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Development of Student Worksheets Based on Children Learning in Science Model to Improve HOTS Ability On Circulatory System Material

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Abstract. Increasingly complex problems in the 21st century require skills to be able to solve and find solutions. This research aims to produce student worksheets (SWs) based on the children learning in science (CLIS) model to improve higher order thinking skills (HOTS) on the circulatory system material, as well as seeing the responses of teachers and students to the SWs. The research method used is development research of the ADDIE model (analyze, design, development, implementation, evaluation) using all five stages. The validity of the SWs, teacher and student responses, and improvement of HOTS ability, respectively, are known through expert validation tests, readability tests, response tests, and n-gain tests. The final product developed received a total average percentage of 85.48% with very good criteria in the expert validation test; and 88.23% with very good criteria in the readability test. The teacher's response to the SWs was in very good criteria with a total percentage of 82.56%. The students' response to the SWs was in very good criteria with a total percentage of 83.10%. There was an increase in students' HOTS ability after using SWs by 0.33 with moderate criteria. Based on the research results, it can be concluded that the SWs research results are suitable for use in Integrated Science learning to improve students' HOTS ability.
Keywords: Student Worksheets, Children Learning in Science, HOTS, Blood Circulatory System

Introduction

The real and rapid progress in science and technology has caused changes in the order of life and produced new challenges, not least in the field of education. Education is required to be able to answer these challenges and anticipate them by preparing human resources (HR) with qualifications that are relevant to current advances. Preparing superior human resources can be done by mastering 21st century skills, namely collaboration, creative thinking, problem solving, critical thinking and communication.

However, several studies show that middle and high school students and even university students still fail to develop the 21st century skills they need, such as critical thinking skills. For example, in simple cases, there are still middle and high school students who are unable to differentiate between fact and opinion, or are unable to judge two contradictory things (Jeong & Kim, 2022). Therefore, learning has an important role in realizing mastery of 21st century skills in students. This can be achieved by creating a

learning atmosphere and an active learning process. The concept of active learning is also in accordance with the mandate of Law no. 20 of 2003 that one of the targets of the learning process is to develop students' self-potential through active learning activities (Afgani, 2020).

Active learning has been attempted to be implemented in the 2013 curriculum (K13). Through student-centred learning at K13, students are expected to be more active in practicing their creative and critical thinking skills in solving problems which can be summarized as higher order thinking skills (HOTS). Therefore, the curriculum is one of the main components in the education system that needs to adapt, so that it can improve students' 21st century skills (Purwasi, et al., 2020). The results of a study also revealed that bibliographic studies can also be carried out to help develop basic education curricula that focus more on developing students' creative thinking abilities, so that in the end they can improve their abilities in facing future challenges (Abustang et al., 2024). Furthermore, curriculum development can make the curriculum used more optimal in carrying out its function of connecting teachers and students. Therefore, a curriculum that contains active learning in it can become an external regulatory framework for the learning process so that the expected learning objectives and skill demands can be achieved (Kazemi et al., 2020).

In the case of the Philippines, the MATATAG curriculum is currently being implemented in the country in order to set new directions in resolving basic education challenges which includes making the curriculum relevant to produce competent and job-ready, active, and responsible citizens. Further, the curriculum takes steps to accelerate the delivery of basic education facilities and services. Moreover, the curriculum takes good care of learners by promoting learner well-being, inclusive education, and a positive learning environment. Finally, the curriculum gives support to teachers to teach better. In all of these, the Philippines (and other countries) continuously innovate their curriculum to produce lifelong learning systems that integrate.

Even though the 2013 curriculum has been implemented for a long time, students' thinking skills in Indonesia are still relatively low and stagnant. Study results from TIMSS (trends in international mathematics and science study) show that students in Indonesia, on average, only have the ability to think in the aspects of understanding and application. They are only able to apply and draw simple conclusions and master knowledge in the form of facts, terms or scientific theories, which can be completed using memory skills alone (Mardayanti, et al., 2020). The importance of improving students' HOTS abilities is also based on the lack of harmony between assessment and the learning process. In fact, many forms of assessment have led to HOTS, but the learning process still does not direct students to these abilities. This was validated by the results of observations which found that in general students still had difficulty in working on questions with HOTS characteristics because they were not used to answering questions in the reasoning aspect (Purwasi, et al., 2020).

HOTS need to be applied to students. This refers to the demands of mastering 21st century skills. The level of questions at the cognitive level of remembering and understanding in Bloom's taxonomy is still not enough to measure students' abilities in complex problems, as the 21st century demands. The application of learning based on high-level thinking skills will really support students to be able to solve problems and determine appropriate solutions to various complex problems currently faced. Apart from that, the application of higher order thinking skills for students can also show relevant relationships between the knowledge they gain in the classroom and real events in their daily lives (Andriyatno, et al., 2023).

