills before and after the learning process. The formula used to calculate N-gain is as follows:

$$Normalized\ Gain\ (G) = \frac{X_{posttest} - X_{pretest}}{X_{max} - X_{pretest}} \quad (3)$$

Key:

g : Normalized gain score
$X_{pretest}$: Pre-test score (initial test)
$X_{posttest}$: Post-test score (final test)
X_{max} : Maximum possible score

The interpretation criteria for the gain index can be seen in the following table:

Table 4. Interpretation of Normalized Gain

Normalized Gain Value	Interpretation
0.70 < G ≤ 1.00	High
0.30 < G ≤ 0.70	Medium
0.00 < G ≤ 0.30	Low
G = 0.00	No Improvement
-1.00 ≤ G < 0.00	Decrease

Source: (Sundayana, 2014)

The effectiveness of the Search, Solve, Create, and Share (SSCS)-based learning module is categorized based on the interpretation of the N-gain score effectiveness, which is then converted into a percentage (%) as shown in the following table:

Table 5. Effectiveness Categories

Interval (%)	Category
G ≤ 55	Ineffective
G ≥ 56	Effective

Result and Discussion

Validation Results of the SSCS-Based Learning Module (Search, Solve, Create, and Share)

The validity aspects evaluated by the three experts include content feasibility, presentation feasibility, and language feasibility. The results of the expert consensus index analysis using Aiken's V coefficient are presented in Table 6.

Table 6. Validity Analysis of the SSCS-Based Learning Module

Aspect	Total Validity Item Score	V	Category
Content Feasibility	14.11	0.71	Valid
Presentation Feasibility	6.22	0.89	Valid
Language Feasibility	11	0.85	Valid

Based on Table 6, the data shows that the content feasibility aspect obtained a total validity item score of 14.11, with a validity index (V) and a mean score of 0.71, placing it in the valid category. The presentation feasibility aspect achieved a total validity item score of 6.22, with a validity index (V) and a mean score of 0.89, also categorized as valid. For the language feasibility aspect, the total validity item score was 11, with a validity index (V) and a mean score of 0.846, which falls into the valid category.

The SSCS-based learning module is declared valid, meaning that the overall content and components of the module are consistent with one another. These components include the alignment of the presented content with the learning objectives and the current curriculum, the integration of material with everyday life problems, and the use of easily understandable language. The results of the validity analysis for the developed SSCS-based learning module conclude that the module is feasible and valid.

Validation Results of the Practitioner Assessment Questionnaire Instrument

The data from the expert validation of the practitioner assessment questionnaire, which consists of several statement items, were analyzed using Aiken's V expert consensus index. Based on the results of the Aiken's V analysis, the data are presented in Table 7.

Table 7. Feasibility Percentage of the SSCS-Based Learning Module

Aspect	V	Category
Instructions	0.71	Valid
Questionnaire Component Coverage	0.73	Valid
Language	0.89	Valid

Based on the validity analysis of the practitioner assessment questionnaire using Aiken's V index, the results for the instructions aspect yielded a validity index (V) and a mean score of 0.62, placing it in the valid category. The questionnaire component coverage aspect obtained a validity index (V) and a mean score of 0.69, which is also categorized as valid. For the language aspect, the validity index (V) and mean score were 1.481, falling into the valid category. The percentage analysis results for each aspect are presented in Table 8.

Table 8. Feasibility Percentage of the Teacher Response Questionnaire

Aspect	Ideal Score	Total Obtained Score	Percentage (%)
Instructions	60	47	78
Questionnaire Component Coverage	60	48	80
Language	60	55	92

Table 8 above shows that the instructions feasibility aspect obtained a total score of 53 with a feasibility percentage of 88%. For the questionnaire component coverage aspect, a total score of 53 was obtained with a percentage of 88%. Meanwhile, the language aspect achieved a total score of 55 with a percentage of 92%. The expert validation data for the teacher assessment questionnaire, consisting of 25 statement items, were further analyzed using Aiken's V expert consensus index. The analysis results for the teacher assessment questionnaire instrument yielded an expert consensus index of 0.88, which falls into the valid category. Based on these results, the teacher/practitioner assessment questionnaire for Google Sites-based physics teaching materials is declared feasible for field use without revision.

Expert evaluations of the practitioner assessment questionnaire reached the same conclusion: it is feasible and ready for use without revision. Therefore, the practitioner assessment questionnaire sheet can be utilized in the field to measure practitioner evaluations of the developed SSCS-based learning module.

Validation Results of the Critical Thinking Skills Test Instrument

The number of test items validated by the three experts consisted of 30 multiple-choice questions on the subject of kinematics. Based on the analysis results, the Aiken's V index for the critical thinking skills test items achieved an average score of 0.722, placing it in the valid category. The results of the expert validation for the critical thinking skills test instrument are declared valid and feasible for use in Class X at SMAN 9 Gowa with revisions.

