

The Development of LKPD Based on a Scientific Approach to Improve Students' Science Process Skills in Material on the Human Circulatory System and Digestive System Class XI SMA

Mia Ramayani^{1*}, Violita¹, Abdul Razak¹, Muhyiatul Fadilah¹

¹ Biology Education Master Program, Faculty of Mathematics and Natural Science, Universitas Negeri Padang, Padang, Indonesia.

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Corresponding Author:

Mia Ramayani

miaramayani@gmail.com

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Abstract: The development of Student Worksheets (LKPD) based on a scientific approach to material on the human circulation system and digestive system is based on the teaching materials used at SMA Negeri 16 Padang in the form of Student Worksheets (LKPD). The LKPD is not complete in terms of components or in terms of LKPD elements. The LKPD used only takes the form of sheets containing questions, and does not use an approach that contains activities or learning steps so that it cannot train students' science process skills. This research aims to produce LKPD based on a scientific approach to material on the human circulation system and digestive system that is valid, practical and effective to improve students' science process skills. This research is development research using the Plomp model which consists of three stages, namely preliminary research phase, development or prototyping phase and assessment phase. The results of the LKPD validity test by the validator obtained a value of 84.67% with very valid criteria. The results of the LKPD practicality test obtained a score of 90.74% by teachers and 88.30% by students with very practical criteria. The results of the T-test showed differences in values between the experimental and control classes with a significance of 0.000 each in the circulatory system and digestive system material. It can be concluded that LKPD based on a scientific approach is very valid, very practical and effective in improving science process skills.

Keywords: Circulatory system and digestive system; Development research science process skills; LKPD; Scientific approach

Introduction

Teaching materials are one component of learning that has an important role, one of which is that it can help students understand the material and can serve as a guide for educators in learning activities. Teaching materials can be created and developed by educators themselves according to the characteristics and needs of students, as well as indicators of competency achievement that must be achieved by students. One of the teaching materials that can be developed by educators is Student Worksheets (LKPD). According to

Ferguson (2022) and Suyatna (2020), Student Worksheets (LKPD) are a collection of sheets containing student activities which enable students to carry out real activities with the objects and problems to be studied. LKPD is very important to use in the learning process, one of the benefits of LKPD is that it can train students to develop science process skills (Maulidiya & Mercuriani, 2023).

Based on observations of interviews between the author and teachers at SMA Negeri 16 Padang, it is known that during the learning process the method most often used by educators is the lecture method

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without implementing an appropriate learning approach or model, and the teaching materials used by educators and students are Worksheets. Students' Worksheets (LKPD) made by educators themselves.

The LKPD is not complete in terms of components or in terms of LKPD elements, such as not including the LKPD title, study instructions and the absence of main

material presented in the LKPD. The LKPD used is only a sheet containing questions, and does not contain activities or learning steps, so it cannot train students' science process skills. These results are proven by the results of the researcher's initial observations who gave initial test questions to see students' science process skills abilities which can be seen in table 1.

Table 1. Initial Ability Values of Students' Science Process Skills in Cell Materials and Cell Bioprocesses

PPP indicators	PPP indicators	Criteria
Observe	Observe	Currently
Asking question	Asking question	Tall
Grouping/classification	Grouping/classification	Currently
Hypothesize	Hypothesize	Low
Interpret/interpret	Interpret/interpret	Low
Forecast/predict	Forecast/predict	Low
Planning an Experiment	Planning an Experiment	Low
Using tools and materials	Using tools and materials	Currently
Applying concepts	Applying concepts	Low
Communicate	Communicate	Low
Average	39.86 Low	39.86 Low

The low level of students' science process skills can be caused because the LKPD used in the learning process only consists of questions and does not contain learning activities or steps. Cairns (2019) and Purba et al. (2021) states that the low level of science process skills is because teachers rarely provide learning that involves "processes" such as carrying out investigative activities, making scientific questions and drawing conclusions Science process skills are all directed scientific skills and can be used to find facts, discover concepts or apply theories. Science process skills need to be trained or developed in biology teaching because they have a role, namely (Wola et al., 2023) : it is an effort to help students achieve learning success, and the subject matter will be easier to learn, understand, appreciate and remember in the long term. a relatively long time if students gain direct experience from the learning event (Murphy et al., 2023).