The lack of alignment between the learning and assessment processes was also confirmed and strengthened by the results of the needs analysis at the orientation stage of this research. Based on the results of student needs interviews, it was revealed that the majority of students still rarely take questions or exams based on HOTS. Another problem

that emerged was that the majority of students at the research location still found it difficult when faced with learning or assessment based on HOTS. In this regard, based on the results of teacher needs interviews, were also confirmed, that student learning outcomes tend to be lower when implementing HOTS-based learning. In fact, the HOTS concept is rooted in reasoning and problem-solving strategies, as a symbol of 21st century competence. In addition, HOTS exploration has the potential to generate substantive insights into science education (Zulfiani et al., 2023). Apart from that, developing creative thinking skills which is a component of HOTS does require learning conditioning which involves learning experiences and can be integrated into learning (Yusnaeni et al., 2017; Zubaıdah et al., 2024). Therefore, HOTS are considered the most suitable skills for the education era 4.0 (Liline et al., 2024).

Increasing students' HOTS abilities can be facilitated through choosing the right teaching materials. One of the effective teaching materials that can improve HOTS abilities is student worksheets (SWs). Student worksheets contain instructions, guides, or stages and a series of activities that support students to learn (Mumtaza et al., 2023). Student worksheets can improve HOTS abilities because SWs places the teacher as a facilitator so that learning is student centered. Through SWs, teachers can guide their students to explore learning concepts, as well as direct students to develop process skills, scientific attitudes and critical thinking skills (Saidaturrahmi et al., 2019). Student worksheets are also a form of learning media that uses a scientific approach. The successful use of student worksheets has a close relationship with the teacher's ability to prepare student worksheets that comply with standards, are representative, effective, and can actually help students achieve learning goals. In fact, although efforts to develop better SWs continue to be made by various parties, there are still many SWs used by teachers that are very simple and have not been able to effectively realize the desired learning objectives (Sari et al., 2018).

The disparity between ideal SWs needs and implementation in the field has also been confirmed through other previous research. It was found that teachers had used and compiled their SWs independently, especially in science learning. However, the SWs is still not in accordance with K13, and is not enough to improve students' HOTS abilities. This is because the activities provided are only limited to answering questions on the understanding and application aspect and have not yet reached the reasoning aspect (Novita et al., 2022). Apart from that, other research also shows that the HOTS abilities of students at the research location are still low. One of the reasons is that SWs which can direct students' activity in honing their HOTS skills is still limited. Therefore, to improve the quality of SWs used in learning, it is very relevant to develop it (Mardayanti et al., 2020).

Student worksheets development is generally carried out by containing steps came from learning models, according to the needs of the SWs itself. Along with the ongoing development of SWs, there are several learning models that are most widely used as a basis. The learning models most often chosen include problem based learning (PBL), project based learning (PjBL), discovery learning, guided inquiry, or those specific to science learning such as science process skills (SPS). These learning models have been effectively used in several studies. However, in an effort to improve students' HOTS, not all learning models are relevant and effective. For this reason, researchers try to explore other models that are rarely or have never been used before as a basis for SWs so that there are variations and alternative choices. In this research, researchers chose to use a learning model that has actually been introduced for a long time, but is still rarely used as a basis for learning media such as SWs. In addition, the application of alternate learning approaches, methods and models is believed to be able to support students in developing critical, analytical and creative thinking skills through a fun and conducive learning atmosphere (Tiwery, 2019). Apart from that, the importance of determining models in learning is also in line with Sari et al. (2024) research, which concluded that the use of

technological media using GRANDE (grow, replay, analysis, narration, demonstration, evaluation) quantum teaching model in biology learning can improve 21st century skills.

One learning model that supports student activity and encourages HOTS improvement is the CLIS model. This model is a form of constructivist learning that directs students to be able to construct the knowledge and concepts they are studying independently. On the other hand, the role of the teacher does not dominate learning because the teacher is positioned as a guide, companion, motivator and facilitator in the learning process. Thus, students' mental activities in constructing their knowledge can remain focused through information processing, creating collaboration in the classroom, and developing skills. At the end of constructivist learning, the teacher's role is to provide relevant evaluation and feedback on the learning activities that have been carried out by students (Sandoval et al., 2022).

Therefore, the CLIS model which is the basis of this research is relevant and appropriate to use to help students improve their higher order thinking abilities (Paramata, et al., 2021). The CLIS learning model consists of five stages, namely orientation, generating ideas, reorganizing ideas, implementing ideas, and strengthening ideas. Each of these stages contains independent and meaningful learning activities that will stimulate changes in students' conceptions (Mardayanti, et al., 2020). Apart from that, a series of CLIS learning stages can also involve students actively in expressing and combining ideas through discussions, experiments and observations, so that a strong understanding of the concepts being studied is built (Arisantiani et al., 2017).

