A Meta Analysis on Biology Worksheet’ Students Forms

Tri Windari* and I Gusti Suryadharma
Yogyakarta State University, Yogyakarta, Indonesia

*E-mail: winndari24@gmail.com

Abstract: This study was aimed to analyze LKPD (students’ worksheet) in Biology subjects. The LKPD (students’ worksheet) is a collection of sheets containing the activities of students that allow students to carry out real activities with objects and problems learned. The LKPD (students’ worksheet) is used by teachers in facilitating students and must be oriented to the scientific process to find or prove the concept. This research method is a meta-analysis. Data collection techniques were by searching for electronic journals on Google and Google scholars. The population of this study is the level of secondary education, especially high school. The sample is LKPD (students’ worksheet) of Biology subjects. Based on the meta-analysis, the results of this study are the LKPD (students’ worksheet) in Biology subjects can be grouped according to their form, namely LKPD which helps students find concepts, LKPD as a learning guide, LKPD as reinforcement, LKPD as practical guide. The LKPD (students’ worksheet) classification including conventional LKPD (students’ worksheet), approach based LKPD (students’ worksheet), learning model based LKPD (students’ worksheet), character education based LKPD (students’ worksheet), thinking skills based LKPD (students’ worksheet), problem based LKPD (students’ worksheet), and technology based LKPD (students’ worksheet). The form of LKPD (students’ worksheet) finding the highest concept of 39% and the highest frequency is conventional LKPD (students’ worksheet) of 12.

Keywords: Students’ worksheet; Classification, Meta analysis; Biology subjects.

1. Introduction

Biology is one of the compulsory subjects in the Department of Natural Sciences (IPA) and is one of the specialization programs for students majoring in Social Sciences (IPS). Biology has an organizational level study from the cell level to the biosphere. Biology is included in science; science always experiences development through sequential steps. These steps are reflected in scientific research methods, scientific attitudes and the results are scientific products.

The 2013 curriculum is loaded with scientific approaches in which learners are more directed to find concepts. To find the concept, approaches, models, learning strategies are needed in the learning tools, starting from the syllabus, lesson plans and teaching materials. Teaching materials should be made by the teacher, not just practice questions. One of the teaching materials is LKPD (student worksheets). In this curriculum, several learning models have been suggested that lead to student-centered teaching and learning activities. Suyanto, et al. in [1] stated that LKPD is a sheet where students work on something related to what they learn. Something that is learned is very diverse, such as conducting experiments, identifying parts, making tables, making observations, using a microscope or other...
observation tools and writing or drawing the results of the observations, measuring and recording the measurement data, analyzing measurement data, and drawing conclusions. In making LKPD it is necessary to pay attention to the form of LKPD and the group, so that it is easier to apply during teaching and learning activities.

The rest of this paper is organized as follow: Section 2 describes the fundamental concept of LKPD. Section 3 presents data used and proposed research method. Section 4 presents meta analysis and its classification results, following by discussion. Finally, Section 5 concludes this work.

2. Rudimentary

Arsyad in [2] stated that LKS or LKPD as learning resources have many benefits. Some of the advantages of learning using LKS are:

- Students can learn and advance according to their respective speeds so students are expected to master the subject matter.
- Besides being able to repeat the materials in the printed media, students will follow the logical sequence of thoughts.
- Allows a combination of text and images that can add attraction, and can facilitate the understanding of the information presented.
- Especially in programmed text, students will participate actively because they have to respond to questions and exercises.
- Materials can be economically reproduced and easily distributed.

Some conditions for writing LKPD according to Widjajanti in [3] are, didactic requirements (LKS emphasizes the process to find concepts), construction requirements (clarity of sentence structure, language usage, alignment between learning objectives) and technical requirements (writing, pictures and performance). Common traps for determining LKPD design are including size, page density, and clarity. The size used must be able to accommodate the instructional needs that have been set, and endeavored so that the page is not too crowded with writing. A page that is too dense will make it difficult for students to focus their attention [4]. The existence of LKS supporting information such as pictures, tables, and clear schemes can greatly assist students in understanding the purpose of the activity and conducting investigation activities [5]. Prastowo [6] presented the objectives of the LKPD (students’ worksheet); further he explained five types of LKS or LKPD (students’ worksheet) i.e.:

- LKPD (students’ worksheet) that helps students find a concept that is LKPD (students’ worksheet) first presents a phenomenon that is concrete, simple, and related to the concepts to be studied.
- LKPD (students’ worksheet) helps students apply and integrate various concepts that have been found
- LKPD (students’ worksheet) which functions as a learning guide, namely LKPD (students’ worksheet) contains questions or entries whose answers are in the book. Students will be able to work on the LKPD (students’ worksheet) if they read a book
- LKPD (students’ worksheet) which functions as reinforcement
- LKPD (students’ worksheet) which functions as a practical guide.

3. Material and Methodology

This section presents the material used and the proposed methodology.

3.1 Material

Data was obtained by typing the keyword "LKPD (students’ worksheet) of Biology High School journal" or with similar keywords on the Google search engine. Then selected journals included in the
LKPD (students’ worksheet) of Biology subjects at the level of high school education in the last 5 years. There were 36 relevant journals are obtained.

3.2 Methodology

This research is a meta-analysis study, which was conducted by analyzing national journals. The selection of national journals because the 2013 curriculums is only applied in Indonesia, starting from provinces that already have the complete supporting facilities until the facilities are incomplete. Biology is chosen because it is one of the compulsory subjects for students in the Department of Natural Sciences. The population of this study is the level of secondary education, especially high school. The sample is LKPD (students’ worksheet) of Biology subjects. Coding in the meta-analysis is the most important requirement to facilitate data collection and analysis. Therefore, the instrument in this meta-analysis is done by coding (coding category). In this case, the variables used for coding and producing the information needed in mapping the percentage of LKPD forms and LKPD classification are the name of the researcher and the year of the study, the title of the study, the level of education of the research subjects, and the material used in the study. Calculating the percentage of LKPD forms by analyzing journals that are in accordance with the forms of LKPD, then counting the number divided by the total journal and multiplied by 100%. LKPD classification is done by classifying LKPD based on approaches, learning methods, character education, thinking skills, science process skills, problems, technology and conventional.