The results of distributing questionnaires regarding student responses to the teaching materials that have been used show that 100% of the teaching materials used by students in biology subjects are LKPD, 47.10% of students stated that the teaching materials used have not helped students understand the subject matter. 52.90% of students stated that the information or material presented in teaching materials was not complete, and 100% of students still needed other sources of information such as Google search and other learning applications. 76.50% of students said it was difficult to understand the circulatory system material and 47.20% of students said it was difficult to understand the human digestive system material.

The material on the human circulatory system and digestive system is complex material, this material

examines the structure of the organs of the circulatory system and digestive system along with their functions, and the mechanisms of processes that occur in the body. In this material, students will also carry out blood type tests and food content tests, so that students are required to have process skills in carrying out practicums or experiments. The scientific approach is suitable for application to material on the circulatory system and digestive system (Jahn et al., 2023). Through the stages of the scientific approach, students are directly involved in the learning process to build concepts and knowledge and can train students' science process skills (Darmaji et al., 2022; Dwivedi et al., 2021).

Scientific activities or stages can direct students to observe, ask questions, collect data, associate and communicate, so that they can practice scientific process skills (Dwivedi et al., 2021). The development of LKPD based on a scientific approach is very important to improve students' science process skills, this is because the stages or syntax contained in the scientific approach are in accordance with the indicators of science process skills. According to Khusnul et al. (2019) and Oliveira et al. (2023) the implementation of the scientific approach to science learning, including biology, in the 2013 curriculum places greater emphasis on the application of students' science process skills through scientific stages, namely observing, asking, collecting data, processing data and communicating.

According to Suniasih et al. (2023), the benefits of using LKPD based on a scientific approach are Activating students in the learning process, Helping students in developing concepts, Training students in discovering and developing process skills. Zammiluni et al. (2018), have conducted research on "Development of

Student Activity Sheets (LKPD) Based on a Scientific Approach on Environmental Pollution Material to Train Science Process Skills for Class X High School Students". The research results revealed that the LKPD was declared valid, practical and effective so it was suitable for use to train the science process skills of class X high school students. Susanti et al. (2019) and Diani et al. (2020) also stated that the scientific approach is effective for practicing science process skills.

Based on the description of the background to the problem above, it is necessary to carry out research with the title "Development of LKPD based on a Scientific Approach to train students' Science Process Skills on material on the Human Circulatory System and Digestive System in Class XI SMA.

Method

This research is research and development which aims to produce LKPD based on a scientific approach to improve students' science process skills on circulatory system and digestive system material that is valid, practical and effective. The development model used in this research is the Plomp model which consists of three stages, namely: preliminary research phase, development or prototyping phase and assessment phase (Plomp & Nieveen, 2013).

Preliminary Research Phase

The aim of the initial investigation stage is to get an overview of the product to be developed, so that it can be used in learning. The activities carried out in this stage are: problem analysis, needs analysis, curriculum analysis.

Development Or Prototyping Phase

At this stage, prototype development, evaluation and revision are carried out, so that a final prototype of the LKPD product based on a valid, practical and effective scientific approach is produced.

Assessment Phase

This stage is the final stage in design assessment (design research), namely a large group test on one class to see the practicality and effectiveness of the prototype. Practicality is carried out by filling out practicality questionnaires by teachers and students regarding the use of LKPD based on a scientific approach. The next assessment in the assessment phase is product effectiveness. The assessment of the effectiveness of LKPD tests based on a scientific approach is carried out in the domains of knowledge, attitudes, skills and scientific process skills.

