

The Validity of the Development of Project-Based Oriented Learning Modules on Evolution and Biotechnology Materials For High School

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Abstract – Based on the analysis of data collected through observation and interview activities to biology teachers and some learners. Found that there are still less educated learners biology books, display and presentation of textbook material less interesting, teaching materials used not fully assist in learners in understand the material, the unavailability of teaching materials that help learners in building their own knowledge, forming the character and skills independently, then learning unavailability of teaching materials that facilitate learners in doing the work and making a project. To overcome this problem, then developed biology learning module oriented on project based learning (project based learning). The purpose of this research is to reconstruct valid biology learning modules. This type of research is development research using Plomp model. The development phase of the Plomp model consists of 3 stages, namely 1) preliminary research stage, 2) development stage or prototyping, and 3) assessment stage. The results showed that the learning-based project learning module on evolution and biotechnology materials for SMA was declared very valid. Then proceed with the stage of practicality and effectiveness.

Keywords –Development, Module, Project Based Learning, Plomp

I. INTRODUCTION

The government continues to strive to improve the quality of education for the intellectual life of the nation. One of the efforts made is through curriculum change and development. Since independence (1945-2013), Indonesia has experienced approximately 10 times the turn of the curriculum. Each curriculum has its own specificity and emphasis on different aspects, but in essence it is to refine the previous curriculum in order to align with the demands of the times. One of them includes the 2013 curriculum. Implementation of the 2013 curriculum in education aims to produce productive, creative, innovative, devout and devout Indonesian human beings to God Almighty. The development of curriculum 2013 focuses on the formation of students' character competence in the form of a combination of knowledge, skills, attitudes, which can be applied to students so that it can keep up with the times.

Based on the results of preliminary observations conducted in schools found that still cterdapat learners who are less fond of reading biology books, display and

presentation of textbook material less interesting, teaching materials used not fully assist in learners in understanding the material, the unavailability of teaching materials that help participants educate in building their own knowledge, forming character and skills independently, then learning unavailability of teaching materials that facilitate learners in doing the work and making a project. Owned source book has not led to the learning model suggested in the curriculum of 2013 that the formation of student character competence in the form of a combination of knowledge, skills, attitudes, which can be applied learners.

Based on the description outlined above, an effort is needed to develop teaching materials in the form of modules. Prastowo (2011) stated module that the module is a teaching material written with the aim to learners can learn independently either with teacher guidance or without teacher guidance. From the statement, a research entitled "Development of Learning-Based Biology Module Based Project Based Learning (PjBL) on Evolution and Biotechnology Material for SMA".

Materials evolution and biotechnology is appropriate if applied to project based learning oriented module. A module is a set of teaching materials that is presented systematically so that its use can be learned with or without a facilitator / teacher (Kemendikbud, 2013). Modules can be interpreted as teaching materials derived from the basic competencies contained in the curriculum and arranged systematically written with the aim that learners can learn independently without or with teacher guidance (Prastowo, 2012). Another role of the module is to provide facilities for learning activities, both on its substance and about its presentation (Kurniawan, 2015).

The development of project based learning oriented module is one of the activities that can extend and deepen the material applicatively (Primiani, 2014). The project-based learning model is one model based on constructivism that supports the involvement of learners in problem-solving situations (Doppelt, 2013). According to Gatot and Joko (2014), learners in project-based learning are directly involved in the real-life environment in solving problems, so the knowledge gained is more permanent. Characteristics of project-based learning are defined by Buck Institute for education (in Partana 2016): (1) learners make decisions and create frameworks; (2) There are problems that the solution has not been determined before. (3) Learners design the process to achieve results. (4) The student is responsible for obtaining and processing the information collected. (5) There is continuous evaluation. (6) Learners regularly see what they do. (7) The final product and evaluated its quality.

Parmin and Peniati, (2012) to according to project-based learning has tremendous potential to create a more engaging and meaningful learning experience for adult learners, such as those studying at college or training to enter the workforce. In project-based learning, learners are encouraged to be more active in learning because the instructor or lecturer is positioned behind and learners who take the initiative. In addition, lecturers or instructors are tasked with facilitating and evaluating the meaningfulness or application of projects for the learner's life.

II. REVIEW OF LITERATUR

The learning process is the most important activity in education that aims to achieve educational goals. In the learning process occurs the interaction between teachers and learners. Teachers and learners should know what their respective tasks are. Between teachers and learners also tedapat relations or mutual communication renewal. Lufri (2007) states that, teachers as learning facilitators must understand the concept of learning both in terms of

psychology, environment and ways or methods in learning is appropriate and refers to efforts to achieve educational goals.