In fact, the choice of learning model also has a significant effect on the achievement of learning objectives. In several studies, it is known that the CLIS learning model has a positive contribution to other research variables. One study concluded that the CLIS learning model had a significant effect on student learning outcomes. Experimental class students compared with the control class had a higher level of understanding and learning outcomes (Indriyani, et al., 2019). Apart from that, the CLIS learning model also has a positive influence on students' science process skills. Scientific activities that require science process skills such as observing, interpreting, predicting, communicating, and asking questions are more pronounced using the CLIS model (Safahi, et al., 2021).

The choice of material in developing SWs is also very important. The material that will be taught using the SWs must support the research objectives. This research hopes for an increase in students' HOTS abilities. Therefore, the ideal material to use is material whose basic competencies are in the reasoning aspect. On the other hand, the main purpose of using learning media such as SWs is to make it easier for students to understand difficult and abstract material. Material that requires a high level of understanding is difficult to learn using only verbal methods, so learning media are needed that can make it easier for students to learn it (Ningrum, et al., 2022). Therefore, in this study the researcher chose material that was in the reasoning aspect to be included in the SWs because it was the right choice to improve students' understanding and learning outcomes in this material, as well as improving their higher order thinking abilities.

One suitable material is the blood circulatory system in the Integrated Science subject for class VIII middle school. In this material, students are asked to analyze the blood circulation system and find out the effect of activity on heart rate frequency (Ministry of Education and Culture, 2018). The circulatory system material was also chosen based on its urgency in people's lives. Diseases and disorders of the circulatory system have become the highest cause of death in various countries. In Indonesia, in 2018, cases of coronary heart disease had a prevalence of 1.5%, the number was approximately 883,447 people. Therefore, efforts are needed to increase public awareness and attention to this issue, one of which can be started with students through the learning process (Saputri, et al., 2023).

Therefore, this research aims to produce SWs based on the CLIS model to improve HOTS on circulatory system material, as well as seeing the responses of teachers and students to the SWs.

Methods

This research is development research using the ADDIE development model according to Reiser and Mollenda. The ADDIE development research carried out includes all five stages, namely analysis, design, develop, implementation, evaluation (Jusuf et al., 2023). As the first stage, the analysis aims to outline the source of the problems in the research, as well as formulate solutions to these problems. The processes carried out at this stage include, validating the existence of gaps in ability, and analyzing students through an interview process regarding the needs of teachers and students; formulate learning objectives; as well as formulating potential sources and supporting research through curriculum analysis and material analysis processes. Thus, the summary of the results of the analysis stage includes the results of assessing student abilities, the results of analyzing teacher and student needs, the results of curriculum analysis, and the results of material analysis. Next, the design stage aims to outline the planning which refers to the results of the analysis carried out in the first stage. This stage consists of three processes, namely, preparing the initial design, determining the format, and making the product. The final result of the design stage is an initial draft of the SWs which is then processed further at the next stage in the research.

The third stage is development. This stage aims to improve and perfect the initial draft of the SWs that has been prepared so that it becomes better. There are two processes at this stage, namely the expert validation test and the SWs readability test. The results that will be obtained after carrying out the development stage are SWs that are suitable for use based on their validity and readability as measured through the two test processes carried out.

The research will continue to the implementation stage. This stage aims to determine the responses of students and teachers when using SWs in learning. At this stage, two processes are carried out, namely, testing teacher responses and testing student responses. Thus, at the end of the implementation stage, the feasibility of the SWs can be confirmed. The research ends by evaluating the success of the learning media and presenting recommendations for further research. Two things are measured through this stage, namely increasing students' HOTS abilities, as well as the effectiveness of CLIS model learning. The achievement of increasing students' higher order thinking skills abilities is known from the results of students' HOTS tests and normalized gain tests. The effectiveness of learning using the CLIS learning model is measured using the learning implementation observation instrument.

The subjects of this research consisted of respondents and validators. Respondents came from MTs Pembangunan UIN Jakarta, consisting of one teacher respondent, and 20 regular grade 8 student respondents. The validators consist of material expert and media experts from Tadris Biology lecturers, as well as practitioner expert from integrated science teachers at schools.

The instruments used in this research were aimed at each research subject. The instruments aimed at teacher and student respondents were needs analysis instruments, readability test instruments, response test instruments, HOTS test instruments, and observation instruments for the implementation of the CLIS learning model. The instrument aimed at validators is the SWs content validity test instrument.