Data tabulation steps are (1) identifying of research variables. Variables that have been found are included in the appropriate variable column, (2) analyzing variables, enter into the LKPD forms column, (3) calculating the percentage of LKPD forms, (4) forming the results of step analysis (5) the LKPD classification is made.

4. Meta Analysis on Biology Worksheet’ Students Forms

This section presents the Meta-analysis of LKPD (students’ worksheet) forms (see Table 1) and Classification studies (see Table 2). Sub-sequentially, they are discussed accordingly.

| References | Subject Matter | Forms of LKPD | Percentage (%) |
|------------|----------------|--------------|----------------|
| [7, 8, 9, 10 ,11, 12 ,13, 14 ,15, 16 ,17, 18, 19, 20] | Excretory system, genetic substance, Eubacteria, biogeochemical cycle, Protista, Animalia, biodiversity, environmental pollution, digestive system, structure and function of plant tissues, peat swamp ecosystem, fungi, ferns. | Find concepts | 39 |
| [21, 22 ,23, 24, 25, 26, 27, 28] | Waste recycling, biogeochemical cycle, respiratory system, nervous system, senses and hormones, in vitro culture techniques, seed plants, environmental changes and impacts on life. | Implement and integrate concepts | 22 |
| [29, 30, 31, 32, 33, 34 ,35, 36, 37] | Ecosystems, nervous systems, Bacteria, genetic substances, environmental pollution, biodiversity, food digestion systems, plant inventories, changes and environmental conservation, biotechnology. | Study guide | 28 |
| | | Reinforcement | - |
| [38, 39, 40, 41] | Plane, recycling agricultural waste, conventional biotechnology, ecosystem components, energy flows and interactions in ecosystems | Practical instructions | 11 |
Table 1 shows that the forms of LKPD (students’ worksheet) were finding concepts (39%), applying and integrating concepts (22%), study guides (28%), and practical instructions (11%). Finding the concept was 39% which is the highest percentage with material coverage of the excretion system, genetic substance, *Eubacteria*, biogeochemical cycle, Protista, *Animalia*, biodiversity, environmental pollution, digestive system, structure and function of plant tissues, peat swamp ecosystem, fungi, ferns. While the form of LKPD (students’ worksheet) as the lowest practicum guide was 11%. The scope of the material is *Plantae*, recycling of agricultural waste, conventional biotechnology, ecosystem components, energy flows and interactions in ecosystems.

| Classification | References |
|----------------|------------|
| LKPD based on Conventional | [17, 24, 27, 33, 34, 35, 36, 39, 40, 41, 42, 43] |
| LKPD based on approach | [9, 11, 19, 22, 26] |
| LKPD based on teaching models | [8, 12, 14, 15, 16, 18, 23, 26, 44] |
| LKPD based on character education | [31] |
| LKPD based on thinking skills | [10, 29] |
| LKPD based on scientific process skill | [38] |
| LKPD based on problem | [13, 20, 21, 28, 31] |
| LKPD based on technology | [30] |

Based on the data in Table 2 above, LKPD (students’ worksheet) in Biology subjects can be grouped according to their form, namely LKPD which helps students find concepts, LKPD which helps students apply and integrate concepts, LKPD as a learning guide, LKPD as reinforcement, LKPD as practical guide. LKPD in the form of finding the concept has the largest percentage because it is in accordance with the 2013 curriculums concept that uses a scientific approach, which directs students to find concepts. Learning by finding the concept activates students because learning activities are centered on students. In this form of LKPD, the material coverage ranges from class X to class XII, which includes class X material of ferns, biodiversity, environmental pollution, biogeochemical cycle, peat swamp ecosystem, *Eubacteria*, Protista, *Animalia*. Class XI material includes the structure and function of plant tissue, digestive system, excretory system, and material in class XII of genetic substances.

The LKPD (students’ worksheet) in Biology subjects can be classification are conventional LKPD, approach-based LKPD, LKPD based on learning model, character education-based LKPD, scientific process skill-based LKPD, thinking skill-based LKPD, problem-based LKPD, and technology-based LKPD Table 2; LKPD based approach in this research is scientific approach, discovery. LKPD is based on learning models including problem based learning (PBL), contextual teaching learning (CTL), science environment technology and society (SETS). The one included in LKPD thinking skills is critical thinking skills. The excellence of each form of LKPD can be applied to the material as depicted in Figure 1. The LKPD which was most frequently used was conventional LKPD. The use of this LKPD easier in the making and its use.
5. Conclusion

This paper has presented a meta-analysis on biology worksheet’ students forms. The form of LKPD includes LKPD to find concepts, apply and integrate concepts, study guides, reinforcement, and practical instructions. The LKPD Classification in Biology subjects include conventional LKPD, LKPD based on learning approaches, LKPD based on learning models, LKPD based on character education, LKPD based on thinking skills, problem-based LKPD, and technology-based LKPD. The highest percentage of form of LKPD finding the concept that covered 39%. With material coverage of the excretion system, genetic substance, *Eubacteria*, biogeochemical cycle, *Protista*, *Animalia*, biodiversity, environmental pollution, digestive system, structure and function of plant tissues, peat swamp ecosystem, fungi, ferns. The highest frequency of conventional LKPD that is 12.

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