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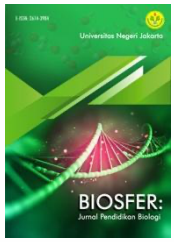

Developing an innovative worksheet to foster critical thinking and scientific literacy on the topic of plant growth and development

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ABSTRACT

This innovative worksheet is designed based on the Search, Solve, Create, and Share (SSCS) model integrated with the Summarizing strategy to foster scientific literacy and critical thinking in students. This research aims to produce a worksheet based on the SSCS learning model integrated with the summarizing strategy that is valid and suitable for use in learning. This research is a developmental research and development (R&D) adapting the 4D model by Thiagarajan, Sammel, and Semmel. The research instruments used were an interview guide, expert validation sheet, teacher and student response sheets, and an integrated test instrument for critical thinking and scientific literacy. Data were analyzed descriptively. The resulting worksheet is suitable for use in learning because it meets the criteria for good preparation, namely didactic, constructive, and technical requirements. This product was declared highly valid with a score of 3.78 by media experts and 3.69 by material experts. Student and teacher responses also indicated that this worksheet product was suitable for use, with scores of 90.00% and 95.75%, respectively. Worksheets based on the integrated summarization strategy and the SSCS model can improve students' critical thinking skills and scientific literacy..

INTRODUCTION

Education is a crucial element in developing the quality of human resources. Aslamiah et all. (2021) argued that education serves to equip people with fostering adaptability and innovation in a modern world. Therefore, the government is striving to accelerate the impact of education through an in-depth learning approach. This in-depth learning approach places students at the center of the learning process. The essence of deep learning in education actually refers to efforts made to encourage students to think critically and actively, and to connect and apply knowledge to real life, thus creating a sustainable learning experience.

Research conducted by Jiang (2022) states that a deep learning approach tends to improve students' understanding, motivate them to participate in learning, and effectively apply knowledge to everyday life. The application of a deep learning approach in the learning process trains students' readiness to face the global world, focusing on developing critical thinking and creativity, problem-solving, and scientific literacy skills. Critical thinking is not an innate ability, but a skill that requires consistent training and development through habituation to be fully acquired by students. According to Kuhn (2019), critical thinking relates to a person's ability to express ideas, arguments, and responses. Bazhouni (2018) and Silva et al. (2025) argued that college students' critical thinking can be cultivated by integrating questioning, effective classroom management, assignments requiring analysis, and facilitating discussions. On the other hand, one of the goals of science learning is to foster scientific literacy in students. According to Dragos and Mih (2015), scientific literacy describes a person's ability to understand laws, theories, phenomena, and various scientific matters. Furthermore, Solahudin et al. (2023) added that scientific literacy is a crucial competency for every individual, yet it remains a challenge for the majority of students worldwide.

Based on the importance of critical thinking and literacy skills in facing the challenges of the 21st century, teachers play a crucial role in initiating the development of these two skills in learning so that students are equipped for the future. Therefore, in learning, it is necessary to create a learning environment that can stimulate the emergence of these abilities. One way to do this is through learning models. One learning model that accommodates the development of critical thinking and scientific literacy is the Search, Solve, Create, and Share (SSCS) learning model. The SSCS learning model involves students through four stages: Search, Solve, Create, and Share (Yusnaeni et al., 2017; Lele & Diyah, 2022). This SSCS learning model is problem-oriented and develops critical thinking skills and understanding of scientific concepts (Meika et al. 2021; Azzahra et al., 2023; Munawaroh et al., 2022), creative thinking (Yusnaeni et al, 2017). In addition, Magfirah (2022) also revealed that the SSCS learning model on scientific literacy skills in biology learning.

The SSCS learning model can be implemented with learning strategies, one of which is the summarizing strategy. Summerzing allows students to engage in deeper literacy before writing or summarizing the main ideas of the material they have read. This allows them to delve deeper into searching and analyzing information during the Search stage. The summarizing strategy allows students to create something in written form while learning and focusing on how to construct meaning in the text. According to Andini (2019), a simple way to summarize is to present the main points of the text without changing its meaning.

The implementation of the SSCS model integrated with the summarizing strategy in learning requires learning aids, namely, student worksheets. Research conducted by Muthoharoh et al. (2017) states that student worksheets are a learning aid that can improve student motivation and learning outcomes. The e-student worksheets are electronic sheets provided to support the learning process (Khastini et all, 2023). The use of innovative student worksheets will engage students in learning activities, encourage structured thinking, encourage problem-solving skills, and also develop imagination to see situations from various perspectives. Surjono (2017) states that student worksheets are a type of teaching material that can be used by teachers and students to make learning activities more effective and efficient. The use of student worksheets also supports student-centered learning so that in discovery activities, students can understand learning concepts directly (Laili et al., 2019; Elviyasmi et al., 2024). The use of student worksheets in learning not only makes it easier for teachers but also makes students more independent in learning, exploring, and completing assignments. Therefore, for more meaningful and in-depth learning, creativity is needed in designing student worksheets.