There are two data processing techniques used in this research, namely using the Guttman scale and Likert scale. The data processed using the Guttman scale are the results

of the SWs readability test and the results of observations of the implementation of the CLIS learning model. The Guttman scale data assessment criteria are explained in table 1.

Table 1. Guttman Scale Data Assessment Criteria

No	Alternative Answers	Score
1.	Yes	1
2.	No	0

(Yusrizal et al., 2022)

The data processed using a Likert scale is the results of the SWs validity test and the results of teacher and student response tests. The Likert scale data assessment criteria are explained in Table 2.

Table 2. Likert Scale Data Assessment Criteria

No	Alternative Answers	Score
1.	Very good	5
2.	Good	4
3.	Pretty good	3
4.	Not good	2
5.	Very not good	1

(Yusrizal et al., 2022)

There are two data analysis techniques carried out in this research. The first data analysis technique is used to analyze data from the SWs feasibility test results. The following is the formula used to calculate the percentage gain from the data obtained:

$$P = \frac{\sum X}{\sum Xi} \times 100 \qquad (1)$$

Information:
P : percentage
X : score of the respondent's answer in one item
Xi : the maximum score in an item

Table 3 shows the quality interpretation of the results of calculations and analysis of SWs feasibility test data.

Table 3. Quality Interpretation for SWs Feasibility Test

No	Percentage Interval (%)	Criteria
1.	81-100	Very good
2.	61-80	Good
3.	41-60	Pretty good
4.	21-40	Not good
5.	0-20	Very not good

(Saputra, 2021)

The second data analysis technique is the normalized gain test. The gain test was carried out to analyze data from students' HOTS ability test results. To be able to carry out an n-gain test on HOTS test result data, a HOTS test instrument is needed which is tested on students. In this research, the HOTS test instrument consisted of 12 questions at cognitive levels C4-C6 in Bloom's taxonomy. Using the same instrument, the HOTS test is carried out during pre-learning and post-learning using SWs. The sample that participated in the pre-test and post-test was 20 students. The value used for the n-gain test is the average value of the entire sample, both in the pre-test and in the post-test. The following is the formula used to calculate the results of increasing students' higher order thinking skills abilities:

$$\text{Normalized Gain (g)} = \frac{post\ test\ score - pre\ test\ score}{maximum\ score - pre\ test\ score} \quad (2)$$

The results of the normalized gain test to measure the increase in HOTS in students are concluded based on the criteria contained in Table 4.

Table 4. Interpretation of N-Gain Value Criteria

No	Value g	Criteria
1.	$g \geq 0.7$	High
2.	$0.7 > g \geq 0.3$	Medium
3.	$g < 0.3$	Low

(Supriadi, 2021)

Results and Discussion

The result of this research is the final product in the form of a SWs based on the CLIS learning model to improve HOTS abilities of Junior High School students on circulatory system material. Based on all the stages that have been carried out, data obtained from development research results are in accordance with the development research model used, namely the ADDIE model.

Analysis Stage

The first stage carried out is the analysis stage to find the source of the main problems in the research as well as formulating solutions to these problems (Jusuf et al., 2023). The results obtained at the analysis stage are the results of assessing students' abilities, the results of analyzing teacher and student needs, the results of curriculum analysis, and the results of material analysis. Validation of the ability gap and analysis of students through the needs interview process obtained results in the form of HOTS ability gaps and several other problems.

Based on interviews with teacher and student needs, the problems found included that learning and assessment carried out by teachers were not fully HOTS oriented; student learning outcomes in HOTS learning are lower; The SWs used by teachers is still limited to SWs containing questions, not using a specific model as its basis; Students have been trained to think at a higher thinking level but still rarely work on questions based on higher thinking, so they still find it difficult when faced with learning or assessments that is oriented at a higher level of thinking.

The results of the curriculum analysis show that basic competencies 3 in the circulatory system material is at the cognitive reasoning level or meets the HOTS learning criteria. The results of the potential material analysis have mapped four circulatory system sub-materials that are relevant to be included in the SWs, namely blood circulatory components, circulatory system organs, circulatory pathways, as well as disorders and abnormalities in the circulatory system. The achievement of these four materials will be measured through five competency achievement indicators (GPA).

Design Stage

The second stage of this research is the design stage. At the design stage, the results obtained are the initial SWs design, design format, and SWs product. The results of the initial design that have been prepared formulate six learning activities in the five stages of the CLIS model. Activity one is at the orientation stage, activity two is at the idea generation stage, activities three and four are at the idea reformulation stage, activity five is at the idea application stage, and activity six is at the idea consolidation stage. According to Bloom, the HOTS indicators that are expected to appear in each of these activities are the ability to analyze, evaluate and create.