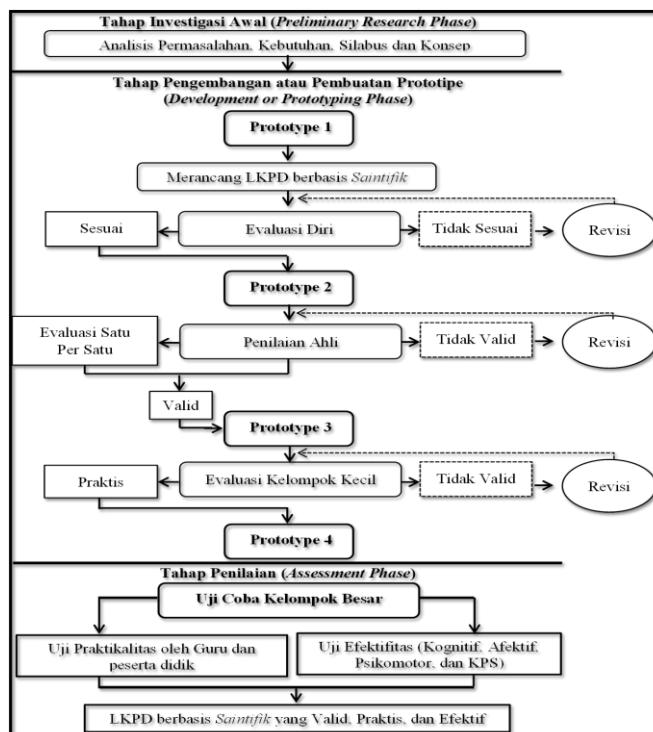


Figure 1. Procedure for developing based LKPD scientific approach (Plomp and Nieveen, 2013)

Result and Discussion

Initial Investigation Phase (Preliminary Research Phase): Problem Analysis

Based on observations of interviews between the author and teachers at SMA Negeri 16 Padang, it is known that during the learning process the method most often used by educators is the lecture method without implementing an appropriate learning approach or model, and the teaching materials used by educators and students are Worksheets. Students' Worksheets (LKPD) made by educators themselves. Then, based on the results of the author's analysis of the LKPD used, it is known that the LKPD is not complete in terms of components or in terms of elements of the LKPD, such as not including the title of the LKPD, unclear study instructions, and the absence of main material presented in the LKPD, so that in In the learning process, students still find it difficult to understand the material.

The LKPD used only takes the form of sheets containing questions, and does not use an approach that contains activities or learning steps that lead to scientific processes, so it cannot train students' scientific process skills. This is proven by the low initial value of students' science process skills obtained through the author's initial observations. The low level of students' science process skills is due to the fact that the LKPD used in the learning process only consists of questions and does not contain learning activities or steps. Science process skills

can be trained through LKPD which presents steps for learning activities or practicums through a learning approach. In line with the statement by that LKPD is able to train students' science process abilities through a series of learning activities or practicums.

The results of distributing questionnaires regarding student responses to the teaching materials used revealed that 100% of the teaching materials used by students in biology subjects were LKPD, 47.10% of students stated that the teaching materials used had not helped students understand the subject matter. 52.90% of students stated that the information or material presented in teaching materials was not complete, and 100% of students still needed other sources of information such as Google search and other learning applications. As many as 76.50% of students stated that it was difficult to understand the circulatory system material and 47.20% of students said it was difficult to understand the human digestive system material. This is because apart from the broad and abstract nature of these two materials, the mechanisms occur in the body and cannot be seen directly by students. Meanwhile, according to Hadiprayitno et al. (2019) and Lee et al. (2015), the circulatory system material is considered difficult for students because the organs and processes that occur cannot be observed directly, the books used also do not contain colored pictures about the components and processes that occur so that they do not help students understand the material.

Needs Analysis

Based on the results of the analysis of student needs, it was found that 91.20% of students agreed that LKPD should be used as teaching materials in biology subjects, equipped with a cover, study instructions, basic competencies (KD), competency achievement indicators (GPA), and learning objectives. According to Maharani et al. (2020), Educators must include core competencies, basic competencies, and indicators of competency achievement that must be mastered by students. As many as 82.40% of students agreed that the LKPD used presented complete material and information. 97.10% of students agree that the LKPD is equipped with images that are relevant to the material to make it easier for them to understand the material. As many as 100% of students agreed that the LKPD used had activities or learning activities that could improve science process skills. As a reference in designing LKPD based on a scientific approach regarding color, 64.70% of students like blue, 58.80% of students like pink, and 52.90% of students like white.

Furthermore, 82.40% of students agreed that the LKPD used presented complete material and information. 97.10% of students agree that the LKPD is equipped with images that are relevant to the material

to make it easier for them to understand the material. Maroungkas et al. (2023), revealed that teaching materials equipped with pictures will facilitate understanding and strengthen memory, apart from that it can also provide a connection between the content of the material and students' real world, thus having an impact on satisfactory learning outcomes.