Observations at high schools in Malaka Regency indicate that the student worksheets used by teachers are generally still downloaded from the internet from other people. These worksheets are not designed to develop students' critical thinking skills or scientific literacy. Furthermore, preliminary studies have shown that students' critical thinking and scientific literacy skills are still low. This was evident when students completed integrated critical thinking and scientific literacy questions. Both of these thinking skills are essential for meaningful learning. They enable students to understand scientific concepts and apply them to solve problems and make informed decisions in everyday life

Scientific literacy enables students to understand the world around them, while critical thinking helps them analyze, evaluate, and synthesize information to develop a deeper understanding. Therefore, it is deemed necessary to develop student worksheets based on an integrated learning strategy, namely, student worksheets based on the SSCS learning model integrated with a summarization strategy. The summarization strategy is integrated into the Search stage of one of the SSCS phases to maximize the information retrieval process through the development of students' literacy skills. This summarization strategy also significantly supports the transition to the next stage of the SSCS model. Student worksheets for an SSCS (Search, Solve, Create, Share) model integrated with summarization have specialized characteristics that guide students through a cyclical process of inquiry, problem-solving, and knowledge consolidation. Key features include guided investigation prompts in the "Search" phase, structured problem-solving activities with clear steps in the next step. It is hoped that the results of this development can be used by biology teachers in classroom instruction and will facilitate students' understanding of biological concepts, as well as empower their critical thinking and scientific literacy.

METHODS

Design of the Study

This research is a developmental study adapted from the 4D model of Thiagarajan, Sammel, and Semmel (1974), which includes the stages of define, design, develop, and disseminate, known as the 4D (Anrkandiatika dkk, 2020). The disseminate stage was modified into a quasi-experimental stage (Corebima, 2009b). This stage was designed based on a quasi-experimental research design. This developmental study produced student worksheets based on the Search, Solve, Create, and Share (SSCS) learning model integrated with summarizing strategies. The ADDIE model design is described in Figure 1.

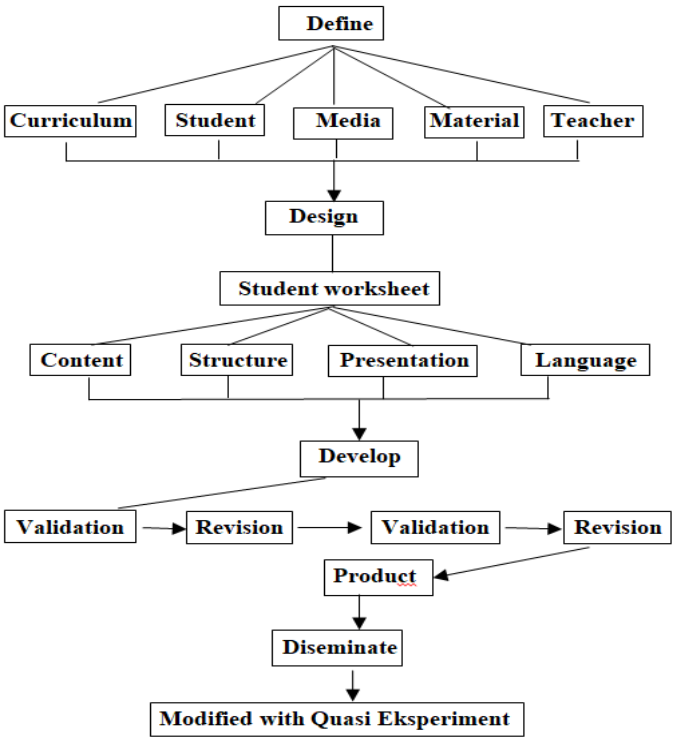


Figure 1. Thiagarajan, Sammel, and Semmel's 4D Development Model

The Define stage is conducted by analyzing the objectives and boundaries of the material being developed. This stage includes front-end analysis, curriculum analysis, student analysis, media and task analysis, and material and teacher analysis. The analysis is linked to the identification of the fundamental problems faced in biology learning, namely literacy and critical thinking skills. These fundamental problems form the basis for developing this student worksheet.

