Developing LKPD Medicinal Plant Diversity with an Investigation Model Group on Learning Comprehension

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Abstract. This study has purposes to: (1) Determine the eligibility of Lembar Kegiatan Peserta Didik (LKPD); (2) Determine the eligibility of LKPD model of group investigation on the understanding of students grade X. This research uses research and development approaches with steps of 4-D (four-D-model). Subject of trial of the study were limited to 10 students of grade XI. Subject of operational product trials consists of two classes, the experimental classes and control class which consists of 24 students of grade X of one high school in Yogyakarta, Indonesia. Data were analyzed by using SPSS to determine the validity, reliability item, and analyze data by the Independent T-Test. This research resulted in the product of the LKPD fit for use as a learning resource. The results of 1) validation subject matter and learning experts showed good and very good results with an average score of 2.8 and 3.3, 2) The value of the understanding the significance of students at the pre-test of learning is 0.125 > 0.05, whereas, at post learning is 0.007 <0.05.

Keywords: LKPD Development; Group investigation; Learning.

1. Introduction
Learning field is a learning method that makes the students as the subject or source of learning [1,2]. To support the implementation of the required field of learning the instrument as a tool for recording information objectively and facilitate learners in carrying out the task [3]. Research and development is a process used to develop and validate the development of education. Research of product itself is based on a model-based development of the industry, the findings are used to designate the products and procedures, which are then systematically be field tested, evaluated, refined to meet criteria of effectiveness, quality, and certain standards [4]. The Lembar Kegiatan Peserta Didik (LKPD) development of medicinal plant diversity is an instrument or tool used to guide learners in achieving the learning objectives effectively and efficiently. Trial product development to understand of learning enabled to see the feasibility of the development of medicinal plants in LKPD diversity which affect the understanding of learners in the learning fields.

The benefits of this study is to find out the eligibility of LKPD medicinal plantation diversity which then can be recommended for further development of LKPD and to find out the test results of LKPD diversity of medicinal plants with Group Investigation model on the understanding for students grade X. This is in accordance with previous research that examined the cooperative learning about investigative can improve the understanding of students of material a sequence and series [3]. Group investigating models try to combine the teaching strategies such as the shape and dynamics of the democratic process with the process of academic inquiry [1]. Based on the description above
research undertaken development is to produce products such as Activity Sheet Students (LKPD) on the material diversity of medicinal plantation.

The rest of this paper is organized as follow: Section 2 describes the proposed research method. Section 3 presents the obtained results and following by discussion. Finally Section 4 concludes this work.

2. Research Method

This section presents the proposed research method.

2.1 Development Model

The development of teaching materials especially LKPD in this study by using research methods and educational development by using model 4-D (Four D). 4-D model of the development consists of four main phases between lain Define (restricted), Design (Design), Develop (Development), and Disseminate (Spread) [5]. However, due to time constraints, the researchers modified the model of development into a 3-D is just Define (restricted), Design (Design), and the Development (Development).

2.2 Development Procedure

Procedure development is the elaboration of a development model LKPD modified adjusted to the needs.

2.2.1 Defining Stage

In this process, the learning needs to be adjusted to the curriculum in force, the level or stage of development of learners, and school conditions. At this stage, the analysis of objectives within the constraints of the subject matter of the biological diversity of grade X.

2.2.2 Design stage

The design of learning tools that will be used in the development of this LKPD consists of:

a) Selection format
   Selection criteria format adapted to the format module, adapted from the book format criteria issued by BSNP.

b) The initial design of the module
   In preparing the initial draft produced draft LKPD LKPD 1 with at least include in it, namely:
   i. LKPD title that describes the material that will be poured in LKPD.
   ii. Competence or sub-competencies to be achieved after studying LKPD.
   iii. Objectives to be achieved learners after learning modules.
   iv. The material consists of knowledge, skills that must be learned by the learners.
   v. Procedures or activities that must be followed by the students to study modules.
   vi. Problems, exercises, and or work to be done or completed by learners.
   vii. Evaluations or assessments which measure the ability of learners in mastering LKPD.

2.2.3 Development Stage

The development phase is intended to produce a revised LKPD based on expert’s validation and trial results to the learners i.e.:

a) Validation device revision followed
   This stage aims to get advice to determine the truth of the contents and the format and enforce-ability of the draft LKPD. Validation processes involve validators namely: Expert; Biology teacher and Colleagues (peer review). After the draft LKPD 1 validated and revised, then the resulting draft LKPD II which will then be tested to the learners.

b) Trials with learners
LKPD first trial conducted on a small limited group. The results of a limited trial findings will be used to revise the draft LKPD II which then produced a draft LKPD III that will be tested to try a trial class in the form of field trials.