Learning is not only composed of teachers and learners, but also accompanied by learning materials, materials or learning media so that the learning process can run smoothly. According to Prastowo (2011), teaching materials is a set of materials that are arranged in a systematic, both written and not written, so as to create an environment or atmosphere that allows learners to learn. Teaching material is a set of material / substance of learning (teaching material) systematically arranged, displaying the whole figure of competence that will be controlled learners in learning activities (Depdiknas, 2008).

One of the teaching materials that can be used in the learning process is the module. A module is a set of teaching materials that is presented systematically so that its use can be learned with or without a facilitator / teacher (MoNE, 2008: 20). Modules can be interpreted as teaching materials written with the aim that learners can learn independently without or with teacher guidance. A module will be meaningful if it is written in accordance with the characteristics of the module ie a) learners can easily use it, b) describe the basic competencies to be achieved by learners, c) presented with a good and communicative language, interesting equipped with illustrations and drawings (Nasution (2010).

Writing a module becomes more varied by using the approach or learning model with the aim of 1) reducing dependence on textbook availability, 2) broadening the horizon because it is compiled using various references. 3) Adding more knowledge and experience in writing teaching materials; 4) building effective communication between teachers and learners because learning does not have to run face-to-face; 5) adding credit numbers if collected into books and published (Lufri, 2017).

One of the learning models that can be used in module writing is project based learning model. Project-based learning is also called project based learning. Project-based learning is one of the learning models that emphasize the provision of opportunities to learners to produce a work through development, knowledge, attitudes, values and social skills.

Johnson and Lamb (2007) stated that: project based learning focuses on creating a product or an inquiry based on the depth of the driving question. The project-based learning model is a systematic method of learning that engages learners in learning knowledge and skills through a

structured, real-time and meticulous process designed to produce a product (Buck Institute for Education, 2003). The project-based learning model is a student-centered strategy that encourages initiatives and focuses learners on the real world and can improve their motivation (Guarasa, 2005).

Sutirman (2013) states that the project-based learning model is a learning model that involves learners actively in designing learning objectives to produce a real product or project. A project-based learning model (a learning model that addresses the focusing of meaningful questions and problems, problem solving, decision-making, information seeking processes, giving members the opportunity to work in collaboration and closing with real-world product presentations (Thomas, 2000).

In this regard, project-based learning becomes one of the alternatives offered in the 2013 curriculum. There are many projects that teachers and learners can do. Projects can increase the interest of learners because of the involvement of learners in solving authentic problems, working with groups, and building solutions to real problems. Learners also have the potential to improve competence in thinking (learning and thinking high level) because students are assigned to plan, conduct, evaluate and communicate (Kamdi, 2008).

III. METHODOLOGY

The type of research used in this study is a development study that adopted the development model from Plomp (2013). The design of the Plomp development model has three phases or phases: (1) preliminary research stage, (2) development or prototyping stage, (3) assessment stage.

Validation stage is done at development stage or prototype (development or prototyping phase). Validation stage using Plom model as follows.

3.1 Design Prototype I

The design of the prototype is focused on the process of formulation/drafting of the module, in the form of biology oriented learning project oriented learning model on evolution and biotechnology materials. After that, the module design is realized to be a product so that the learning module of biology is based on project based learning prototype 1. Prototype I is then evaluated by using check list to check errors in writing and module design. Prototype I was revised to produce prototype II.

3.2 Design Prototype II

Prototype II is a development stage in consultation with experts (expert review). The biology module based on project based learning is valid by the validator covering several aspects namely, didactic aspect, construct aspect, technical aspect and language aspect. Based on the results of validation and further revisions made module development.

IV. RESULT AND DISCUSSION

4.1 Results

The results obtained at the initial investigative stage are used as guidance in developing biology oriented learning module based project learning. The results of the development undertaken at this stage are as follows.

4.1.1. Prototype I

In prototype I starting from the design and making of learning-oriented learning-based learning module. This module contains cover, introduction, core competence, basic competency, competency achievement indicator, module usage manual, competency achievement indicator, learning objectives, material description, drawing, summary, competency test, competency test, answer key, feedback, glossary, and references. Natural science learning module designed with Microsoft Office Publisher 2007.

The results of the evaluation itself indicate that the module component already exists and is appropriate. However, there are some errors that occur that there are some posts whose letters are not complete so that its meaning becomes unclear, in the picture, there is no source. After being evaluated, it was revised by improving incomplete writing and completing the source of the drawing so as to produce project oriented learning module based learning.