The Design stage is conducted by designing the student worksheet according to the intended problem, namely empowering students' literacy and critical thinking skills. The design refers to several requirements that must be met: didactic requirements, construction requirements, and technical requirements (Yusnaeni et al., 2019). Didactic requirements emphasize the process of discovering concepts, providing a variety of stimuli through various media and student activities, and prioritizing the development of thinking skills, social communication, and aesthetics. Construction requirements are linked to the use of language, sentence structure, vocabulary, difficulty level, and clarity in the worksheet. Meanwhile, technical requirements are related to the writing, images, and presentation of the worksheet, and creativity. The topic covered in this worksheet is plant growth and development. The topic material created in this worksheet is plant growth and development. This topic was developed in three meetings, namely: 1) growth phases, 2) internal factors that influence plant growth and development, and 3) external factors that influence plant growth and development. The Development phase involves developing a prototype based on the established design. Validation and improvements are then made based on validator suggestions and during trials. This phase involves two expert validation activities (two competent material and media experts each) and developmental testing to assess user responses. The Dissemination phase is conducted to test the effectiveness of the developed student worksheet product, validated both by experts and empirically through user response trials. The effectiveness of the resulting student worksheet was measurably tested through a quasi-experimental study using a randomized pretest-posttest control group design.

Population and Sample

This study used a senior high school population in Malaka Regency. The sample size was from Welaus State Senior High School and Fajar Kobalima Senior High School. Three biology teachers and 10 students were selected from Fajar Kobalima Senior High School for teacher responses. The sample size for the dissemination phase, which was declared valid and suitable for use in learning, came from Welaus State Senior High School. Two classes were used for the 12th grade.

Instrument

The research instruments used were: 1) interview guidelines for teachers and students during the needs analysis as a basis for designing student worksheets based on the Search, Solve, Create, and Share (SSCS) learning model integrated with summarizing strategies, 2) validation sheets for media experts and material expert, 3) Teacher and student response questionnaires, and 4) integrated essay test instrument for critical thinking skills, while scientific literacy skills are measured using a 20-item multiple-choice test. The scientific literacy score is 1 if correct and 0 if incorrect. Meanwhile, critical thinking scores were scored from 1 to 4 based on a prepared rubric. The indicators and aspects assessed in the subject matter expert validation sheet can be seen in Table 1. Each aspect is assessed using a Likert scale of 1-4.

Table 1.
Aspects and Indicators of Material Expert Validation Assessment

No.	Aspect	Indicators	Number of items
1.	Content Appropriateness	Relevance, Accuracy, Material Up-to-Date, and Encourages Scientific Literacy and Critical Thinking	17
2.	Presentation Appropriateness	Techniques and Supporting Materials, and Coherence and Sequence of Flow	7
3.	Language Appropriateness	Clear and Communicative, Suitability to Student Development, and Suitability to Language Rules	9

Meanwhile, the indicators and aspects assessed in the media expert validation sheet can be seen in Table 2. Each aspect is assessed using a Likert scale from 1 - 4.

Table 2.
Aspects and Indicators of Media Expert Validation Assessment

No.	Aspect	Indicators	Number of items
1.	Content	Relevance , Conformity, Accommodate student differences, Clarity of steps, Suitability to the learning model, and Encourages Scientific Literacy and Critical Thinking	6
2.	Presentation	Systematically , Complete with instruction, Complete with isntruction, Easy to follow, clear information	4
3	Graphics	Type design, Image/animation design, Layout balance, Attractive and easy to understand	4
4.	Language Appropriateness	Spelling compatibility, Communicative, Suitability to Language Rule, and Sentence clarity	4

The indicators and aspects assessed in teacher and student responses are presented in Table 3. Each aspect is assessed using a Likert scale ranging from 1 to 4.

Table 3.
Aspects and Indicators Assessed in Teacher and Student Responses

No.	Aspect	Indicators	Number of items
1.	Ease of Use	Understanding instructions, completing assignments, Ease of use in the learning environment, Clarity steps, and Steps according to the SSCS Model Integrated Summarizing model	9
2.	Time for Work	According to the allocation of teaching hours and according to the students' abilities	2
3.	Clarity of Instructions and Language	Clear and easy to follow, supplied with examples or illustrations, Information clearly and easily understood, the language simple and easy to understand, the terms is not confusing, and easy to read font	6
4.	Worksheet Display	Appropriate image and color display, layout, attractive and easy-to-understand design, supplemented with appropriate stimuli	4
5.	Relevance of the material	Presented according to objectives and indicators, related to everyday life, easy to understand	3
6.	Didactics	Providing meaningful learning experiences, activity steps that foster science literacy s and critical thinking skills	9

The expert validation sheet and teacher and student response questionnaires were measured using a Likert scale of 1-4, where 1 = poor, 2 = fair, 3 = good, and 4 = excellent..These scores were then converted to percentages and qualitatively analyzed.

