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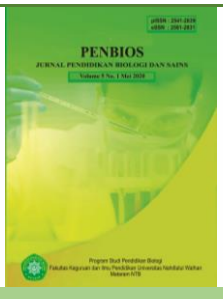

Research Article

Development Of Student's Activity Sheet (SAS) Based On Problem-Solving About Digestive System Materials In Humans In Class XI SMAN 1 Panyabungan Selatan

Nina Fadilah Lubis [a,1,*], Lufri [b,2]

[a,b] Jurusan Biologi, FMIPA Universitas Negeri Padang, Padang, 25132, Indonesia

[*]Corresponding author: ninafadilah144@gmail.com

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ABSTRACT

The problem behind this research is the way students learn who tend to only read and memorize textbooks. The teaching materials used by schools only rely on textbooks. This study aims to produce SAS based on problem-solving in the digestive system material in humans that is valid and practical. The SAS was validated by lecturers in the biology department of FMIPA UNP and biology teacher at SMAN 1 Panyabungan Selatan. The practicality of this product was carried out by one biology teacher and fifty students at SMAN 1 Panyabungan Selatan. As a result, problem-solving-based worksheets were developed using 3 stages of the 4D model, namely the define stage by analyzing learning needs using the curriculum, the design stage by Designing SAS components, and the Develop stage which aims to produce valid and practical SAS. The value of validity is 92.02% with very valid criteria, practicality by teachers is 90.38% with the criteria is very feasible and students are 89.28% with very feasible criteria. Based on this study, it can be concluded that Student Activity Sheets (SAS) based on problem-solving have been produced on the material of digestive system in humans in class XI of SMAN 1 Panyabungan Selatan which are valid and practical.

INTRODUCTION

Education is a conscious and planned effort to create an effective learning atmosphere and learning process so that students are able to develop themselves to have spiritual strength, self-control, intelligence, and noble character needed by students. A good education will produce a positive impact on the development of the nation, which is of high quality, namely by taking various ways and actions to produce intelligent students.

Improving the quality of education will give birth to a superior generation. Therefore, the government seeks to implement education in Indonesia as well as possible, one of which

is learning that is based on a scientific approach. This will have an effect on the learning development process of students and also affect student learning outcomes, including in the field of science.

One of the fields of scientific study is biology learning. Biology learning from the 1975 curriculum to the competency-based curriculum asks students to develop their skills through the use of scientific methods, practicum activities, process skills approach, implementation of experiments, and other approaches, including the concept approach (Ali et al., 2007).

Based on the results of observations made by the author on two teachers, namely Mrs. Masdewita Lubis, S.Pd., and Mrs. Hairunnisah, S.Pd., as well as 50 students at SMAN 1 Panyabungan Selatan, revealed that teachers have not used SAS based on problem-solving to guide students in solving problems. On the other hand, it was revealed that the learning process was still oriented towards memorizing subject matter which caused students to tend to memorize facts from textbooks.

This way of learning by rote does not equip students to solve problems in long-term life. This is because memorization can only last for a short period of time. Learning by rote makes it difficult for students to understand concepts in biology learning. Memorizing material from textbooks without understanding its meaning results in learning not being achieved, and the teaching materials used by teachers do not vary. Teachers only use textbooks in the biology learning process.

Based on interviews with class XI students in the July-December 2020 semester, it was revealed that learning biology is one of the lessons that has solid material and uses Latin a lot so students tend to try to memorize the material that has been given by the teacher. This is evident from the results of the author's interview with 50 students of SMAN 1 Panyabungan Selatan.

In line with the implementation of the 2013 curriculum, teachers are required to facilitate students with a variety of media. One of the efforts made is by using SAS which applies a more problem-solving-oriented scientific approach that can support student learning outcomes, especially on the Digestive System in Humans material.

Lufri et al. (2018) revealed that “The Student Activity Sheet (SAS) contains a set of activities fundamental things that must be done by students to maximize understanding in the formation effort basic abilities according to the indicators of achievement taken".

