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The Assessment of Science Process Skills in Biology Subject Lesson Plan Sheets

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Abstract: The purpose of this study was to find out the science process skills on the lesson plans for biology at SMA Negeri 1 Gorontalo. This research is a qualitative descriptive study to determine the existence of aspects of science process skills in lesson plans. This research data collection technique uses observation sheets and in-depth interviews. Data analysis includes data reduction, data presentation, drawing conclusions, and testing the validity of the data using the triangulation method. The primary data in this study were biology teachers in class XI, and the secondary data was obtained from notes or documentation in the form of odd semester biology lesson plans for class XI. The results of the study show that in the entire lesson plan which consists of 21 meetings, there are 3 formulations of science process skills in it, namely; observing skills, asking questions, and communicating skills. Other science process skills were obtained based on the results of the interviews conducted, namely classifying skills on the material of cells meeting 2, material of cells meeting 3, material on the structure and function of bones meeting 1, material on the structure and function of tissues in animals meeting 1, material on the structure and function of tissues on plants meeting 1, material on the structure and function of cells in the digestive system meeting 1, material on the structure and function of cells in the digestive system meeting 3, as well as material on the structure and function of the circulatory system meeting 1. Meanwhile, for all the science process skills studied lies in material membrane transport and nutrient assay.

Keywords: Biology; Learning implementation plan; Science process skills

Introduction

Learning that places the teacher as the center during the learning process is no longer used, because this makes students unable to contribute and become passive in learning at school. Current learning activities prioritize learning that places students as the center of the learning process (student center). Students are required to be active in contributing their opinions and ideas in the learning process, actively seeking materials from various learning sources other than those delivered by the teacher. This can be achieved when teachers can develop appropriate learning designs, starting from the process of planning, implementing, to evaluating (Puspita et al., 2016).

The learning process is in accordance with *Permendikbud* No. 22 of 2016 regarding process standards, stating that learning planning includes making syllabus and Learning Implementation Plans (RPP) which refer to content standards. Teachers also prepare learning media and resources, assessment tools, and scenarios in learning. The preparation of the syllabus and lesson plans is adjusted to the learning used. Based on this statement it can be seen that the entire learning process that will be taught in class is contained in the lesson plan which must be in sync with the syllabus used. Lesson plans are designs that contain plans that describe learning procedures and management to achieve a basic competency set out in the content standards described in the syllabus. Teachers are expected to be able to produce more meaningful learning for students through designs that are prepared to develop the potential of students (Nensy, 2019).

The potential that is developed is not only knowledge and marks, but also skills. The development of the potential and skills expected of students is the emergence of science process skills in the students' personalities. These skills are needed to improve, achieve, and practice various scientific theories. Learning should not always be oriented towards

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learning outcomes, but there are many skills that need to be provided to students (Guswita et al., 2018).

Biology learning activities are interactions between students and objects consisting of objects (living things), events, processes, and products (Wonorahardjo, 2020). Direct interaction can train students in developing their abilities and skills. Therefore, teachers need to formulate learning activities in the lesson plans that are used and provide more opportunities for students to interact with objects independently, so they can explore and find concepts. According to Putriana et al. (2017), Biology as a science field provides a variety of learning experiences to understand the concepts and processes of science. Biology is a branch of science that has a unique way of thinking. Thinking processes in biology include sensing, adaptation, and abstraction. Therefore, learning biology must be packaged in an effective form to realize a scientific approach and develop students' science process skills.

Science process skills are abilities that certainly make students have direct experience of a biological phenomenon around them. Science process skills are all directed scientific skills that are used to find facts, concepts, or theories. Taib et al. (2020) teaching and learning activities in schools haven't optimized some yet skills contained within students, this is because learning in class is still general and theoretical and less accustom students to using his thinking tools, temporarily in society students are required to can perform skills optimally. The results of OECD (Organization for Economic Co-operation and Development) research in Naviyati et al. (2022), show that Indonesia is ranked 74 out of 79 member countries through the results of the PISA (Program for International Student Assessment) test related to science studies. This proves that science learning has a very important and strategic role in improving the quality of human resources so that they are able to face various challenges, especially those related to science and technology (Ade, 2018). While the science process skills of students in Indonesia are still categorized as very minimal because there are still many schools that do not know the importance of science process skills. This situation is certainly an issue of particular concern for further study, because science process skills are basic skills that facilitate learning in science as well as enhance learning and research methods. Science process skills also enable students to be active, develop a sense of responsibility, as well as encourage students to use thoughts and actions efficiently and effectively to achieve a certain result. Science process skills are important for students to master because science can develop quickly and is not absolute, biology is no exception, so that students are accustomed to exploring and updating their knowledge based on their own experiences (Ariyansyah et al., 2022). According to Risamsu (2016) science process skills are all directed scientific skills which include aspects (cognitive and psychomotor) that can be used to discover a concept, principle or theory with the aim of developing pre-existing concepts, or also can be used as a denial of a discovery that has been made.