Curriculum Analysis

Curriculum analysis aims to see the sequence and scope of material required in accordance with the core competencies and basic competencies contained in the 2013 Curriculum, as well as formulating indicators of competency achievement and learning objectives. The analysis focused on the human circulatory system and digestive system. Based on the core competencies (KI) and basic competencies (KD) that have been determined in the curriculum, they can be used as guidelines in creating indicators of competency achievement that must be achieved by students. Based on the competency achievement indicators that have been determined, students are required to have the ability to explain, but also have the ability to analyze, especially in the competency achievement indicators regarding the principles of the ABO system blood grouping in humans and testing the content of food substances. On this indicator, practical blood group testing and food content testing will be carried out, so that students are expected to have scientific process skills.

Development Or Prototyping Phase (Development or Prototyping Phase)

Prototype I Development Results

In prototype I, the LKPD storyboard was designed based on a scientific approach. At this stage, it begins with designing the systematics of the LKPD, such as the cover, table of contents and images, presentation of learning objectives, presentation of material guided by KD 3.6 and KD 3.7, and learning activities that will be carried out in accordance with the Scientific stage. After the scientific-based LKPD was designed and the results obtained from prototype I, a self-evaluation was carried out by the researcher using a self-evaluation instrument.

Table 2. Self evaluation assessment result(self evolution)

Error	Follow up
There are several errors in writing and punctuation	Improve writing and use of punctuation
Some of the images used are unclear and blurry	Replace images with good image quality.

Prototype II Development Results

At this stage, a LKPD validation test is carried out with experts (expert review) using the LKPD validation instrument sheet. The expert assessment includes

aspects, namely construct, content, graphic and language aspects

Table 3. Validation Results of LKPD Based on a Scientific Approach

Rated aspect	Validity Value	Criteria
Construction Aspects	82.14	Very Valid
Content Aspect	91.67	Very Valid
Graphic Aspects	77.38	Valid
Language Aspects	87.50	Very Valid
Total	338.69	Very Valid
Average	84,67	Criteria

Based on analysis of LKPD validation test data based on a scientific approach, the overall average value of LKPD validation is 84.67% with very valid criteria. These criteria were obtained because the aspects of the LKPD construction that were developed were based on a scientific approach, contained appropriate study instructions, contained material that had been prepared systematically, presented evaluation questions that were in accordance with competency achievement indicators, had a bibliography that matched the citations used, and the scientific stages used can improve students' science process skills.

Judging from the content aspect assessment, the scientific approach-based LKPD obtained a validity value of 91.67% (very valid criteria). These criteria were obtained because the LKPD that was developed presented material that was in accordance with indicators of competency achievement, presented concepts of the human circulatory system and digestive system, presented worksheets that used stages from a scientific approach, and presented images that were appropriate to the material.

Judging from the graphic aspect assessment, the LKPD based on a scientific approach obtained a validity value of 77.38% (valid criteria). These criteria were obtained because the cover of the developed LKPD already presented images that were appropriate to the material. The size and layout of the image, title, student identity column, naa and logo on the cover are appropriate. The size and type of letters used in scientific approach-based LKPD are appropriate. Overall, the LKPD design based on a scientific approach is interesting. Judging from the linguistic aspect assessment, the scientific approach-based LKPD obtained a validity value of 87.50% (very valid criteria). These criteria were obtained because the LKPD that was developed used good and correct Indonesian language rules and was communicative. Apart from expert assessment, during the development of the prototype II stage, one-to-one evaluations were also carried out. This stage was carried out by three students with different abilities, namely high, medium and low abilities. This

evaluation activity is carried out by filling out a one-to-one evaluation instrument questionnaire.

Table 4. One to One Evaluation Results

Rated aspect	Results
Component Completeness	The scientific-based LKPD components are complete
Language	The language used is simple and easy to understand
Presentation	The material presented is easy to understand and is equipped with images that match the material
Graphics	The shape and size of the letters can be read clearly, the images are clear and the colors used are attractive.

Prototype Development Results III

This stage carried out a small group practicality test by 6 students with different learning outcomes, namely high, medium and low. Practicality results can be seen in table 5.

Table 5. Practicality Test Results by Small Groups

Rated aspect	Value of Practicality	Criteria
Ease of Use	97.22	Very Practical
Effectiveness of Learning Time	83.33	Very Practical
Benefits Obtained	90.38	Very Practical
Total	270.94	Very Practical
Average	90.31	

Based on the table of practicality test results above, the results obtained are that the ease of use aspect is 97.22% with very practical criteria, the effectiveness of learning time is 83.33% with very practical criteria, and the benefits obtained are 90.39% with very practical criteria. The overall average practicality value of LKPD based on a scientific approach by small groups is 90.31% with very practical criteria. This shows that the scientific-based LKPD developed is very practical.