Teacher Responses to the SSCS-Based Learning Module

Teacher responses to the SSCS-based learning module were obtained through a practitioner assessment questionnaire. This questionnaire was completed by three physics teachers at SMAN 9 Gowa. The scores obtained from the three teachers' assessments of the learning module are grouped by aspect in Table 9.

Table 9. Percentage Results of Teacher Response Analysis Toward the SSCS-Based Learning Module

Aspect	Ideal Score	Total Obtained Score	Percentage (%)
Content Feasibility	60	53	88
Presentation Feasibility	60	53	88
Language Feasibility	60	55	92

Based on the practitioner assessment analysis in Table 9, the teachers provided highly positive responses to all three assessment aspects of the developed SSCS-based learning module. Across all categories, the highest percentage was achieved in the language feasibility aspect at 92%, while the instructions and questionnaire component coverage aspects both yielded the same score of 88%.

Based on the results of the practitioner assessment analysis, it is concluded that, on average, practitioners gave a positive evaluation of the developed SSCS-based physics learning module. The results of this study are further supported by direct feedback from the practitioners during the assessment process.

Table 10. Results of Student Critical Thinking Skills Test Analysis

Parameter	Pre-test	Post-test
Number of Respondents	31	31
Maximum Ideal Score	30	30
Minimum Ideal Score	0	0
Maximum Empirical Score	12	26
Minimum Empirical Score	5	19
Average Score (Mean)	9.35	21.45
Number of Classes	6	6

Effectiveness of the SSCS-Based Learning Module

The effectiveness of the SSCS-based learning module is measured using a critical thinking skills test instrument administered to tenth-grade students at SMAN 9 Gowa. The critical thinking skills test was given to students before (pre-test) and after (post-test) the implementation of the SSCS-based learning module. Each test consists of 30 items divided into five indicators of critical thinking skills: providing elementary clarification, building basic skills, drawing conclusions, advanced clarification, and strategies and tactics. The results of the student critical thinking skills analysis prior to the implementation of the SSCS-based learning module can be seen in Table 10.

Furthermore, an analysis of students' critical thinking skills was conducted using the pre-test and post-test data. The results of the critical thinking skills test analysis, performed before and after the implementation of the developed SSCS-based learning module, can be seen in Table 11, the diagram representing the results of the pre-test and post-test can be observed in Figure 4.

Table 11. Pre-test and Post-test Score Percentages of Critical Thinking Skills for Tenth-Grade Students at SMAN 9 Gowa

Criteria Interval	Category	Pretest		Postest	
		Frequency	Percentage (%)	Frequency	Percentage (%)
25 < X ≤ 30	Very High	0	0	2	6
17 < X ≤ 24	High	0	0	29	94
13 < X ≤ 18	Medium	0	0	0	0
7 < X ≤ 12	Low	30	97	0	0
0 < X ≤ 6	Very Low	1	3	0	6
Total		31	100	31	100

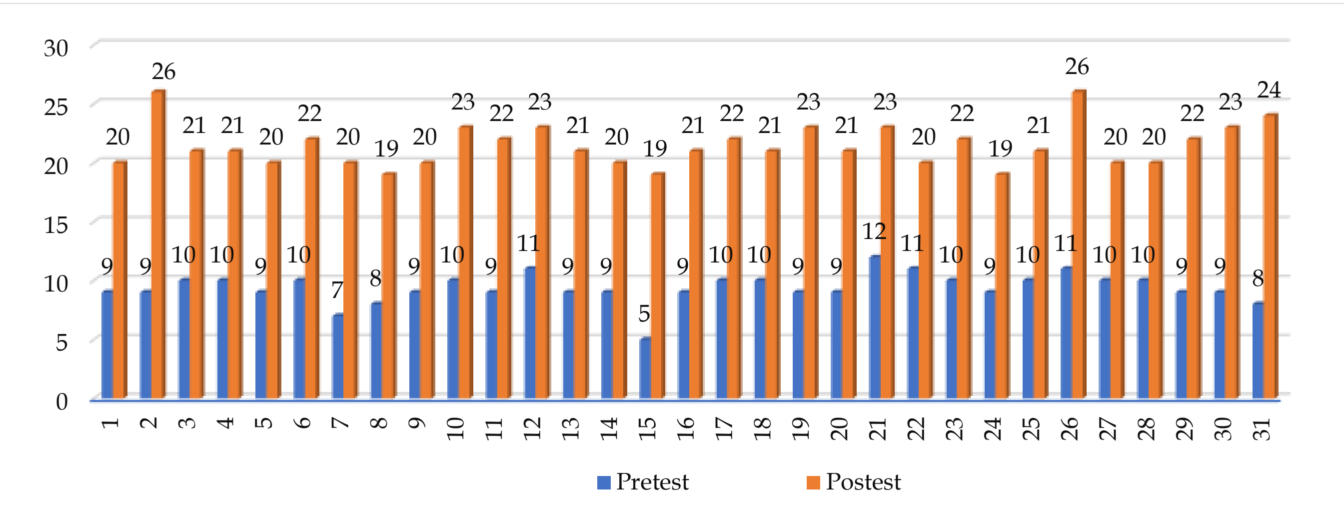

Figure 4. Pre-test and Post-test Scores of Students' Critical Thinking Skills

Table 12. N-Gain Scores of Critical Thinking Skills for Tenth-Grade Students at SMAN 9 Gowa