Science process skills are defined as the physical, mental, and competency abilities needed in effective science and technology learning with the aim of individual development, problem solving, and social development (Agustina et al., 2016). Science process skills are divided into two, namely basic SPS and integrated SPS (Widayanti, 2016). Basic KPS is a basic skill that is usually often carried out by students, namely the ability to rely on the senses, including observing objects and events from a case or experiment and then classifying them to find a new concept, by looking for similarities and differences (Zaki et al., 2013). Integrated KPS is an advanced skill from basic KPS, where students are trained to find out the answers to their questions themselves and design investigations to test and prove their truth through a scientific experiment (Amalia et al., 2016). These skills need to exist within every student to provide knowledge so that it can be applied in their lives (Ariyansyah et al., 2022).

Based on initial observations at SMA Negeri 1 Gorontalo, the learning process activities were centered in class only with students conducting group discussions and question and answer activities. The results of interviews with subject teachers, they said that they already knew about science process skills, so that there were several skills that had been applied during the learning process in class. Class XI IPA at SMA Negeri 1 Gorontalo has 7 classes, and there are 3 teachers who teach. In the results of other interviews, these teachers also said that the 3 teachers who were responsible for teaching in class only used 1 lesson plan, where the lesson plan was the result of deliberations from the three teachers.

What was found from the initial observations was that the teacher had applied several science process skills during class learning. Student activities to develop science process skills are certainly related to teacher creativity to create learning that can train the skills of each student. Science process skills will appear in the learning process if the device used in the form of lesson plans has formulated science process skills, and implemented in the learning process. So that what needs to be examined is what science process skills have been formulated in the lesson plan, even though the teachers have applied some science process skills during the learning process.

Science process skills in schools are very important as a provision for students to solve problems that might occur in their lives. Acording (Lestari et al. (2018) the role of process skills science in teaching and learning is very important for learning success. So in this case, efforts are

needed that can be done to overcome these problems. Therefore, the researcher is interested in conducting a study entitled "The Assessment of Science Process Skills in Biology Subject Lesson Plan Sheets of Class XI Odd Semester at SMA Negeri 1 Gorontalo".

Method

The type of research used is descriptive research. Descriptive research is a research method aimed at describing existing phenomena, which are taking place now or in the past, where there is no treatment given or controlled, and there is no hypothesis testing (Miles, 1992). Thus, the approach and type of research used is descriptive qualitative which aims to find out the aspects of science process skills in the lesson plan. The research flow begins with the preparation stage, namely compiling instruments in the form of observation sheets and interview guidelines to find out the developed KPS points, then validated by the validator. The second stage conducted research interviews with the class XI biology teacher and identified the existence of KPS in the lesson plans using the instruments that were made. The final stage is processing and analyzing research data.