Assessment Phase (Assessment Phase)

Practicality Test of scientific-based LKPD by Students in Large Groups (Field Test)

The results of the practicality test analysis in the scientific approach-based LKPD can be seen in table 6. Based on the table of practicality test results, it is known that the overall average is 88.30% in the very practical category. This shows that the LKPD based on the scientific approach developed is very practical for students to use. This criterion was obtained because from the aspect of assessing the ease of using LKPD based on a scientific approach, a practicality value of 88.31% was obtained (very practical criteria). The material and language used is clear so it is easy to understand. The size and type of letters used are easy to

read. The scientific stages and steps of practical activities contained in the scientific-based LKPD are clear so they are easy to implement.

Table 6. Practicality Test Results by Large Group (Field Test)

Rated aspect	The Value of Practicality	Criteria
Ease of Use	88.31	Very Practical
Effectiveness of Learning Time	87.50	Very Practical
Benefits Obtained	89.10	Very Practical
Total	264.91	
Average	88.30	Very Practical

LKPD based on a scientific approach can be used in group learning. Compiling printed teaching materials there are several provisions that must be used as guidelines, such as the language and sentences used are easy and clear. The letters used in compiling teaching materials should not be too small and easy to read. In the aspect of learning time efficiency in scientific-based LKPD, the practicality value was 87.50% (very practical criteria). These criteria are met because using LKPD based on a scientific approach can provide good time availability and time efficiency for students to master the material. This shows that by using LKPD based on a scientific approach in the learning process the availability of time for students to master the material in the learning process is more efficient. In accordance with (Turan et al., 2022), which states the function of teaching materials for students, students can learn at their own pace and students can learn whenever and wherever they want.

In the aspect of benefits obtained in LKPD based on a scientific approach, a practicality value of 89.10% was obtained (very practical criteria). Presenting material with appropriate pictures in LKPD based on a scientific approach helps students master the lesson material. This shows that having appropriate pictures in LKPD based on a scientific approach can help students to master the lesson material. Textbooks state that the role of illustrations can help students understand concepts that are difficult to explain in words and help them remember lessons. Apart from that, illustrations can also arouse student interest and motivation.

The language used in LKPD based on a scientific approach is clear, helping students to master the material easily. LKPD based on a scientific approach helps students re-study the teacher's explanation at home. LKPD based on a scientific approach increases students' interest in learning. This shows that with scientific-based LKPD students can help students repeat lessons independently at home. Tullis et al. (2020) states that the benefit of teaching materials is that students get

the opportunity to learn independently. Students also find it easy to learn each competency they must master

Scientific-based LKPD Practicality Test by Educators

The results of practicality tests by educators were carried out to see the practicality of LKPD based on a scientific approach. This assessment was carried out by one of the teachers who taught biology subjects in class XI SMA N 16 Padang. The results of scientific-based LKPD practicality data analysis can be seen in table 7.

Table 7. Practicality Test Results by Educators

Rated aspect	The Value of Practicality	Criteria
Ease of Use	100.00	Very Practical
Effectiveness of Learning Time	75.00	Very Practical
Benefits Obtained	97.22	Very Practical
Total	272.22	
Average	90.74	Very Practical

Judging from the aspect of assessing the ease of using LKPD based on a scientific approach, the practicality score is 100% (very practical criteria). This is because the material and language used in the LKPD are based on a scientific approach and are clear so they are easy to understand. The size and type of letters used are easy to read. The scientific stages and practical activities contained in the LKPD are clear so they are easy to implement. LKPD based on a scientific approach can be used in group learning.

Group learning can help students solve the problems they are give it can also train students' cooperative attitudes with their group friends. According to Kerimbayev et al. (2023), the scientific approach in the learning process emphasizes cooperation between students in solving problems. In the aspect of learning time efficiency in scientific-based LKPD, a practicality value of 75% (practical criteria) was obtained. These criteria are met because LKPD based on a scientific approach provides time for students to master the material, and provides time efficiency for educators by using LKPD based on a scientific approach in the learning process. This shows that by Minarni et al. (2023), using LKPD based on a scientific approach in the learning process, the time required for educators to carry out learning becomes more efficient. In accordance with the function of teaching materials for educators, namely that they can save educators' time in teaching and improve the learning process more effectively.