2.3 Products Trial Design

2.3.1 Design and Subjects Trial
This research trial conducted twice that limited testing and field trials.

a) Limited trial
LKPD feasibility was tested on a limited pilot group consisted of 10 students of grade XID with high, moderate, and low learning achievement.

b) Field trials
To determine the increased use of crop diversity LKPD drugs developed to the understanding of learners then after a limited trial whose results are used to revise LKPD, then conducted field trials in order to obtain a final product that has been tested for feasibility. Classes used are two experimental classes and control classes, each class involves 24 learners by using a model of one group pretest and post-test designs.

2.3.2 Technique and Instrument of Data Collection
Quantitative data is data about the data of LKPD in the form of feasibility assessment experts, teachers, and related people. Data include a feasibility assessment scores from the aspect of content, language and image, the aspect of the presentation, as well as the response of graphics. Score of student’s response on LKPD on limited limited and field trials, score of the implementation of learning, and understanding of learners.

Data collection techniques used in this study were as follows:

a) Questionnaire/ Questionnaire
To get the data of eligibility of LKPD then given a questionnaire to the experts (media specialists and subject matter experts), teachers, and peers. In addition, the questionnaire was also used to respond to the learners during the process of product testing, and learning assessment.

1) Analysis of questionnaire of need
Needs analysis questionnaire used as an initial reference in product development LKPD. The sheet of questionnaire contains a number of statements relating to the biology of learning activities.

2) Questionnaire validation of media experts, subject matter experts, biology teachers, peers, and student’s peseta
Validation aims to measure the quality of product development. This questionnaire by using Likert scale with four alternatives, namely: Excellent, Good, Less, and Very less (see Table 1).

| Table 1. Question form validation experts |
|---|---|---|
| Aspect | Indicator | Item number |
| Media | Feasibility contents | 7 |
| Linguistic | 4 |
| Presentation | 7 |
| Graphics | 4 |
| Total item | 22 |

b) Problem test
Instrument booklet was used to determine the level of students understanding of the material contained on LKPD. Tests were performed prior to the learning process (pretest) and after the learning process (post-test). The type of test used was correct or incorrect form (B/S) (10 items).
2.4 Data analysis technique
Data analysis techniques in this study divided into two according to the type of data used which is qualitative data analysis techniques and quantitative data analysis techniques.

2.4.1 Qualitative Data Analysis
Qualitative data in the form of criticism and suggestions for improvement of the development of medicinal plants LKPD diversity of subject matter experts, expert learners, peers, a biology teacher and learners.

2.4.2 Quantitative Data Analysis

2.4.2.1 Feasibility Data Analysis Techniques Media Development
The aim of this data analysis techniques to analyze data on the product validation questionnaire developed by subject matter experts, media experts, teachers of subjects and questionnaire responses of learners. Assessing the feasibility of product development results refer to the assessment procedure Mardapi [6], with the following provisions:

a) Obtain quantitative data by changing score on the questionnaire sheet in the form of qualitative data with the guidelines in Table 2.

| Assessment criteria | Score |
|---------------------|-------|
| Very good           | 4     |
| Good                | 3     |
| Poor                | 2     |
| Very poor           | 1     |

b). Calculating the average score of the total charge sheet questionnaire by using the following formula:

\[ \bar{x} = \frac{\sum x}{n} \]

Where:
Error! Reference source not found. = The average score
Error! Reference source not found. = Total score
Error! Reference source not found. = Number of assessors
c). Changing the average score into a qualitative value to the assessment criteria as listed in Table 3.

| Score range       | Category     |
|-------------------|--------------|
| \( x \geq \bar{x} + 1SB \) | Very decent  |
| \( 3,1 \)         | Worthy       |
| \( 3,1 > x \geq 2,5 \) | Not feasible |
| \( 2,5 > x \geq 1,9 \) | Very unfit   |

2.4.2.2 The data analysis technique of understanding of learners
The data analysis technique of the understanding of learners was analyzed by tabulating the results of pretest and post-test scores of the experimental class and control class, with scoring guidelines 1 if true and 0 if false. Then calculate the average score pretest and post-test of the experimental class and class control. Data were analyzed using analysis prerequisite test is a test of normality and homogeneity tests to determine whether the data obtained from the research is the data that homogeneous and normally distributed.