Result and Discussion

In the research results obtained from the field, there are three science process skills (SPS) formulated in all class XI biology lesson plans at SMA Negeri 1 Gorontalo, odd semester, totaling 21 lesson plans, namely; observing skills (SPS.01), asking questions skills (SPS.05), and communicating skills (SPS.10). This is in accordance with the interviews conducted with the three teachers. In addition, there are other science process skills at several meetings based on the results of interviews conducted with the three biology subject teachers, which are: (a) "Lesson Plan of Cells Meeting 2" on cell activities as a structural and functional unit of living things (LP.02), there are five SPS, namely SPS.01, SPS.02, SPS.05, SPS.09, and SPS. 10. (b) "Lesson Plan of Cells Meeting 3" on membrane transport and protein synthesis to compile the morphological and physiological properties of cells (LP.03), there are all SPS components studied, namely SPS.01, SPS.02, SPS.03, SPS .04, SPS.05 SPS.06, SPS.07, SPS.08, SPS.09, SPS.10, and SPS.11. (c) "Lesson Plan of the Structure and Function of Bones, Muscles, and Joints Meeting 1" on the mechanics of motion and types of motion (LP.05) there are four SPS, namely SPS.01, SPS.02, SPS.05, and SPS.10. (d) "Lesson Plan of Tissue Structure and Function in Animals, Meeting 1" regarding tissue structure in animals (LP.08), there are four SPS, namely SPS.01, SPS.02, SPS.05, and SPS.10. (e) "Lesson Plan of the Structure and Function of Tissues in Plants, Meeting 1" on the types of tissues in plants (LP.10) there are four SPS, namely SPS.01, SPS.02, SPS.05, and SPS.10. (f) "Lesson Plan of Cell Structure and Function in the Digestive System Meeting 1" on nutrition, BMR (Body Mass Index) and BMR (Basal Metabolic Rate), as well as a healthy menu (LP.13), there are all SPS components studied, namely SPS .01, SPS.02, SPS.03, SPS.04, SPS.05 SPS.06, SPS.07, SPS.08, SPS.09, SPS.10, and SPS.11. (g) "Lesson Plan of Cell Structure and Function in the Digestive System, Meeting 3" on the structure and function of the ruminant digestive system network (LP.15), there are four SPS, namely SPS.01, SPS.02, SPS.05, and SPS.10. (h) "Lesson Plan of the Structure and Function of the Circulatory System, Meeting 1" about the parts of the blood; blood cells and blood plasma, there are four SPS, namely SPS.01, SPS.02, SPS.05, and SPS.10. For more details can be seen in the Table 1.

Table 1. Research Data

SPS	Lesson Plans (LP)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
SPS.01	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
SPS.02		√	√		√			√					√		√		√				
SPS.03			√										√								
SPS.04			√										√								
SPS.05	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
SPS.06			√										√								
SPS.07			√										√								
SPS.08			√										√								
SPS.09		√	√										√								
SPS.10	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
SPS.11			√										√								

Description: SPS.01: Observing; SPS.02: Classifying; SPS.03: Interpretation; SPS.04: Predicting; SPS.05: Asking Questions; SPS.06: Hypothesize; SPS.07: Planning Experiments; SPS.08: Using Tools and Materials; SPS.09: Applying Concepts; SPS.10: Communicating; SPS.11: Conducting Experiments.

Observing Skills (SPS.01)

The formulation of SPS.01 is found in all lesson plans used, because these skills are basic skills which are generally always carried out in learning activities. Activities that use various senses on events that occur in a case or experiment are the most basic skills that must be possessed by every student.

Based on the analysis of the data in the lesson plans and interviews with the three teachers, it can be seen that; Observing skills which are formulated are only limited to seeing the display of images in the form of objects or phenomena presented in power point, then students express what they have seen and carry out discussions as usual. This is a way of learning scientific concepts related to the results of initial observations. Putra et al. (2015), states that the activity of observing objects or phenomena is a stimulant to bring students towards the material to be studied. Students who already have good observation skills can practice other science process skills.

Classifying Skills (SPS.02)

The formulation of classifying skills is not contained in the lesson plans, but based on interviews with the three informants and reinforced by interviews with students, it turns out that classifying activities are often carried out in several meetings. The classifying activity in question is to distinguish characteristics and look for differences/similarities. This is in line with Tawil et al. (2013), who state that classifying skills are recording each observation made separately, looking for differences and similarities, contrasting features, comparing, as well as finding a basis for grouping or classification. SPS.02 was only found in a few meetings, because the material taught was related to structure and types, including; animal tissue, plant tissue, digestive system, and circulatory system. Based on this, it can be said that learning activities have formulated SPS.02 and have been implemented during the learning process.

Interpretation Skills (SPS.03)

Interpretation skills (SPS.03) are not formulated in lesson plans, but are carried out in two meetings based on interviews from T.03. According to the results of the interview, SPS.03 is in the membrane transport material and the food substance test. Both of these materials hold experiments or practicum directly where students make conclusions related to the results of the experiments carried out. This is in accordance with the formulation of interpretation, which asks students to conclude from an experiment. This is in line with the research conducted by Salosso et al. (2018), which states that the learning process which involves students directly in conducting practicums can make students have their own observations and make it easier to draw conclusions.

Predicting Skills (SPS.04)

Predictive skills do not exist or are not formulated in lesson plans. However, based on interviews with T.03, SPS.04 was carried out after conducting an experiment where the teacher asked for opinions after doing the practicum. For example in the food substance test; "Will the same color appear if the material being tested is with another material?" Based on this, students are trained to predict. This is in line with Kurniawati (2021), who states that predicting is an activity of exposing what possible outcomes might occur from an experiment based on the observations that have been made. This is reinforced by the opinion of Sulistri et al. (2018), which states that students are faced with a situation and are asked to predict what will happen if changes are made to the situation.