Data Analysis Techniques

The data in this study were analyzed using descriptive statistics in the form of percentages and averages. Assessment criteria from expert validation were used to determine whether the developed product was valid or not. The validity criteria in question were: 3.50 – 4.00 (valid, not revised), 3.00 – 3.49 (quite valid, not revised), 2.00 – 2.99 (less valid, partially revised), 1.00 – 1.99 (invalid, totally revised) (Suryani, 2022). Meanwhile, teacher and student responses were used to determine whether the developed worksheet product was feasible or not. The categories used were: not feasible (0% - 20%), less feasible (21% - 40%), quite feasible (41% - 60%), feasible (61% - 80%), and very feasible (81% - 100%) (Windiastuti et al., 2018). Meanwhile, the dissemination stage data in the form of students' critical thinking and scientific literacy scores were determined by comparing the average gain scores of the two classes after being taught using conventional worksheets and worksheets based on the SSCS model integrated with the summarizing strategy.

RESULTS AND DISCUSSION

Define

The results of the development research began with a needs analysis at the define stage. This

needs analysis to obtain information regarding the availability of student worksheets at SMAN Malaka Regency. The study analysis focused on the applicable curriculum, the student worksheet media used, especially the content and thinking processes involved in the worksheets, students' literacy and critical thinking skills, and the capacity of subject teachers to develop worksheets according to curriculum requirements. In essence, teachers' understanding of the independent curriculum is still minimal, including learning tools, especially worksheets required for model-based learning. They tend to use worksheets directly accessed via the internet. The content of the worksheets also still revolves around short-answer questions that do not train critical thinking skills and scientific literacy. This problem is the basis for this research to produce a product according to needs. This is in line with Latif (2009 in Waruwu (2024), who revealed that in development research, two aspects need to be used as a reference: the problem to be solved and the specifications of the product developed based on the problem found.

Design

The results of the needs analysis in the define stage were used as a reference in the design stage to develop worksheets based on the SSCS learning model integrated with the summarization learning strategy. The worksheets were compiled based on the SSCS learning model syntax, which integrated the summarization strategy (in the Search stage). The stimuli were designed to train students' scientific literacy and critical thinking skills. The stimuli provided were narratives and images related to the topics taught in each meeting. Figure 2, An example of stimuli provided to train literacy and critical thinking skills in the first meeting.

