JOURNAL OF BIOLOGY EDUCATION
J O B E
E-ISSN 2656-3436/ P-ISSN 2615-3947
IAIN KUDUS
http://journal.iainkudus.ac.id/index.php/jbe

Difficulties Analysis of Pre-Service Biology Teacher in Developing Students' Worksheet to Support Biology Online Learning in XI Class of Senior High School

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ABSTRACT

This study aims to analyze the difficulties of Pre-Service Biology Teachers in developing student worksheets that can support online learning in Biology subjects in Class XI High School. The subjects in this study were 70 Pre-Service Biology Teachers in the fourth semester of the Biology Education Study Program, The teacher training and eduation faculty of Sriwijaya University. The sampling technique is a saturated sampling technique. The type of research used is descriptive qualitative with data collection carried out using a questionnaire to analyze the difficulties of Pre-Service Biology Teachers in developing students' worksheet and followed by interviews. Based on the results obtained, it is known that there are fourteen Biology materials for XI class of senior high school which were developed by Pre-Service Biology Teachers to become students' worksheet. Difficulties encountered by Pre-Service Biology Teachers in developing students' worksheet include determining supporting information (62.3%) in the high category, compiling discussion questions (58.8%) in the high category, and determining work steps (41.1%) in the high category. This could be an evaluation in the learning process so that in the end Pre-Service Biology Teachers can solve problems related to the difficulties encountered in developing Biology Materials students' worksheet.

Keywords: difficulties analysis, Pre-Service Biology Teachers, students' worksheet, online, Biology

INTRODUCTION

A learning process will run well if it is carried out by teachers who have competency standards as educators. A pre-service teacher also needs to have these standards. Pre-service teacher needs to have the readiness to become a professional teacher candidate based on the competency standards of educators. The competency standards for educators include pedagogic, personality, professional, and social competencies (Sukmawati, 2019). Law Number 14 of 2005 concerning teachers and lecturers explains that teacher competence is a set of knowledge, skills, and attitudes in the form of intelligent and responsible actions in carrying out their duties as learning agents (UU, 2005) .

The pedagogical competencies of a teacher include mastering the characteristics of students from various aspects (physical, moral, social, cultural, emotional, and intellectual), mastering learning theory and educational learning principles, developing curriculum related to the field of development being taught, and organize educational development activities. In addition, this competency is also related to the ability to utilize information and communication technology for the benefit of organizing development activities that educate and facilitate the development of students' potential to actualize their various potentials. Pedagogic abilities are also related to the ability to communicate (effectively, empathically, and politely) with students, conduct assessments and evaluations of learning processes and outcomes, utilize the results of assessments and evaluations for the benefit of learning, and take reflective actions to improve the quality of learning. This competency also requires teachers to present themselves as honest, noble, and role models for students and the community, present themselves as individuals who are steady, stable, mature, wise, and authoritative and demonstrate a work ethic, high responsibility, a sense of pride. become a teacher, and self-confidence also upholds the code of ethics of the teaching profession (Permendiknas, 2007).

The next competency is personality competency. These competencies include acting in accordance with Indonesian religious, legal, social and national cultural norms. The next competence is social competence. Social competence is related to the ability to be inclusive, act objectively, and not discriminate because of considerations of gender, religion, race, physical condition, family background, and socioeconomic status. This competency is also related to the ability to communicate effectively, empathically, and politely with fellow educators, education staff, parents, and the community. Social skills also require teachers to be able to adapt in places of duty throughout the territory of the Republic of Indonesia which has socio-cultural diversity, communicate with their own professional community and other professions orally and in writing or in other forms and scientific mindset that supports the subjects taught. Teachers also need to master competency standards and basic competencies of the subjects/fields of development being taught, develop creatively guided learning materials, develop professionalism in a sustainable manner by taking reflective actions, and utilize information and communication technology to communicate and develop themselves (Permendiknas, 2007).

Based on the description above, the pedagogic and professional competence of teachers is related to learning. A teacher and even a pre-service teacher should also always try to develop these competencies. Competence in designing learning using teaching materials that are in accordance with the characteristics of the material and students needs to be possessed by pre-service teacher. This is because pre-service teachers will also teach and prepare for learning in schools. This is in line with what was expressed that to become a professional teacher one should master science as a source of material to be taught, mastery of learning methods and models and plan learning activities in order to achieve a smooth educational process including designing teaching materials (Uno, 2012).

Teaching materials are materials used to assist and facilitate teachers in the learning process. The teaching materials themselves must meet criteria such as logically arranged, according to the stage of student development, can stimulate student curiosity and be up-to-date and contextual. According to Mahrawi, et.al. that in developing a teaching material, it must also meet certain criteria such as the feasibility of the material component or the feasibility as a medium (Mahrawi, Usman, & Setiani, 2021). One of the teaching materials used to complete practical activities in Biology is a student worksheet.