The formats obtained at the design stage include application format, theme, layout, fonts and colors. Umbaryati stated that product manufacturing in development research cannot be carried out before the formatting and initial design preparation has been carried out (Mumtaza et al., 2023). The application used to design SWs is the Canva Pro application. The design theme used in the SWs is a minimalist theme adapted to the circulatory system material. The SWs display layout format uses normal margins with A4 paper size. There are three types of letters used in this research, namely Pop EB, Bernoru, and Avenir. The types of letters that have been used also meet the principles of typography, namely readability (able to read the arrangement), legibility (easy to recognize the shape and character), clarity (clear and easy to understand), and legible (letter characters are clear from each other (Rosita, 2022).

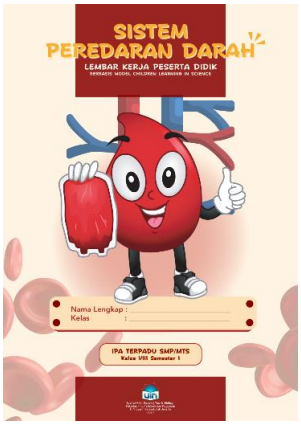
Figure 1. List of SWs Font Types

The final aspect that determines the format is color. There are 10 types of colors used with red predominating, several other colors being secondary colors. The choice of red dominance is in line with the article by Julianto et al. (2019), that the colors red and green can have a psychological effect because they can stimulate the eyes.

Figure 2. SWs Color List

The third process in the design stage is product creation. The SWs created accommodates all the important components of the SWs and is ensured to meet the criteria and requirements for a good SWs, namely meeting didactic, construction and technical requirements (Diniaty et al., 2015). The initial SWs product that was created at the design stage consists of 23 pages in total. In more detail, the initial SWs product results are depicted in Table 5.

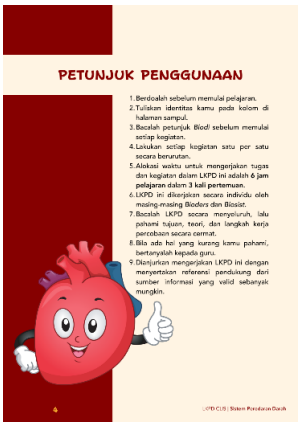
Table 5. Initial Draft of Student Worksheets



Front cover

List of contents

Foreword and Identity of SWs

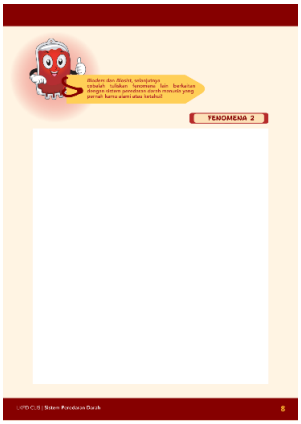


Instructions for use

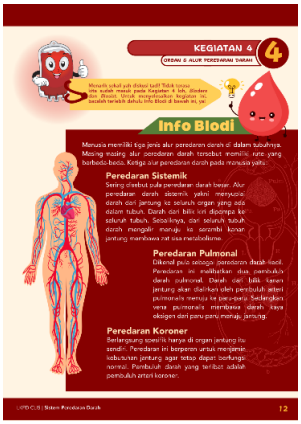
Core Competencies and Basic Competencies

GPA and Learning Objectives

Description of CLIS Syntax and Activities

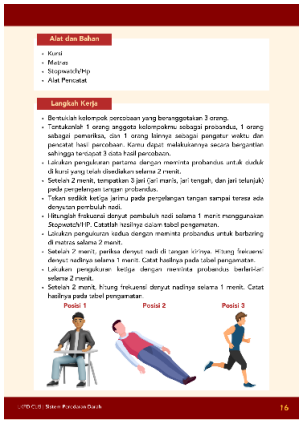


Answer Fill Column



Short Information Column

Description of the HOTS Indicator According to Bloom



Tools, Materials, and Experimental Work Steps

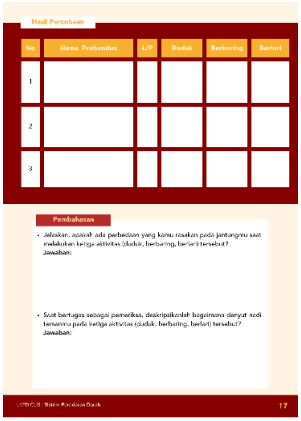
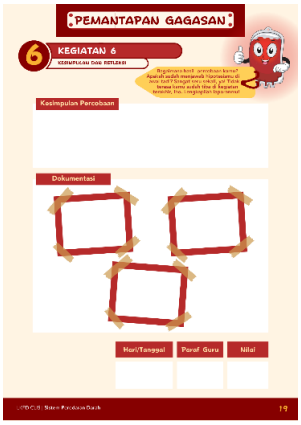
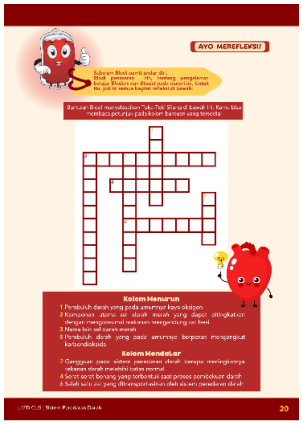