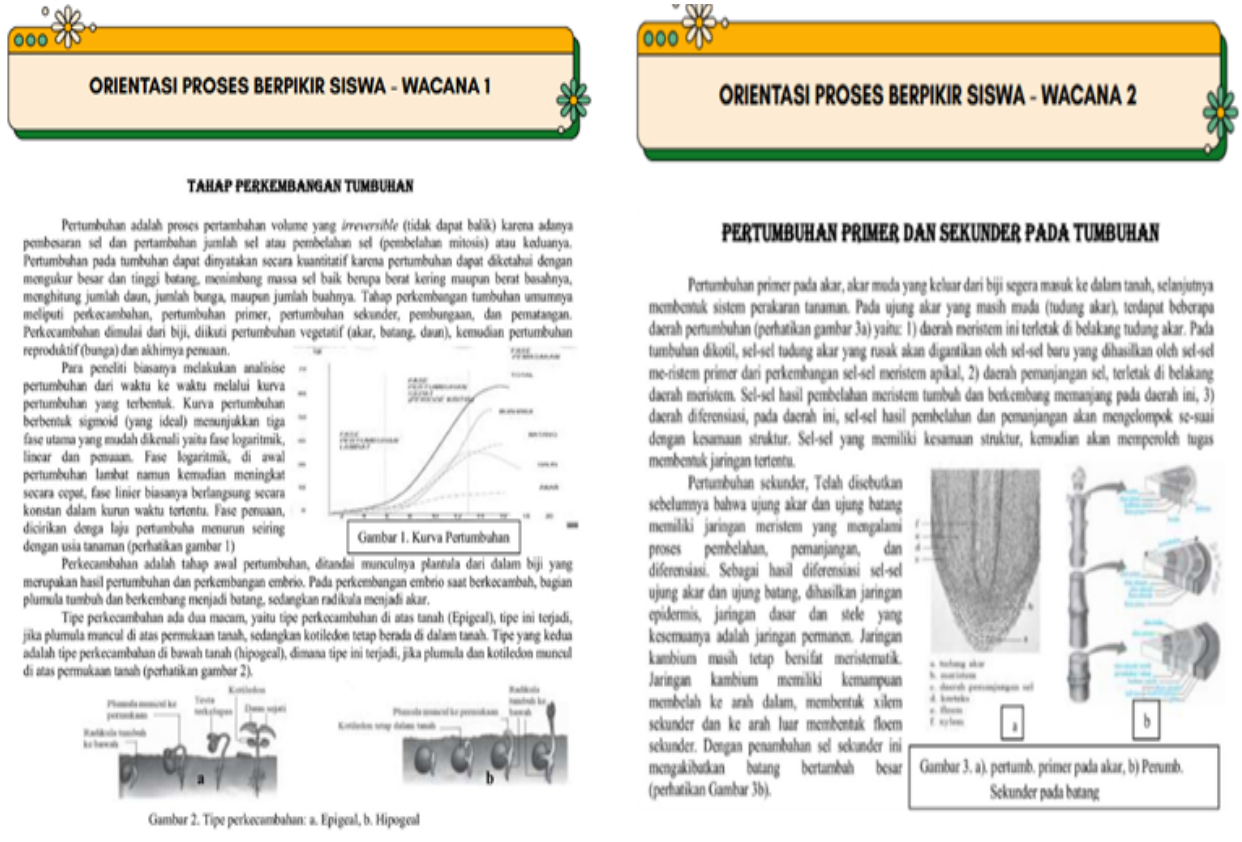


Figure 2. Example of a stimulus used to train students' scientific literacy and critical thinking

Next, to determine whether students have developed literacy and critical thinking skills, a follow-up is performed with a request for a bill on the worksheet, in accordance with the strategy included in one of the SSCS stages, namely the Search stage. The bill format expected of students is designed as shown in Figure 3.

Figure 3. Example of a design integrating a summarizing strategy into the search stage to train students' scientific literacy and critical thinking skills.

Figure 3 shows that the design, including color, shape, and animation, has been varied to encourage reading. Each step of the SSCS model is accompanied by clear instructions and space for students to write down their thoughts based on their literacy skills. The worksheets specifically focused on growth and development, consisting of three sessions: 1) stages of growth, 2) internal factors influencing growth, and 3) external factors influencing growth. Each worksheet was designed to consider the presence of didactic, constructional, and technical requirements to meet the requirements for a suitable worksheet. This aligns with Prastowo's suggestion in Diana et al. (2022) that a good worksheet should accommodate didactic, constructional, and technical requirements.

The next phase is the solve phase. This phase is a follow-up to the search phase. Students are given space to solve the problems they pose and also reflect on what efforts will be made to solve them. This step is part of in-depth learning. When students know what they will do to solve a problem, they will become more confident, motivated, and independent in the learning process. In other words, they will not feel intimidated by challenges but instead see them as opportunities for learning. This is in line with Khotimah and Abdan (2025), who stated that in-depth learning can foster active participation and conceptual understanding in students, creating a more interactive and effective learning experience (Turmuzi, 2025). Students' activities in the solve phase can be seen in Figure 4.

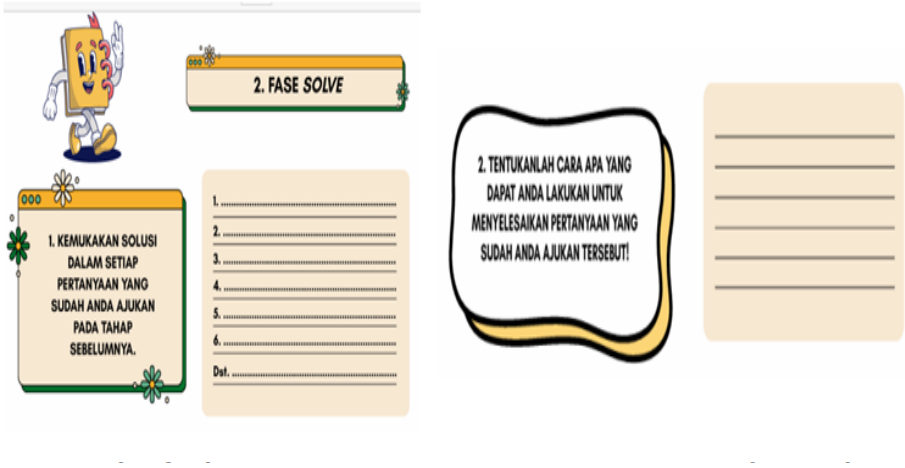


Figure 4. The solve stage to train students' scientific literacy and critical thinking skills

Next, in the create phase, students are given the freedom to design their solutions as attractively as possible as creative products. These products will vary depending on their creativity. The finished products will then be presented in the share phase. The designs from the create and share phases can be seen in Figure 5.