Student worksheets are teaching materials that contain material, summaries, and instructions for carrying out tasks carried out by students and refer to the basic competencies achieved (Prastowo, 2011). Student worksheets is part of a learning tool that supports the learning process so that it is more optimal (Laelasari & Supriatno, 2019). This is expected to help students to increase information about the concepts learned through structured learning activities (Juwita, Putri Utami, & Sri Wijayanti, 2019). Therefore, it can be seen that student worksheets is one type of teaching material that has components that must be done by students and is expected to be one of the things used and utilized by educators to motivate student involvement in the learning process in a subject.

Student worksheets have several benefits. Among other benefits, it is hoped that it will make it easier for educators to manage the learning process, help educators direct their students to find and understand concepts in a learning material by doing activities independently or in group work activities. Student worksheet can also be used to develop some skills. Student worksheet can also be used to develop certain attitudes such as the scientific attitude of students. In addition, educators can also evaluate the learning process has achieved learning objectives (Lestari, 2018). This is in line with what was revealed that with the student worksheet, it is expected that students will interact with the material provided so that in the end it can increase students' mastery of the material provided (Sinatra, 2013).

Appropriate and good student worksheets will be related to basic competencies and indicators in learning from certain materials. In its application, student worksheets will be related to other sources of teaching materials, especially those related to theory and practice (Khotimah, Nyeneng, & Sesunan, 2017). A student worksheet that meets the appropriate criteria from the material, media, and language aspects is expected to be used as a source or learning material for teachers and students (Kalifah & Nugraheni, 2021). It is also revealed that a good student worksheeter will have the main elements that become a reference in its manufacture. These elements include having a theme that covers the whole, having stages on how to use student worksheets. In addition, student worksheets will also refer to competencies that have been determined according to the subject matter, have references from other sources, and have practice questions and practices (Andi Prastowo, 2014).

Based on the results of observations on the learning of Curriculum Subjects and the development of teaching materials carried out in the Even Semester of the Biology Education

Study Program, The Teacher Training and Education Faculty of Sriwijaya University. There were still obstacles and difficulties in compiling teaching materials for the type of student worksheets. According to Danial & Sanusi (2020) revealed that in compiling student worksheets, a teacher only needs to get training. This is because in compiling student worksheets a good plan is needed to achieve an effective learning process. On the other hand, the teacher does not fully understand the principles and technical steps of preparing student worksheets. Therefore, in compiling the student worksheet, it is necessary to practice and it is necessary to know the components that become difficulties in compiling the student worksheet, especially for pre-service teachers.

In this curriculum and the development of teaching materials Course,Pre-Service Biology Teachers are assigned to compile student worksheets according to the selected biology material. The material chosen is the subject matter of Biology in XI Class of Senior High School. Based on this, it turns out that pre-service teachers encounter obstacles in several components. Therefore, these obstacles need to be analyzed and used as material for future evaluation. Student worksheets prepared at this time are also expected to support student learning which is still being carried out online. So far, student worksheets are in the form of sheets containing student activities that allow students to carry out real activities with the objects and problems they face (Katriani, 2016). At this time, the development of Biology student worksheets has led to digital designs such as using live worksheets (Nadifatinisa & Sari, 2021). This is in line with the current innovation of student worksheets, especially during the Covid Pandemic, which has led to digital designs using applications that can be accessed using the internet (Fuadi, Melita, & Syukur, 2021). Therefore, it can be seen that the different thing is that in the past the student worksheet design did not lead to a digital design, while at this time the student worksheet that was compiled was expected to support online learning.

Based on the description above, it is necessary to carry out further analysis of the difficulties thatPre-Service Biology Teachers encounter in compiling student worksheets according to the basic competencies they have chosen. The difficulties analyzed are related to the components of the student worksheet that were developed such as titles, study instructions, basic competencies, objectives, supporting information, activity work steps, and discussion questions. In addition, the material that is the theme of the student worksheet is also documented. The goal is to find out and analyze the difficulties encountered byPre-Service Biology Teachers, which are expected to be used as evaluation materials for lecturers to find the right learning strategies to overcome these problems. In addition, it can also be useful forPre-Service Biology Teachers to improve the quality of their skills in developing student worksheets on certain components that are considered difficult.