Table of Experiment Results and Questions

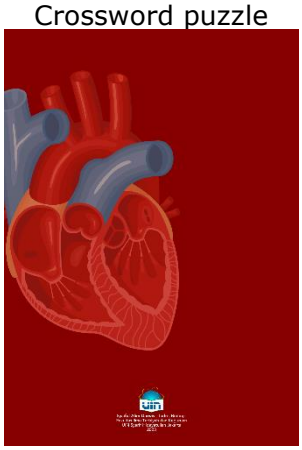


Documentation Column



Crossword puzzle

Glossary and Bibliography



Back Cover

Based on Table 5, it can be seen that the initial SWs product was made with good SWs) writing systematics. In general, a good SWs contains several components, namely title, introduction, objectives, tools and materials, work steps, table of observation results, and questions. Apart from these components, researchers also added other components which are no less important in this research. These additional components include a table of contents, competency achievement indicators, learning objectives, CLIS syntax information, HOTS indicator information according to Bloom, short information column, answer filling column, documentation column, crossword puzzle, glossary, and

bibliography. As part of the active learning process, SWs is structured in such a way that the dominant role is with the students. In several parts, the SWs design is also designed to build interaction between students, both in the form of group work and peer assessment. This form of peer assessment is found in the activities of reorganizing ideas and implementing ideas. Various studies have concluded that the opportunity for students to provide assessments in the collaborative activities they carry out has shown a positive influence and improved the individual performance of each student (Van Hoe et al., 2024).

Development Stage

The third stage in this research is the development stage. The results obtained at the development stage are final SWs products that are suitable for use based on the results of expert validation tests and SWs readability tests. The validity test of the SWs was carried out by three predetermined experts, namely material experts, media experts and practitioner experts.

Table 6. Result of SWs Validity Test Analysis

No	Component	Score (%)	Criteria
1.	Eligibility of content	89.44	Very good
2.	Learning stage in SWs	84.75	Very good
3.	Language	83.33	Very good
4.	Presentation	88.56	Very good
5.	Graphic display	81.33	Very good
	Total Percentage and Conclusion of SWs Criteria	85.48	Very good

Table 6 shows that the SWs developed is valid with a feasibility percentage score of 85.48%, on very good criteria. The total results of the validity test assessment show that the five components in the SWs, namely content suitability, learning stages in the SWs, language, presentation and graphic display, each received very good criteria. The highest percentage of assessment was in the content suitability component, while the component with the lowest percentage was the graphic display.

However, each expert also provided suggestions and input for improvements which were then revised and refined again by the researchers. Validation and analysis along with validator suggestions are used as guidelines for making revisions and improvements to the product. Improvements can be made repeatedly until the resulting product is truly feasible and in accordance with the researchers' targets and revision suggestions from the validators (Fatirul et al., 2022).

After going through the revision process of the SWs validity test, the researcher continued the development stage by testing the readability of the SWs. The readability test was carried out by 11 students who were randomly selected at the research location.

Table 7. Result of SWs Readability Test Analysis

No	Component	Score (%)	Criteria
1.	Uses of SWs	92.5	Very good
2.	Text clarity	90.9	Very good
3.	Ease of use	83.85	Very good
4.	Display suitability	85.68	Very good
	Total Percentage and Conclusion of SWs Criteria	88.23	Very good

Table 7 shows that the SWs readability test results also have very good criteria with a total percentage of 88.23%. In the content component, the indicator with the highest percentage of feasibility is the usefulness of the SWs. The indicator with the lowest percentage is ease of use. On the other hand, the graphic display component, namely the display suitability indicator, received an assessment percentage of 85.68%. One of the aspects that received the lowest rating on this indicator was the appearance of the cover, four of the total respondents considered that the cover of the SWs was not attractive.

The two processes carried out at the development stage, namely the expert validation test process and the SWs readability test, have resulted in an assessment that has the same substance, namely that the SWs is suitable for use after going through a series of corrective revisions. Therefore, after carrying out revisions in accordance with suggestions and assessments in the expert validation test and SWs readability test, the final results of the development stage have been obtained.

Implementation Stage

The fourth stage of this research is the implementation stage. After the final development product was obtained, at this stage the use of SWs was implemented in learning circulatory system material in class 8 at the research location. The results of the implementation stage are the responses of teachers and students to the SWs that has been used during learning. Teacher responses to SWs had a percentage of 82.56%. The results of the teacher response test analysis are presented in Table 8.