In the aspect of benefits obtained in LKPD based on the Scientific approach, a practicality value of 97.22% was obtained (very practical criteria). These criteria are met because the LKPD based on the Scientific approach supports the role of educators as facilitators and helps educators in explaining lesson material. LKPD based on

a scientific approach helps students master the lesson material by presenting appropriate pictures. The scientific stages in the LKPD increase students' interest in learning. The practical activities contained in the LKPD raise students' interest and motivation to do them. The evaluation questions contained in the LKPD can stimulate good students' thinking power and can be used for practice and as a measuring tool to determine the level of understanding of good students. The

appearance of scientific-based LKPD can increase students' learning motivation very well.

Science Process Skills Results

The value of science process skills is obtained through observation and assessment when students carry out practical blood group testing and food content testing. The assessment is carried out using the science process skills observation instruments provided. The average science process skills can be seen in table 8.

Table 8. Average Science Process Skills

Research Materials	Research Class	Average	Asymp. Sig. (2-tailed)	Note
Blood Type Test	Research Class	80.56	0.000	H1 is accepted
	Experimental Class	62.38		
Food Substance Content Test	Control Class Experimental	83.05	0.000	H1 is accepted
	Class Control Class	62.18		

Based on the value of science process skills and the results of the U-Test, it is known that the value of Asymp. Sig. (2-tailed) students' science process skills are smaller than 0.05, which indicates that H1 is accepted,

namely that there is an influence of the use of scientific-based LKPD on students' science process skills. In detail, the value of students' science process skills in each indicator can be seen in table 9 .

Table 9. Value of Students' Science Process Skills for Each Indicator

PPP indicators	Blood Type Test		Food Substance Content Test	
	Experiment	Control	Experiment	Control
Observe	88.89 ^s	68.57 ^s	83.33 ^s	60.00 ^s
Asking question	80.56 ^s	57.14 ^s	83.33 ^s	60.00 ^s
Grouping	80.56 ^s	57.14 ^s	80.56 ^s	51.43 ^s
Hypothesize	77.78 ^s	40.00 ^s	80.56 ^s	37.14 ^s
Interpret	83.33 ^s	60.00 ^s	86.11 ^s	57.14 ^s
Predict	77.78 ^s	48.57 ^s	80.56 ^s	42.86 ^s
Planning an Experiment	79.63 ^s	62.86 ^s	80.56 ^s	63.81 ^s
Using tools and materials	80.95 ^s	70.61 ^s	86.11 ^s	64.90 ^s
Applying concepts	77.78 ^s	54.29 ^s	80.56 ^s	51.43 ^s
Communicate	77.78 ^s	54.29 ^s	80.56 ^s	51.43 ^s
Average	80.56	62.38	83.02	62.18

Information: S = Significant; NS = Non-Significant

The results of the research showed that the experimental class that had used LKPD based on a scientific approach had higher science process skill scores than the control class, this was because LKPD activities in the form of experiments provided opportunities for students to practice scientific process skills, learning with a scientific approach required students to be active and participate during the learning process so that students' science process skills will emerge more often and be trained. According to Karyadi et al. (2018), applying a scientific approach to learning involves process skills, such as observing, classifying, measuring, predicting, explaining and concluding.

The use of scientific-based LKPD can support students' activities in practicing process skills, this is because LKPD already has scientific stages that are in accordance with the indicators of scientific process skills,

so that using scientific approach-based LKPD can train students' science process skills. In accordance with Hutapea et al. (2021) and Hadzigeorgiou et al. (2019), all aspects of science process skills are included in the scientific approach, so that when the scientific approach is truly applied in the learning process, students' science process skills will increase. The scientific approach has stages, most of which are indicators of scientific process skills, such as observing, asking questions, gathering information, processing information and communicating.

Completion and improvement of science process skills are also analyzed for each indicator of science process skills. Observation skills are basic skills that can be obtained through observing objects to obtain data. This skill is the most basic so that students are able to describe an object or event through observation. This is

proven by the average value of the control class on the observing indicator, which is 88.89 and 83.33. This happens because the picture illustrations on the LKPD based on the scientific approach used are clear so that students can carry out observation activities optimally. The observing stages in the scientific approach can train students' seriousness and accuracy in making observations. Observing activities aim to ensure that learning is closely related to the context of real situations faced in everyday life (Lodge et al., 2018; Holleman et al., 2020).