Analyzing data on the understanding of learners on experimental class and control by using \( t \) test (independent sample T-test) by using SPSS. The data obtained can be said to be normally distributed if
it has a probability value greater than 0.05 (p> 0.05) and the sample is said to be homogeneous if it has a probability value greater than 0.05 (p> 0.05) at a significance level of 5%.

Criteria for decision-making in the t test, namely:
(a) If the significance value > 0.05, then H0 is accepted
(b) If the significance value < 0.05, then H0 is rejected

3. Results and Discussion
This section presents the results obtained and following by discussion.

3.1 Validation
The result of the development of medicinal plant diversity LKPD which refers to the model 4-D which has modified into 3 stages of development, namely the definition, design, and development [7].

3.1.1 Defining Stage
Defining stage was used to define what is necessary in the learning process during the study. This phase consists of two steps: analysis of activities of the components of learning (curriculum, syllabus, lesson plan, materials and learning resources, supporting facilities biology learning activities) and analysis of participant characteristics. The results analysis of the components of learning undertaken by interviews showed that the curriculum used is the curriculum of 2006 [8]. Syllabus and structured lesson plan with good and complete and refers to KTSP. The source of learning curriculum provided in the form of text book learning of biology. The method used method was lecturing. The data of interviews showed that the material of biodiversity is difficult to understand when learning is done only with the lecturing method. Based on the analysis performed in this study, then two basic competencies were selected to be developed, they were KD 3.1. Describing the diversity of genes, species, ecosystems through observation activities and K.D 3.2. Communicating Indonesia's biodiversity and conservation efforts as well as the use of natural resources.
The results of the analysis of the characteristics of learners showed that the understanding and interest of students of grade X during the learning activities of biology tends to be low marked by the majority of students who pay less attention to the delivery of learning.

3.1.2 The design Stage
This phase includes the design format of initial product development and writing instrument research. The initial design stage format generated the development of learning materials used for research that is Biodiversity (which focused on the diversity of medicinal plantation). Sub-sub-materials developed include: (1) The unique biodiversity of medicinal plants; (2) The benefits of the diversity of medicinal plants, (3) The degree of diversity of medicinal plants. Rate understanding of learners using right or wrong model for pretest and post-test that was supported by the observation of understanding of student learning while doing all the learning activities and analysis of the results of the work of learners who wrote in the piece LKPD GI models.

3.1.3 The development Stage
Assessment of the feasibility and accuracy of the material include: Language, presentation materials, and graphical or evaluation suitability. The tool assessment results can be seen in the following Figure 1:
Results of expert assessment showed that the feasibility and accuracy of the material had a mean score of 2.6 (category worth it), linguistic had a mean score of 3.0 (feasible category), an indicator of the presentation had a mean score of 2.85 (feasible category), and graphical had a mean of 2.75 (feasible category). The mean total score of the four indicators of the assessment was 2.8 (feasible category), meaning that the quality of LKPD result of the development in terms of the results of expert assessment of the material in the category very worthy and ready to be tested at a later stage. While the media expert assessment results showed that the feasibility and accuracy of the material had a mean score of 3.0 (category worth it), linguistic had a mean score of 3.5 (categorized as very feasible), an indicator of the presentation had a mean score of 3.1 (very viable category) and graphical had a mean 3.5 (categorized as very feasible). The mean total score of the four indicators of the assessment was 3.3 (categorized as very feasible), meaning that the quality of LKPD result of the development in terms of the assessment results in the category of matter expert very worthy and ready to be tested at a later stage.

Data of biology teacher assessment results indicated that the feasibility and accuracy of the material had a mean score of 3.0 (category worth it), linguistic had a mean score of 3.2 (categorized as very feasible), an indicator of the presentation had a mean score of 3.0 (feasible category), and graphical had a mean of 3.0 (feasible category). The mean total score of the four indicators that assessment was 3.05 (feasible category), meaning that the quality of LKPD result of the development in terms of learning expert assessment results in the category very worthy and ready to be tested at a later stage. While the peer assessment data is done by making the average of the three assessors. The results indicate that the peer assessment of feasibility and accuracy of the material had a mean score of 3.0 (category worth it), linguistic had a mean score of 3.0 (feasible category), an indicator of the presentation had a mean score of 3.0 (feasible category), and graphical have mean of 3.0 (feasible category). The mean total score of the four indicators that assessment was 3.0 (feasible category), meaning that the quality of LKPD result of the development in terms of learning expert assessment results in the category very worthy and ready to be tested at a later stage.