RESEARCH METHOD

This research is a qualitative descriptive research. This study was to analyze and describe the difficulties ofPre-Service Biology Teachers in developing student worksheets for

Biology subjects in XI Class of Senior High School. The subjects in this study were 70Pre-Service Biology Teachers for Biology Education, The Teacher Training and Education of Sriwijaya University, semester IV who took Curriculum and Teaching Material Development Courses in the Even Semester of the 2021/2022 Academic Year. The sampling technique used is the saturated sampling technique. Saturated sampling technique is a sampling technique with all members of the population used as samples (Sugiyono, 2015).

The instrument in this study was a questionnaire to analyze the difficulties of Pre-Service Biology Teachers in compiling student worksheets. The components contained in the student worksheet include titles, study instructions, basic competencies, objectives, supporting information, work steps, and discussion questions. The type of questionnaire used is a closed questionnaire with each statement in each component filled in according to a rating scale from a scale of 1 to 5. The number of statements contained in the questionnaire is 35 items. The compiled questionnaire was transferred to a Google Form. The results obtained for each component are then converted into percentages (Riduwan, 2015). The interpretation table of the percentage range obtained is presented in Table 1.

Table 1. Interpretation of Percentage Range

Percentage Range	Criteria
81-100	very high
61-80	high
41-50	average
21-40	low
0-20	very low

The results of the questionnaire were followed up by conducting interviews regarding the student worksheet components that were difficult to develop. The results of this interview provide further explanation of the difficulties faced byPre-Service Biology Teachers in compiling a student worksheet. Semi-structured interviews were conducted by taking into account the components of the student worksheets.

RESULT AND DISCUSSION

Based on the activities that have been carried out, data related to the type of student worksheet developed were obtained. In addition, data were obtained on the theme of the selected student worksheets or selected biology materials based on the basic competencies and difficulties faced byPre-Service Biology Teachers in developing certain components in the student worksheet for XI Class in Biology Subjects of Senior High School.

Student worksheets developed 85.7% are experimental types and 14.2% are non-experiments. Table 1 presents Biology material that was developed into student worksheets.

Table 2. Biology Materials on Student Worksheet

No	Theme/Material
1	Food containing fat
2	Solution diffusion
3	Counting pulse
4	Animal tissue and its structure
5	Plant tissue
6	Respiration system
7	Types of vascular bundles in plants
8	Cartilage and bone
9	Plant and Animal Cells
10	Membrane Transport: Diffusion and Osmosis
11	Muscle Contraction
12	Anatomical Structure of the Kidney
13	Test the content of substances in the urine
14	Blood type test

Based on Table 2, the material developed in the form of student worksheets consists of materials related to the digestive system, respiratory system, excretory system, movement system and digestive system. This is in accordance with Permendikbud 36 (2018) that for high school levels using the 2013 Curriculum for XI class in Senior High School, basic competencies related to practicum activities refer to skill competencies.

These skill competencies lead to processing, reasoning, and presenting in the concrete and abstract realms related to the development of what they learn in school independently, acting effectively and creatively, and being able to use methods according to scientific rules. Based on these competencies, an activity that develops skills is developed. Figure 1 presents the percentage of difficulties encountered byPre-Service Biology Teachers in compiling the student worksheet components.

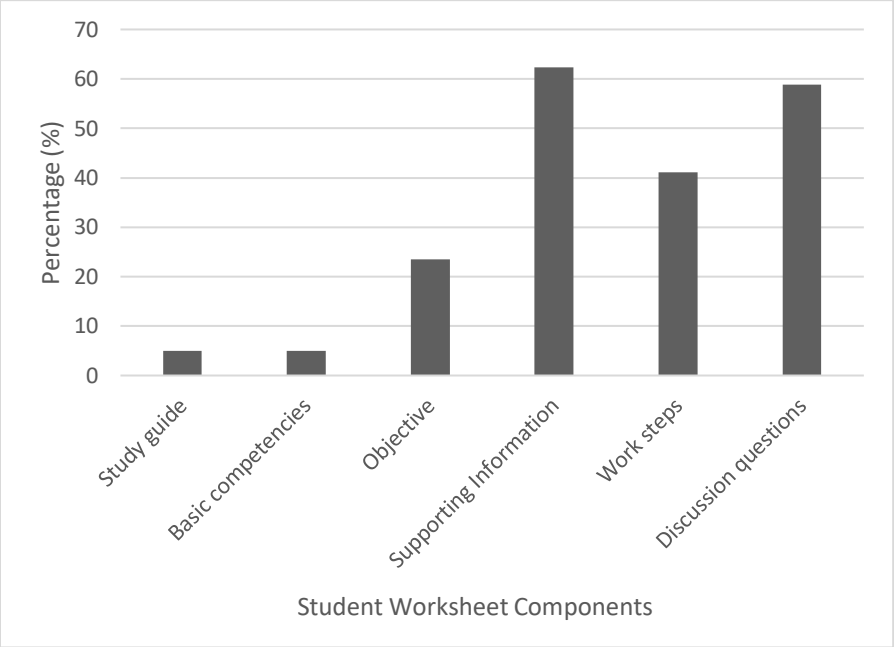

Figure 1. Percentage of the Difficulty ofPre-Service Biology Teachers in Compiling The Components of Student Worksheet

Figure 1 shows the difficulty ofPre-Service Biology Teachers in compiling student worksheets. The difficulties found are in the components of compiling supporting information (62.3%) in the high category and discussion questions (58.8%) in the high category. The next component is compiling work steps (41.1%) with average category. Then followed by setting goals, interpreting basic competencies and compiling learning instructions.