Question asking skills are students' skills to formulate questions scientifically. This skill is important to train because through asking questions, students do not just obtain information but also improve students' thinking abilities. The skill of asking questions can be trained through the questioning stages of a scientific approach-based LKPD (Agustina et al., 2024; Ranti & Usmeldi, 2019). At this stage students are given the opportunity to raise questions based on objects that have been observed, stimulating students to ask questions so that students can practice making scientific questions. The questioning stage can also develop students' curiosity.

The skill of formulating a hypothesis is the student's skill in making temporary answers to questions that have been asked previously (Eristya & Aznam, 2019). The average indicator value for formulating a hypothesis for the experimental class is much higher than the control class. This difference occurs because the experimental class has used LKPD based on a scientific approach which consists of a questioning stage (Oktiarini et al., 2023). Through the questioning stage students can be trained to formulate hypotheses based on the questions that have been asked (Pedaste et al., 2015).

Skills in planning experiments and using tools and materials, namely students' skills in determining the tools or materials to be used (Wijayati et al., 2019). Meanwhile, skills in using tools and materials are students' skills in knowing how to use tools and the reasons for using them (Haleem et al., 2022; Suarniati et al., 2018). These two skills can be trained through the stage of trying data in LKPD based on a scientific approach, this is because activities at this stage include planning, designing and carrying out experiments. This activity is also useful for increasing students' curiosity to strengthen understanding of concepts and principles by collecting data, developing creativity and scientific work skills.

Classification skills are students' skills to look for differences, similarities and compare characteristics, students are able to find the basis for grouping. This skill is closely related to observation, because this skill can be trained through the existing observation stages in the

scientific approach-based LKPD. In preparation for developing classification skills, it is necessary to prepare observation objects that are appropriate to the purpose of the observation. Prediction skills are students' skills in analyzing the results of experiments that have been carried out. Students are trained to use patterns from experimental results and suggest possibilities that will occur. From the research results, it is known that students' skills in predicting in the experimental class are higher than in the control class. This is because the scientific approach-based LKPD used by students in the experimental class can practice prediction skills through the associating or reasoning stages found in the scientific approach-based LKPD. Through this activity, students understand a concept because they directly discover facts from the results of experiments.

Data interpretation skills are the ability of students to connect the results of observations with the knowledge they have and their relationship to the surrounding environment, students are also able to find patterns from their observations so they are able to properly draw conclusions based on the results of their observations. done. Concept application skills are students' ability to apply concepts to new experiences to explain what is happening. can be trained through the associating stages in the LKPD based on a scientific approach. This stage aims to build the ability to think and behave scientifically. Classification, interpretation, forecasting and applying concepts skills can be trained through the reasoning or associating stages in the scientific approach-based LKPD (dos Santos Accioly Lins et al., 2021). Data obtained from the observation stages and collecting data that have been carried out previously will then be classified, processed, and specific relationships will be found. At this stage students can also carry out activities including analyzing data, grouping, creating categories, concluding and predicting the results obtained based on experiments.

Communication skills are students' skills to describe experimental data, explain experimental results, compile and submit reports systematically (Reith-Hall, 2022). This skill can be trained through communicating activities in LKPD based on a scientific approach. This stage is a means of conveying experimental data in verbal, written, drawing, diagram or graph form. This activity is carried out so that students are able to communicate their knowledge, skills and application, as well as students' creations through presentations, making reports and showing their work.

Conclusion

Based on the results of the development that has been carried out, it is concluded that the LKPD based on a scientific approach to the material on the human

circulation system and digestive system is very valid, very practical and very effective in improving scientific process skills. LKPD based on a scientific approach is effective for training students' science process skills to have the ability to observe, formulate questions, group, hypothesize, interpret, forecast, plan experiments, use tools and materials, apply concepts and communicate.

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Author Contributions

Conceptualization; M. R., V., A. R., M. F.; methodology; M. R.; validation; V.; formal analysis; A. R.; investigation; M. F. resources; M. R., data curation: writing—original; A. R, draft preparation; M. F.; writing—review and editing; M. R.; Visualization; M. F. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors have no conflicts of interest

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