Criteria Interval	Category	Frequency	Percentage (%)
0.70 < G ≤ 1.00	High	3	10
0.30 < G ≤ 0.70	Medium	28	90
0.00 < G ≤ 0.30	Low	0	0
G = 0,00	No Improvement	0	0
'-1.00 < G ≤ 0.00	Decrease	2	6
Total		31	100

Based on Figure 4, it can be observed that there is an improvement in critical thinking skills following the implementation of the SSCS-based learning module. Overall, the average N-Gain percentage for the pre-test and post-test of students' critical thinking skills at SMAN 9 Gowa is 59%, which falls into the effective category. Furthermore, to determine the effectiveness of the SSCS-based learning module, an analysis of the improvement in students' critical thinking skills was conducted using the N-Gain equation. The results of the N-Gain analysis are presented in Table 12.

After analyzing the students' overall critical thinking skills, a further analysis was conducted for each specific indicator of critical thinking. The results of this analysis are presented in Table 13.

Based on Table 13, it can be observed that for the 'providing elementary clarification' indicator, students achieved a pre-test mean score of 1.83 and a post-test mean score of 4.17. For the 'building basic skills' indicator, the pre-test mean score was 1.08, while the post-test mean score reached 3.83. The 'drawing conclusions' indicator showed a pre-test mean score of 1.58 and a post-test mean score of 3.83. For 'making advanced clarification,' the pre-test mean score was 2.11 and the post-test mean score was 4.00. Meanwhile, the 'strategies and tactics' indicator yielded a pre-test mean score of 1.44 and a post-test mean score of 3.39.

Table 13. Results of Analysis for Each Critical Thinking Skill Indicator

Indicator	Pre-test Mean Score	Post-test Mean Score	Improvement Percentage (%)
Providing Elementary Clarification	1.83	4.17	23.3
Building Basic Skills	1.08	3.83	27.5
Drawing Conclusions	1.58	3.83	22.5
Making Advanced Clarification	2.11	4.00	18.9
Strategies and Tactics	1.44	3.39	19.4

Regarding the analysis of the improvement in students' critical thinking skills, 2 students showed improvement in the 'very high' category, while 29 students improved in the 'high' category. This is consistent with research by Halik et al. (2019) which states that learning modules can enhance students' critical thinking abilities. Erlistiani et al. (2020) suggest that students taught using the SSCS model are more active in discussions and exchanging opinions, which trains their critical thinking skills. Hatari et al. (2016) further add that the application of the SSCS model is effective in improving these skills and receives very positive responses from students, as it provides opportunities for students to explore their thoughts independently (Mulyono & Lestari, 2016).

Previous research by (Putra et al., 2022) showed that SSCS-based e-modules to train students' creative thinking skills in high school, based on student responses were very good, so according to students, this SSCS-based e-module can be an alternative in helping train students' creative thinking skills in physics learning. Then the results of research conducted by Pratiwi et al. (2017) stated that SSCS-based modules are effective in improving analytical thinking skills. Milama et al. (2017) also stated that there is a significant influence of the search, solve, create, and share (SSCS) learning model on students' critical thinking skills. Therefore, the SSCS model is needed to stimulate students' critical thinking skills (Saroji et al., 2023). Based on the results of research by Ulya et al. (2023) science learning tools with the SSCS model integrated with Islamic values are effective in improving critical thinking skills.

Conclusion

Based on the results of the research and discussions that have been conducted, it can be concluded that the Search, Solve, Create, and Share (SSCS) based learning module is declared valid with an average Aiken's V score of 0.81. The practicality level of the module is also classified as very high based on teacher assessment, with a percentage of 83%. In terms of effectiveness, the results of the N-Gain test show an increase in critical thinking skills of 0.59 in the moderate category. Based on these results, the Search, Solve, Create, and Share (SSCS) based learning module is generally considered valid, very practical, and effective for use in the physics learning process at SMAN 9 Makassar.

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Author Contributions

E.M: Conceptualization, methodology, original draft preparation, formal analysis, investigation, visualization, writing—review and editing. K.A. & P.P.: Validation, supervision, and resources. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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