Upon validation of assessment and input from experts, teachers of Biology and colleagues used as guidelines for revising the initial product LKPD. Revised tests are performed on grade 10 students of grade XC SMAN 1 Cangkringan. After tested on small groups, it was revised by the weaknesses found from the results of tests conducted for the later revisions. After conducted field trials conducted in real class. The field trials conducted in gradeXA as the experimental data and the grade XD as the control data. Of this field trial data showed understanding and interests of student’s grade X SMA Negeri 1 Cangkringan.

3.2 Empirical Validation

Research and development have resulted in a limited test data and results of the field test. Data from a limited test response data in the form of learners to LKPD being developed, while the field test data in the form of data enforce-ability of the implementation of the RPP study visits conducted during the study by using observation sheet. Data interest of students for the diversity of medicinal plants can be
seen from the sheet questionnaires and observation sheets, and data critical thinking skills of students in the form of a booklet and pretest post-test multiple choice and essays.

3.2.1 The limited test results
Learners response to the developed LKPD of medicinal plantation diversity can be seen through a limited trial. The test involves 10 students of grade X SMA N 1 Cangkringan. Criticism and advice on getting and made reference in LKPD development are:
1) The images used in LKPD must be clear and tailored to the sub-materials used to make it easier to understand.
2) The language used in LKPD elusive and should be repaired so easily understood.
3) Phrases used by many repeated, should be shortened and checked again.

3.2.2 Data of field trials
The results of a field trial application stage LKPD diversity of medicinal plants in the learning process is carried out in SMA N 1 Cangkringan. Data field trial results are obtained from the RPP data in learning, critical thinking skills (performed during the learning, and the interests of learners on medicinal plants). Number of research subjects is 48 learners consists of 24 learners class of experiments that use LKPD diversity of medicinal plants and 24 learners who did not use a control class LKPD medicinal plant diversity.

3.2.3 Comprehension learning
The analysis was done by comparing the learning comprehension learners value before and after the learning using LKPD taken from pretest and post-test results data in the form of right or wrong. The pretest and post-test questions has been validated used by subject matter experts and has been tested empirically and then analyzed by software computer to determine the validity and reliability. generate empirical test of 11 items about valid and invalid about 7 items. Then 10 of an item about a valid test in field trials.

The data can be in the field trials were analyzed by using SPSS. Based on the test results are known prerequisite of data pretest and post-test normal distribution and the data are homogeneous. It qualifies parametric analysis that hypothesis test by using parametric test. Parametric test terms used were independent samples T-test aimed to determine the presence or absence of differences or average between the experimental class and control class. Therefore, the independent test results of samples T-test was as shown in Table 4 below:

|                      | t-test for Equality of Means |
|----------------------|-----------------------------|
|                      | t | df | Sig. (2-tailed) |
| pretest              |   |    |                |
| Equal variances assumed | -1562 | 46 | .125 |
| Equal variances not assumed | -1562 | 44 361 | .125 |
| post-test            |   |    |                |
| Equal variances assumed | 2,851 | 46 | .007 |
| Equal variances not assumed | 2,851 | 43 581 | .007 |

Based on the data above, it can be seen that the value of $t_{\text{table}}$ at significance (2-tailed sig) on the understanding of students before learning (pretest) and after learning is 0,125 (post-test) is 0,007. Therefore pretest value of $P$ values greater than ($>$) of 0.05, there were no differences between the experimental class and control class at the beginning of learning (pretest). Meanwhile, the value of post-test $P$ value is smaller ($<$) than 0.05 then there is a difference between the experimental class and a control class at the beginning of the learning. The changes indicated an increase and a better development than ever before, for example, from not knowing to knowing, attitude irreverent be polite [1].
4 Conclusion
The LKPD results from medicinal plantation diversity have been used since it has passed the stage of expert judgments as subject matter experts, media experts, teachers of Biology, and colleagues. Then revised in accordance with the advice obtained. The result of LKPD research trial with the medicinal plantation diversity Group Investigation model on the understanding of students grade X showed the value of understanding of learners at the beginning of learning (pretest) is significant at 0.125 > 0.05, whereas, at the end of the lesson (post-test) is 0.007 < 0.05 which means that no difference between the experimental class and control class at the beginning of learning (pretest), meanwhile, at the end of the learning (post-test) showed that there is a difference between the experimental class and control class.

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