Based on the results of interviews that in compiling supporting information, pre-service teachers encounter obstacles because in compiling information the material presented must be obtained from various credible reference sources and may not present material that can answer discussion questions. Supporting information should also emphasize the material or theme raised in the student worksheet and not explain in detail the material raised so that students find answers to discussion questions from this component. According to Susena, et al. that in identifying appropriate material to be presented in learning is one of the difficulties for teachers in planning a form of learning using certain teaching materials because teachers need to limit the breadth of material and depth of material (Susena, Triwahyuningsih, Supriyadi, & Arief, 2013). Supporting information is one of the components developed in student worksheets as an element of teaching materials in science subjects that are taught through experiments not only as memorization (Rienaldi, 2021). Therefore, based on the description above, it is known that the supporting information component is related to the teacher's understanding/ability to understand the related material, especially related to the breadth and depth of the material so that the supporting information presented supports students to

understand the material content but does not get answers to discussion questions from this component.

The next component of the student worksheet which is quite difficult to develop is the work steps. This relates to the theme or biology material chosen by Pre-Service Biology Teachers. According to Trianto, in compiling both experimental and non-experimental worksheets, several things must be considered. Experimental worksheets will involve many senses, train process skills, instill discipline and responsibility, challenge students to find new things and be able to explore original ideas from students. On the other hand, non-experimental student worksheets also require considerations such as more efficient time, relatively cheap, easy to achieve, more controlled and easier to use (Trianto, 2008). The work steps is a component that is difficult to implement. In addition, students must also consider the student worksheet which is prepared to be carried out independently by students because it is related to learning that is still not fully face-to-face.

Based on the results of the interview, although the design of the student worksheet is still a printed student worksheet, students also need to prepare the student worksheet which has a digital design so thatPre-Service Biology Teachers also need to consider that this student worksheet can also be used independently or even group. Fuadi et al. stated that the innovation of student worksheets into digital designs needs to be done as a component that supports learning during the Covid-19 Pandemic. This innovation requires skills in constructing it because students will use mobile phones and laptops in the learning process (Fuadi et al., 2021). This is in line with that expressed by Lavtania, et al. that in developing digital student worksheets, in the process of compiling work steps it is necessary to pay attention to the skills acquired by students so that the approach presented should also be an approach that directs students to find concepts such as the scientific approach (Lavtania, Nulhakim, & Utari, 2021). Therefore, based on the description above that in designing the work steps of the activities in the student worksheets, Pre-Service Biology Teachers need to consider that not only activities can be carried out but also these activities will be presented in a form that facilitates students to learn independently or even by online.

The next component that is quite difficult for students to design in the student worksheet is the discussion question. This is because discussion questions must lead students to find concepts based on observational data obtained through good and correct work steps, while discussion questions made by students have not led to exploring students' ability to find concepts. Chandra revealed that a teacher's ability to make questions still does not use attractive, contextual stimuli, has not measured cognitive abilities at the level of analysis, evaluation or creation (Chandra, Heryadi, & Keguruan, 2020). Other research also reveals that teachers need to be trained in making student evaluation tools so that a good learning process is created that is able to achieve learning objectives (Herawati, 2021). Therefore, it can be seen that making discussion questions requires skills so practice is needed to achieve these skills.

This is because the discussion questions must be able to guide students to find their own concepts from the biology material (Laelasari & Anggraeni, 2017).

CONCLUSION

The conclusion is that there are fourteen materials compiled byPre-Service Biology Teachers to be further developed into themes in student worksheets. Based on the results of the analysis that the difficulties encountered by biology pre-service in compiling supporting information (62.3%) were in the high category, discussion questions (58.8%) were in the high category, and work steps (41.1%) were in the average category. This is also because students also need to consider that this student worksheet can support online learning so that in compiling the student worksheet. It is necessary to innovate in its activities and presentation. Based on this, it is also known that these components require emphasis in the process of training students in lectures, especially to be able to determine the right supporting information, appropriate work steps and discussion questions that can guide students in finding concepts.

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