Table 8. Results of Teacher Response Test Analysis

No	Component	Score (%)	Criteria
1.	Practicality	80	Good
2.	Appropriateness of the content of the material	86.11	Very good
3.	Graphic display	97.5	Very good
4.	Language	66.66	Good

Total Percentage and Conclusion of SWs Criteria	82.56	Very good

The student response test results had a percentage of 83.10%. The responses that have been given only have a difference of 0.54%. The results of the analysis of student response tests are described in Table 9.

Table 9. Results of Student Response Test Analysis

No	Component	Score (%)	Criteria
1.	Practicality	81.33	Very good
2.	Appropriateness of the content of the material	84.33	Very good
3.	Graphic display	83.75	Very good
4.	Language	83	Very good
	Total Percentage and Conclusion of SWs Criteria	83.10	Very good

Based on the analysis carried out, each assessment, both teachers and students showed that there were components with high and low responses. However, researchers saw a gap between these two results. The components with the highest percentage, namely the appropriateness of the content of the material and the graphic display, are the top two components, both in teacher responses and student responses. This shows that these two components have better quality compared to the other components assessed. On the other hand, the lowest component in the teacher's response is the indicator of accuracy in choosing words and terms as well as the indicator of clarity of information. The lowest component in specific student responses is influenced by the indicator of ease in understanding the use of SWs. Researchers see a relationship between these two lowest components. Lack of clear information or inaccurate choice of words or terms in the SWs makes it less easy for students to understand the use of the SWs. However, the total average percentage of each component assessed is in very good criteria.

Evaluation Stage

The fifth stage of this research is the evaluation stage. Evaluation is carried out to see the achievement of research objectives which are an accumulation of the four stages of development research that have been carried out previously. Increasing students' HOTS has been achieved in this research. This increase can be seen from the results of the normalized gain test, and a comparison of descriptive statistical analysis of the students' pre-test and post-test results. The student worksheets used in learning have supported this improvement. The effectiveness of CLIS learning model has also been determined through testing the implementation of CLIS learning model.

Comparison of descriptive statistical analysis carried out on students' pre-test and post-test results shows an increase in higher order thinking skills abilities. The average student score increased by 23.33 points after using the developed SWs. If explained

further, the increase in students' HOTS abilities based on pre-test and post-test scores, the highest is at the cognitive evaluating level (C4) with an average increase of 6.75 points, while the creative cognitive level (C6) is at second place with an average increase of 4.25 points. The lowest increase in HOTS was at the cognitive evaluating level (C5) with an average increase of 3.25 points. If it is related to the SWs used, the results of increasing students' HOTS are related to the forms of activities in the SWs. For example, the highest increase in HOTS at the analyzing level (C4) corresponds to the activity of generating ideas in the SWs whose level of implementation has the highest percentage in the learning implementation test.

In line with the results of the descriptive analysis of students' pre-test and post-test scores, the results of the n-gain test also showed an increase in HOTS abilities. The normalized gain test results obtained in this study were 0.33 with medium criteria.

There has been an increase in students' higher order thinking skills abilities after using the SWs. The n-gain test results obtained are in accordance with the effectiveness criteria according to Meltzer and David who state that research results can be categorized as effective if the n-gain value obtained is greater than or equal to 0.3 or is in the medium or high criteria (Kurniawan et al., 2021).

However, researchers realized that the increase in students' HOTS abilities in this study was not very significant. Analysis was also carried out to review the factors that influenced these results. In fact, the HOTS improvement results obtained were basically in line with the results of the pre-research interviews. In interviews analyzing the needs of teachers and students, it was also revealed that students are not used to working on HOTS questions, so they still find it difficult when faced with learning or assessment using the HOTS approach. Apart from that, the learning and assessments carried out so far have not been fully oriented towards HOTS abilities, and student learning outcomes in HOTS learning are also lower.

Supporting this fact, several other studies and theories also reveal the same thing. One theory that supports the results of this research is constructivist theory. Driver, et al stated that in constructivist learning, students must be trained continuously until they are able to build their knowledge independently and are able to improve their thinking skills. In addition, Tobin's research results recommend that success in improving HOTS will be easier to achieve by monitoring and maintaining overall student involvement, one of which is by prioritizing the implementation of HOTS in smaller groups and even on an individual scale (Suparman, 2021).