Asking Questions Skills (SPS.05)

The formulation of SPS.05 or the skill of asking questions is contained in LP.01-LP.21 with statements where students are given the opportunity to identify as many things as possible that are not understood, starting from factual questions to hypothetical questions. That is, this activity asks students to examine more deeply related to what material they have not understood and described in the form of questions, then discuss it together.

This statement is in accordance with Suryaningsih (2017), which explains skills in asking questions, namely; students ask what, how, and why, ask for clarification, as well as ask questions with a hypothetical background.

The results of the interviews with the three class XI biology teachers were in accordance with the lesson plans that were made, where the informants explained that question and answer activities were always carried out in every meeting. Questions that arise from students are then responded to by other students.

Hypothesize Skills (SPS.06)

Predictive skills do not exist or are not formulated in lesson plans. However, based on interviews with T.03, SPS.06 is always carried out when conducting experiments. In the membrane transport experiment and the food substance test, students were asked to hypothesize and after that the truth was tested through the experiments carried out. According to Suryaningsih (2017), hypothesizing is realizing that an explanation needs to be tested for its truth in obtaining more evidence or looking for ways to solve a problem.

Planning Experiments (SPS.07)

Experiment planning skills do not exist or are not formulated in lesson plans. However, based on interviews with T.03, SPS.07 was carried out in experiments on materials of membrane transport and food substance tests. In this activity students are asked

to prepare tools and materials as well as master the work steps to be carried out. Therefore it is included in the skill of planning experiments. According to Fitriana et al. (2019), the skill of planning an experiment is asking students to remember the work steps that have been made before doing the practicum. In addition, according to Tawil et al. (2013), that the skill of planning an experiment is an activity that trains students to know the tools and materials to be used, to master the work steps to be carried out, as well as to determine what will be observed. So, it can be said that SPS.07 is in learning activities.

Skills of Using Tools and Materials (SPS.08)

Skills in using tools and materials do not exist or are not formulated in lesson plans. However, based on the interview with T.03, SPS.08 was applied in the experiment. Students are directly involved in the use of tools and materials when conducting experiments. This of course can increase the knowledge and skills of students to be more skilled and careful when using laboratory equipment.

Skills of Applying Concepts (SPS.09)

The skills to apply concepts are not formulated in lesson plans. However, student activities related to applying the concept have something to do with the experiment. From the results of interviews with T.03, when conducting experiments students will adapt the concepts they have learned to the experiments students will do. This is in accordance with Santiawati et al. (2022), that the activity of applying concepts can be seen based on how students understand a concept and apply it when conducting an experiment.

Communicating (SPS.10)

The formulation of communication skills is contained in lesson plans with statements asking students to present the results of group or individual work, which are then responded to by other groups or students. This activity is in LP.01 to LP.21. This statement is in line with Tawil et al. (2013), which states that communication activities namely; describe the empirical data obtained from the results of experiments or observations as well as compiling and presenting it in the form of a clear and systematic report. So that it can be said that SPS.10 has been formulated in the lesson plans.

Presentation activities between groups are always carried out at every meeting. This is in accordance with the information from the three subject teachers, where in every meeting it is certain and always that students hold group discussions to discuss the ongoing learning material. So that the formulation of lesson plans and the implementation of communication skills are in accordance with the learning process in class.

Skills of Conducting Experiments (SPS.11)

Skills of carrying out experiments or SPS.11 are experimental activities that are not formulated in the lesson plans. The formulation seen in the RPP is that students are directly involved in experimental activities. This is in accordance with the statement of T.03, that in carrying out an experiment, of course students must be directly involved in the activity.

Description: T.01: source person 1; T.02: source person 2; T.03: source person 3, LP.01-LP.21: lesson plan meeting 1 to meeting 21.

Conclusion

Based on the results of the analysis and discussion that has been carried out, it can be concluded that the science process skills contained in all lesson plans are; observing skills, asking questions, and communicating skills. Other SPS obtained based on the results of interviews conducted, namely; classifying skills on material of cell meeting 2, material of cell meeting 3, material of structure and function of bone meeting 1, material of structure and function of tissues in animals meeting 1, material of structure and function of tissues in plants meeting 1, material of structure and function of cells in the digestive system meeting 1, material of structure and function of cells in the digestive system meeting 3, as well as material of structure and function of the circulatory system meeting 1. Meanwhile, all SPS studied lies on material of membrane transport and nutrition tests.

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