Based on the background of the problem that has been described, the researchers developed a SAS based on problem-solving about the Digestive System material in humans in class XI of SMA Negeri 1 Panyabungan Selatan.

METHOD

This development research uses three stages of 4-D Models. This study has research subjects, namely three validators with details, two lecturers of the Biology Department, FMIPA UNP, and one biology teacher. For the practical test, using one teacher at SMA Negeri 1 Panyabungan Selatan and fifty students in class XI at SMA Negeri 1 Panyabungan Selatan. The research was conducted in July-December 2021 at the Biology Department, FMIPA UNP, and SMA Negeri 1 Panyabungan Selatan.

This development only uses three stages due to time and cost constraints. Following are the details of the three stages.

1. *Define Phase (Defining)*

The defined stage has the aim of knowing the learning requirements using KI, KD, indicators, and subject matter based on the 2013 Curriculum, has stages of needs analysis, curriculum analysis, and SAS analysis.

2. *Design Phase (Design)*

The purpose of this stage is to design a prototype of a SAS based on problem-solving according to KI, KD, and specified learning indicators. The design stages are the selection of the type of media, the selection of the media format, and the initial design of the media.

3. *Development Stage (Development)*

The development stage is carried out to produce valid and practical SAS. At this stage, validation is carried out which is useful for checking the suitability of problem-solving-based worksheets with the applicable curriculum, correctness of concepts and grammar used, coloring, and appearance of worksheets. After validation, this SAS based on problem-solving was tested for practicality by teachers and students at school, to find out its usefulness, ease of use, and time efficiency of use.

The data analysis technique was carried out with descriptive statistics including analysis of validity and practicality.

1. *Validity Analysis*

The way to get validation data is by analyzing the questionnaire given to the validator. SAS analysis relates to the feasibility of content, language, presentation, and graphics. The answer score is given with the answer weight criteria according to the Likert scale modified from Sugiyono (2017) in Table 1.

Table 1. Criteria and Scores of Validity Analysis Answers

Criteria	Scores
strongly agree	4
agree	3
don't agree	2
strongly disagree	1

Then proceed with finding the validity value of the highest score, and the score obtained from the validator using the following formula.

$$validity\ value = \frac{total\ score\ obtained}{maximum\ score} x\ 100\%$$

Furthermore, the validity assessment is given based on the modified Pristiwanto (2016) criteria, as shown in **Table 2**.

Table 2. Assessment Criteria on Validity

Percentage range	Criteria
90%-100%	Very valid
80%-89%	Valid
60%-79%	Quite valid

0%-59%	Invalid

2. Practicality Analysis

The data from the practicality test were analyzed by the following formula:

$$Practicality\ value = \frac{total\ score\ obtained}{maximum\ score} x\ 100\%$$

After getting the results, then grouped according to the criteria that have been modified based on Purwanto (2012) in **Table 3**.

Table 3. Practicality Assessment Criteria

Percentage range	Criteria
90%-100%	Very practical
80%-89%	Practical
60%-79%	Quite practical
0%-59%	Impractical

RESULTS AND DISCUSSION

RESULTS

1. Define Stage (Defining)

a. Needs Analysis

The needs analysis was carried out through observation and interviews during Practice Field Experience at SMA Negeri 1 Panyabungan Selatan in December 2020. Based on the observations, it was found that students had difficulties in learning because the learning media used were minimal, the teacher only used one supporting book and at the school there is no SAS based problem-solving.

b. Curriculum Analysis

The curriculum that is used as a reference in the development of this SAS is the 2013 Curriculum in accordance with the core competencies (KI) and basic competencies (KD) in the structure of the 2013 Curriculum content.

c. SAS Analysis

In line with the demands of the 2013 curriculum, the expected SAS must use a problem-based scientific approach. The existence of a problem-based SAS on the Human Digestive System material is expected to improve student learning outcomes.