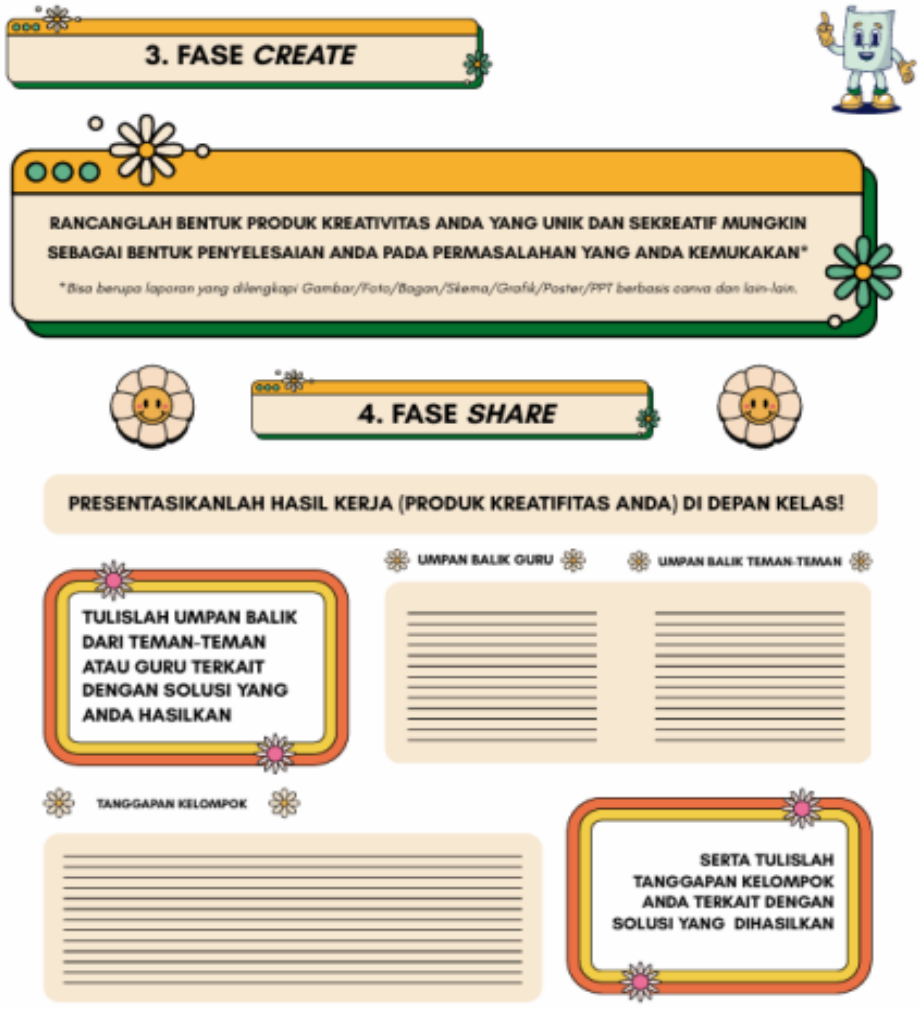


Figure 5. The create and share stage to train students' scientific literacy and critical thinking skills

Figure 5 shows that these two stages also require students to develop their scientific and critical thinking skills in solving the problems presented, while also creating engaging products to present in class. Providing space for writing feedback will engage students more in the learning process, deepen their understanding of their strengths and weaknesses, motivate them to make improvements, and encourage them to reflect on and manage their own learning. Self-reflection enhances the ability to evaluate learning experiences, which in turn fosters critical thinking, where literacy is the foundation for accessing, understanding, and analyzing information in depth. Individuals with good literacy skills tend to have higher critical thinking skills because they can assess information, identify biases, and draw logical conclusions. The ability to reflect can hone critical thinking skills (Choy et al., 2019; Phan, 2009) and become the basis for designing more effective learning strategies (Hafiz et al., 2023).

Develop

The resulting worksheet prototypes were then validated by experts (materials and media) and empirically by users, in this case, teachers and students. During the validation process, several suggestions and inputs were provided for revision to improve the resulting product. The suggestions for improvement and the form of revisions made by the validators and users are shown in Table 4.