The explanation of the theory and the results of this research show that improving students' HOTS abilities must be carried out continuously so that they can be increasingly optimal. The continued improvement of HOTS abilities is in line with the cognitive level concept in Bloom's taxonomy, which is the basis for mapping LOTS and HOTS abilities. Cognitive abilities according to Anderson and Krathwohl's revised Bloom's taxonomy will increase gradually from level C1-C6. Therefore, increasing HOTS abilities can be achieved if they have mastered and become accustomed to the cognitive level below them. This is in line with the research results which states that students' HOTS abilities are inversely proportional to the cognitive level of Bloom's taxonomy. This means that students' HOTS abilities are better at the analyzing level (C4), then the evaluating level (C5) and the lowest at the creating level (C6) (Andriyatno et al., 2023). Furthermore, the development of students' HOTS abilities in active learning classes is also influenced by several factors. These factors include peer interaction, learning motivation, learning strategies, and class preferences. Among all these factors, peer interaction and learning motivation have a direct influence on increasing students' HOTS abilities. Other factors, such as learning strategies and class preferences, have an indirect influence, but still need to be paid attention to by teachers during learning so that students' higher-order thinking skills abilities can be more optimally improved (Lu et al., 2021).

Another factor that influences the increase in HOTS in a broader context is system alignment. Mahanal (2019) concluded that efforts to increase students' HOTS can be successful if carried out together. Collaboration is needed between all parties including all teachers in various fields of study. So that the increase in HOTS obtained by students is the result of a well-developed system, through experience and a learning process that facilitates an overall increase in HOTS in the school. In line with this, Gronlund in Suparman (2021) also stated that HOTS has the same principles as authentic assessment, namely that teaching, learning and assessment must be in a constructive parallel position in order to realize educational goals.

The second result obtained at the evaluation stage was observation of the implementation of the CLIS learning model. The results of teacher observations show that the CLIS learning model has been implemented with an implementation percentage of 100% with very good criteria.

Table 10. Results of Observation Analysis of the Implementation of the CLIS Learning Model for Teacher Observers

No	Component	Score (%)	Criteria
1.	Preliminary activities	100	Very good
2.	Core activities	100	Very good
3.	Closing Activities	100	Very good
	Total Percentage and Conclusion of SWs Criteria	100	Very good

The results of student responses show the implementation of the CLIS learning model at a percentage of 85.43% with very good criteria. A description of the results of implementing the CLIS learning model for students is presented in Table 11.

Table 11. Results of Observation Analysis of the Implementation of the CLIS Learning Model for Students

No	Component	Score (%)	Criteria
1.	Implementation of the orientation stage	76.67	Good
2.	Implementation of the idea generation stage	91.25	Very good
3.	Implementation of the idea rearrangement stage	83	Very good
4.	Implementation of the idea implementation stage	91.25	Very good
5.	Implementation of the idea consolidation stage	85	Very good

Total Percentage and Conclusion of SWs Criteria	85.43	Very good

Tables 10 and 11 show that the CLIS learning model has been implemented with very good criteria in the learning process using SWs. However, student assessments tend to be lower than the results of teacher observations. This low assessment is due to the indicators at the CLIS orientation stage, 50% of students feel that they did not prepare before carrying out learning using SWs. Furthermore, the researcher confirmed with two students who responded low to the orientation stage implementation indicators. As a result, the reasons for students A and B were not relevant to the implementation of the orientation stage in question. Therefore, basically the orientation stage has been carried out well, this is also supported by the results that all students have carried out activities at the orientation stage in the SWs.

Based on the research that has been carried out, it can be concluded that the final product has been produced in the form of a SWs based on the CLIS model of circulatory system material with very good criteria based on expert validity tests and readability tests. The resulting SWs is a printed model SWs consisting of five CLIS model syntaxes containing six main activities and containing HOTS indicators according to Bloom.

Apart from that, in this research the teacher's response and the student's response to the final product of the developed SWs were also identified. The teacher's response and the student's response both show very good criteria. Based on the research results, it can also be concluded that the SWs which has been implemented in learning using the CLIS model has been able to improve students' higher order thinking skills abilities. The increase in HOTS abilities shown is in the moderate criteria. Based on the research results that have been obtained, the final conclusion obtained is that SWs is suitable for use in the learning process.

Conclusion

Based on the research that has been carried out, it can be concluded that the final product has been produced in the form of a SWs based on the CLIS model of circulatory system material with very good criteria based on expert validity tests and readability tests. The resulting SWs is a printed model consisting of five CLIS model syntaxes containing six main activities and containing HOTS indicators according to Bloom. Apart from that, in this research the teacher's response and the student's response to the final product of the developed SWs were also identified. The teacher's response and the student's response both show very good criteria. Based on the research results, it can also be concluded that the SWs which has been implemented in learning using the CLIS model has been able to improve students' higher order thinking skills abilities. The increase in HOTS abilities shown is in the moderate criteria. Based on the research results that have been obtained, the final conclusion obtained is that SWs is suitable for use in the learning process.

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