2. Design Phase (Design)

The development of SAS based on problem-solving is designed based on the guidelines for developing teaching materials compiled by the Ministry of National Education. There are three steps at this stage, namely: media selection, format selection, and initial design. This worksheet was created using the Microsoft Publisher application. This SAS based on problem-solving has several components including instructions for using SAS for students and teachers, problem-solving activities, competency reviews, understanding tests, competency tests, answer keys, and author biographies.

3. Development Stage (Development)

At this stage, validation and practicality testing of SAS based on problem-solving is carried out in the following stages.

a. SAS based on problem-solving validation

The results of the SAS based on problem-solving validation questionnaire analysis on the Human Digestive System material are shown in **Table 4**.

Table 4. Results of Questionnaire Analysis of SAS Learning Biology Based on Problem Solving on Digestive System Material in Humans

No.	Assessment components	Total	Validity value (%)	Criteria
1.	**Content Eligibility**	164	91,11 %	Very valid
2.	**language**	44	91,66%	Very valid
3.	**Presentation**	74	88,09%	Valid
4.	**Graphics**	70	97,22%	Very valid
	Average	**88**	92,02	Very valid

Information:
Validator 1: Drs. Ristiono, M.Pd
Validator 2: Ganda Hijrah Selaras, M.Pd
Validator 3: Masdewita, S.Pd

Based on **Table 4.** the average validity is 92.02% with very valid criteria. This has the conclusion that problem-solving-based worksheets on the Human Digestive System material developed are very valid so that they are used in the learning process.

b. Practicality of SAS Based on Problem-Solving

The results of the practicality questionnaire analysis are in **Table 5.** and **Table 6.**

Table 5. Data on the results of SAS Based on Problem-solving Practicality on the Digestive System Material in Humans by the Teacher.

No.	Aspect	Average Practical Value (%)	Criteria
1.	Ease of Use	85,71	Practical
2.	Learning Time Efficiency	100	Very practical
3.	Benefits	82,14	Practical
	Average	**89,28**	Very practical

Table 6. Data on the results of SAS Based on Problem-solving Practicality on the Digestive System Material in Humans by the Students.

No.	Aspect	Average Practical Value (%)	Criteria
1.	Ease of Use	91%	Very practical
2.	Learning Time Efficiency	90%	Very practical
3.	Benefits	90,16%	Very practical
	Average	**90,38**	Very practical

Based on **Tables 5** and **Tables 6**, it can be seen that the results of the practicality of SAS based on problem-solving on the Human Digestive System material by teachers are 89.28% with very practical criteria and 90.38% students with very practical criteria. So it

can be concluded that SAS based on problem-solving can be used as one of the supporting media in learning about the Digestive System material in humans.

DISCUSSION

1. Preparation of SAS based on problem-solving

This SAS based on problem-solving was developed using 3 stages of 4-D Models, namely: a) the define stage which is done by looking for learning requirements using KI, KD, indicators, and materials based on the 2013 Curriculum; b) the design stage by designing a SAS based on problem-solving with a guide procedure for developing teaching materials that has been prepared by the Ministry of Education. This SAS was created using the Microsoft Publisher application; c) the development stage, SAS validation is carried out by 3 validators, and SAS practicality is carried out by 1 teacher at SMA Negeri 1 Panyabungan Selatan and 50 students in class XI at SMA Negeri 1 Panyabungan Selatan.

2. Validity of SAS based on problem-solving

Analysis of the data from the SAS based on problem-solving validity questionnaire by the lecturer was based on four components, namely the feasibility of content, language, presentation, and graphics. The following is a breakdown of the validation values of each aspect.

a. Content Feasibility Aspect

Judging from the first aspect, namely the aspect of content feasibility, this aims to see if the content or substance of the developed product is really able to measure the concept to be achieved (Ghazali, 2016). The validation results obtained that the product obtained an average validation value of 91.11% with very valid criteria, so it can be stated that the SAS developed was in accordance with the 2013 Revised 2017 Curriculum and in accordance with the demands of Core Competencies (KI) and Basic Competencies (KD) described through Competency Achievement Indicators (GPA). The material in SAS is correct and clear, SAS is in accordance with the needs of students and can provide information to students. In addition, SAS has been able to direct students to be able to carry out problem-solving activities, namely problem analysis, problem formulation, hypotheses, collecting data, observational data, and settlement.