Table 4.
Suggestions for Improvement from Validators and Users on Student Worksheets Based on the SSCS Learning Model Integrated with the Summarizing Learning Strategy

No.	Part	Before revision	After revision
1.	Cover	A topic/identity should be provided for each learning session	Numbers have been added to indicate the meeting and topic of the lesson. Examples include: 01. Stages of Growth,
		Relevant illustrations should be added.	Images related to the stages of growth, internal and external factors affecting growth and development have been added.
2.	Content	Figure 1. Growth curve contains unclear.	Unclear text has been corrected.
		Page numbers should be added and images should be clarified	Page numbers have been added, and images have been clarified.
3.	Stimulus	The font size in the narrative, including the illustrations, should be slightly enlarged.	The font size, shape, color, and illustrations have been adjusted to ensure clarity and readability.

Table 4 shows the suggestions and revisions made to produce a valid worksheet product suitable for use in learning. Furthermore, the validation results from media experts for the developed worksheet product for each measured indicator are shown in Table 5.

Table 5.
Media Expert Validator Assessment Results for Student Worksheets Based on the SSCS Learning Model Integrated with the Summarizing Learning Strategy.

No.	Aspect	Average	Category
1.	Content	3.72	Very valid
2.	Presentation	3.80	Very valid
3.	Graphics	3.83	Very valid
4.	Language	3.75	Very valid
	Average	**3.78**	Very valid

Table 5 shows that the media expert validator's assessment result for the student worksheet product based on the SSCS learning model integrated with the learning strategy, summarized a score of 3.78. This score indicates the product's validity. Furthermore, the results of the material expert's assessment and the media for the developed worksheet product are presented in full in Table 6.

Table 6.
Results of the Material Expert Validator's Assessment Related to Student Worksheets Based on the SSCS Learning Model Integrated with the Summarizing Learning Strategy

No.	Aspect	Average	Category
1.	Content Appropriateness	3.72	Very valid
2.	Presentation Appropriateness	3.67	Very valid
3.	Language Appropriateness	3.68	Very valid
	Average	**3.69**	**Very valid**

Table 6 shows that the assessment results of the material expert validator for the student worksheet product based on the SSCS learning model integrated with learning strategies were 3.69. This score indicates that the product is very valid. Furthermore, the results of the media teacher response assessment for the developed worksheet product can be seen in Table 7.

Table 7.
Result of the Teachers and Student Responses Based on the SSCS Learning Model Integrated with the Summarizing Learning Strategy

No	Aspect	Response (%)		Category	
		Teachers	Students	Teachers	Students
1.	Ease of Use	95.75	92.25	Very Feasible	Very Feasible
2.	Working Time	95.75	87.50	Very Feasible	Very Feasible
3.	Clarity of Instructions and Language	95.75	92.00	Very Feasible	Very Feasible

No	Aspect	Response (%)		Category	
		Teachers	Students	Teachers	Students
4.	Worksheet Appearance	95.75	91.25	Very Feasible	Very Feasible
5.	Relevance	97.25	89.25	Very Feasible	Very Feasible
6.	Didactics	94.50	88.25	Very Feasible	Very Feasible
	Average	**95.75**	**90.00**	**Very Feasible**	**Very Feasible**

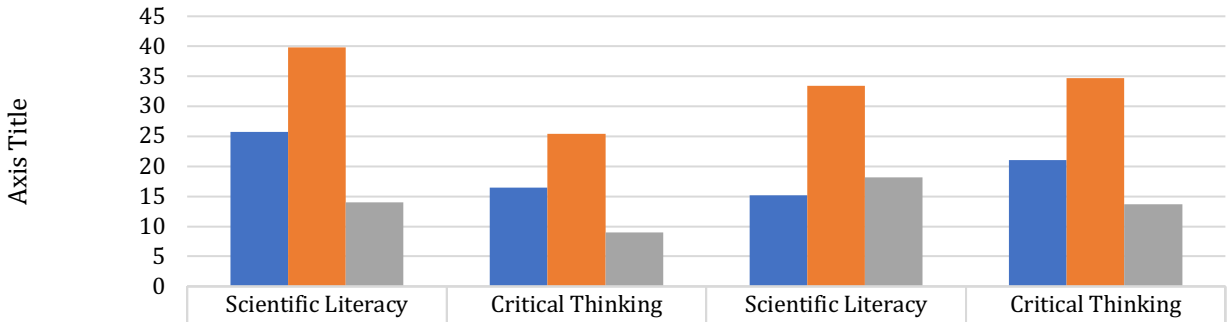
Table 7 shows that the teachers' and students' responses to the worksheet product, based on the SSCS model integrated with the summarizing strategy, fall into the very feasible category for use in learning, as the average value of the aspects is ≥ 90. Based on the assessment results of expert validators, including both material experts and media experts, as well as user assessments from teachers and students, it was concluded that the developed product is valid and highly suitable for use in learning. The validity and suitability of this worksheet product were made possible because, during the design and development process, the provisions outlined for product validity and suitability were met, namely, meeting didactic requirements, construction requirements, and technical requirements. This aligns with Dramodjo's (in Suriani, 2018) statement that worksheet development must meet didactic, construction requirements, and technical requirements.