b. Language Aspect

The next aspect that is validated by the validator is the linguistic aspect. Obtained an average validation value of 91.66% with very valid criteria. This shows that the sentences used in SAS are good, clear, communicative, and do not cause confusion, so that the learning materials are easily understood by students. This is in accordance with the Government Regulation of the Republic of Indonesia No.19 of 2005 concerning National Education Standards (Depdiknas, 2008) that the preparation of teaching materials must be written clearly in order to reduce questions from students about things that students should be able to do.

c. Presentation Aspect

Judging from the presentation aspect, the average validation value was 88.09% with valid criteria. This means that SAS contains Basic Competencies (BC), Competency Achievement Indicators (CAI), and clear learning objectives. In addition, the developed SAS is structured systematically, has clear concepts, and activities in SAS can practice communication skills. Activities in SAS can practice teamwork skills. Activities in SAS can train creative and innovative thinking skills.

d. Graphical Aspect

Judging from the graphic aspect, SAS based on problem-solving obtained an average Validation value of 97.22% with very valid criteria. This means that the type of writing used in the developed SAS can be seen clearly, and the size used is appropriate. Tables on SAS have easy-to-understand information. In addition, the images presented already have good quality.

Overall, the average value of the SAS based on problem-solving validation results is 92.02%. Therefore, it can be said that SAS based on problem-solving on the Human Digestive System material is valid and can be used as a medium and learning resource in biology learning.

3. Practicality of SAS based on problem-solving

SAS based on problem-solving practicalities that have been declared valid by the validator is then given to teachers and students for practicality. SAS based on problem-solving practicality was carried out by one biology teacher and 50 students of SMAN 1 Panyabungan Selatan by filling out the SAS practicality questionnaire. The results of the SAS based on problem-solving analysis by teachers have an average score of 89.28% with very practical criteria. While the analysis of the results of the Practicality of SAS based on problem-solving by students has an average value of 90.38% with very practical criteria. This practicality value is the average of the three aspects tested, namely aspects of ease of use, the efficiency of learning time, and the benefits of using SAS. The following are the details of each practical aspect of the SAS.

a. Aspects of Ease of Use

SAS based on problem-solving when viewed from the aspect of ease of use has an average score of 85.71% in the practical category by teachers, and has a value of 91% by students with very practical criteria. These criteria indicate that the SAS has clear usage instructions, the size and type of writing are easy to read and the material presented in the SAS is clear, and the activities in the SAS are clear.

b. Aspects of Learning Time Efficiency

SAS based on problem-solving when viewed from the aspect of learning time efficiency has a value of 100% with a very practical category by the teacher, and has a value of 90% with very practical criteria by students. This criterion shows that the use of SAS makes learning time more efficient because students can not only study at school but can also study independently at home with the help of the SAS.

c. Benefit Aspect

SAS based on problem-solving when viewed from the aspect of the benefits of use has a value of 82.14% with practical criteria by the teacher, and has a value of 90.16% with a very practical category by students. These criteria indicate that SAS provides good benefits for teachers and students. The benefits of using SAS for teachers are SAS as teaching materials to assist the implementation of learning. SAS based on problem-solving can also be used by teachers in helping students in the process of finding problems and finding solutions to these problems.

In general, this research went smoothly, but some obstacles were still found, namely during the process of making SAS based on problem-solving that took a long time because it required skills in its manufacture.

CONCLUSION

The conclusion of this study is that Student Activity Sheets (SAS) based on problem-solving were produced on the material of the Digestive System in Humans in class XI of SMA Negeri 1 Panyabungan Selatan which are valid and practical.

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