The didactic requirements in developing this worksheet have accommodated how the subject matter is presented, how learning activities are designed, and how individual student differences are taken into account. This is also reinforced by Bungawati et al. (2023), who stated that the didactic requirements in creating worksheets are met if the worksheets adhere to the principles of effective teaching and learning and emphasize the process of discovering concepts. The SSCS-based worksheets, integrated with the summary strategy, still incorporate these principles, where the search stage, reinforced by the summary strategy, emphasizes the process of discovering concepts from the results of the reading searches conducted by students.

Regarding the use of language, sentence structure, vocabulary, level of difficulty, and clarity in the student worksheets, which are constructive requirements in developing worksheets, have also been implemented in such a way that the resulting worksheets can be easily understood by students. This is also clarified by Nurfaidah et al. (2020), who state that construction requirements are requirements related to language, in particular, sentence structure, vocabulary, and clarity. Meanwhile, the final requirement, namely the technical requirements, has also been well fulfilled in this case concerning visual and presentation aspects, including writing, images, and the overall layout.

Disseminate

The student worksheet products that have been declared valid and suitable for further learning were quasi-experimentalized in two different classes. One class was taught using conventional worksheets, and the other class was taught using LKPD based on the SSCS model integrated with summarizing strategies. The implementation of learning for the growth and development material was carried out in three meetings. The test results for each class, along with improvements in scientific literacy and critical thinking skills, are presented in Figure 4.



	Conventional Worksheets		SSCS+ Summerizing Worksheets	
	Scientific Literacy	Critical Thinking	Scientific Literacy	Critical Thinking
Pretest	25.78	16.45	15.21	21.04
Postest	39.8	25.45	33.4	34.7
Improvement	14.02	9	18.19	13.66

Figure 6. Scientific Literacy and Critical Thinking Result in Classes Taught with Conventional Worksheets and SSCS + Summarizing Worksheets

Figure 6 shows that students' scientific literacy and critical thinking skills in both classes improved. The greatest improvement occurred in the class taught using SSCS-based worksheets integrated with the summarization strategy. The graphical data in Figure 1 indicate that developing students' scientific literacy and critical thinking skills requires learning tools that clearly direct what students should do. One such tool is the student worksheet. This aligns with Delima's (2020) statement that student worksheets are sheets of instructions for implementing learning activities that must be completed by students, referring to the core competencies to be achieved. Munandar (2016, cited in Diana et al., 2022) also added that student worksheets contain activities to be carried out by students to maximize their understanding.

Literacy and critical thinking activities in worksheets based on the SSCS learning model integrated with the summarization strategy were ranked higher than those performed using conventional worksheets. This was also evident in the assessments of subject matter experts, who gave the highest scores for critical thinking and scientific literacy. In these worksheets, students are facilitated as much as possible to engage in literacy activities, including literacy related to narratives, images, and graphics. This activity indirectly trains their critical thinking skills. The SSCS learning model, in particular, involves clarifying, formulating key issues, presenting facts, drawing conclusions, and so on. All of these activities refer to indicators of critical thinking (Dimyati, 2020; Syariah et al., 2018; Sugiarni & Durri, 2022; and Prabawati et al., 2022). Information seeking is crucial in evaluating potential solutions. Students can seek information about the advantages and disadvantages of each solution, as well as its impact on the context of the problem at hand. This statement is reinforced by Doyle (1994 in Sodikin et al., 2018) that when someone is able to recognize the information needed and is able to evaluate it according to needs, then that person is information literate and is very supportive in solving problems, and problem solving is closely related to critical thinking.

CONCLUSION

Based on the data analysis and discussion, it can be concluded that the developed student worksheet based on the SSCS learning model integrated with the summary strategy is suitable for use in learning because it meets the criteria for developing good worksheets, namely didactic, constructive, and technical requirements. The product was declared highly valid with a score of 3.78 by the media expert and 3.69 by the material expert. Student and teacher responses also indicated that the worksheet product is suitable for use with scores of 90.00% and 95.75%, respectively. The SSCS-based student worksheet integrated with the summary strategy can improve students' scientific literacy and critical thinking skills. The results of dissemination in learning show that the gain was higher in classes taught with worksheets based on the SSCS model integrated with summarizing strategies.

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