Figure 1. Cover of Module

After the self-evaluation results obtained that the components of all components of the module is complete and appropriate. However, there are some errors that occur that there are some writings whose letters are incomplete so that its meaning becomes unclear, there are some pictures that are not clear and there is no source. Once evaluated, revised by improving incomplete writing and complete the source of the drawing so that the resulting learning-oriented learning-based modules.

4.1.2. Prototype II

In the prototype II development stage, a formative evaluation activity was conducted to see the validity of the biology learning module based on project based learning based on the expert's assessment of the lecturer. The validated module includes four didactic, construct, engineering and language aspects. The evaluation tool used is a validation sheet of learning biology learning module based on project based learning. Validation is done by 3 validators. In addition to assessing the module, the validator also provides suggestions for module improvements. The suggestion given by the validator is then used as a reference to revise the developed module.

The results of the validation of biology learning modules based on project based learning developed can be seen in Table 1.

Table 1. Validation Test Validation Test Result Data

No	Assesment Component	Validity Value	Criteria
1.	Aspects Didactic	91,66	Very Valid
2.	Aspects Construct	88,33	Very Valid
3.	Aspects Technical	83,33	Very Valid
4.	Aspects Language	80	Valid
Amount		343,32	Very
Average		85,83	Valid

Validity value Table 1 shows that the learning-oriented biology learning module developed as a whole is valid (average validity is 85.83%). This is in accordance with the recommendation of the validator, in terms of didactic, constructive, and technical with average values obtained for all aspects of all aspects are categorized very valid.

4.2 Discussion

Module is one of choice of instructional media which is expected to accelerate learners 'understanding so as to improve learners' learning competence. Through the module, students can learn based on their own learning ability. Modules can be used for biology lessons (Sumarmin, 2014). Essentially, the module is designed to be used by teachers and learners in a learning process that aims to help teachers and learners implement the learning process (Lufri, 2013).

The biology module based on project based learning is stated very valid after the assessment by the validator. Assessment of validity seen from several aspects namely didaktik aspect is an aspect relating to the contents and formats of modules developed. The module of the deductive aspect is valid by the validator. This indicates that the module has been developed as a guide in learning activities and can be said that the validity of the module can be accounted for because it has been assessed by experts. Kevalidan in the didactic aspect given by the validator due to the designed module has been in accordance with the core competencies and the basic competencies in the curriculum 2013, presents clear learning objectives, there is complete material details, and the suitability between the material to the module and evaluation. Darmodjo and Kaligis (1992) stated that the didactic conditions governing the use of universal modules can be used well for the learner who is slow or clever.

Dilihat dari aspek konstruk, modul biologi berorientasi *project based learning* dinyatakan sangat valid oleh validator.

The validation results show that the module has constructed project-based learning steps that include project identification / determination, formulation of problem-solving strategies, product design / activity planning, production process / implementation activities and teacher monitoring, project presentation / publication of results , evaluation.

Further validity is assessed from the technical aspects in terms of technical aspects of the module expressed in very valid categories. A very valid value is given a validator based on some indicators. First, it states that the module design is interesting. The developed modules are designed as interesting as possible using Microsoft office publisher 2010 program. It has a regular layout and layout. Second, the clarity of writing, where fonts are used more than one type with clear font sizes is read. The reasons for using some fonts are to increase the attractiveness of the Project

Based Learning-oriented module to avoid the boredom of learners while reading, and to distinguish between material and titles. Muslich (2010) argues, to distinguish and get a combination of display letters, can use variations and series of letters.

Third, the suitability of presenting images or displaying images that help students understands the material. This is evidenced by the image on the module can be seen clearly, the image of the quotation includes the source and description of the image in accordance with the given image. It aims to facilitate learners in understanding the images displayed so that the images displayed can clarify the concept of material that must be understood by learners. According to Prastowo (2011), the presentation of the drawings is needed to support and clarify the contents of the material, because in addition will clarify the description can also increase attractiveness and reduce the sense of boredom learners to learn it. Arsyad (2012) argues that the appearance or presentation of instructional media can improve and direct the attention of the participants so as to generate motivation to learn.

The last validity assessed is from the language aspect. Assessment of the language aspects of the modules developed are in very valid categories. This is because the sentence structure used in accordance with the EYD, in accordance with the level of understanding of learners, simple, clear and unambiguous, making it easier for learners to understand the learning activities in the module, the language used can develop students' thinking skills and use appropriate terms. According to Hamdani (2011), the aspect of language is one aspect that needs to be considered in the preparation of teaching materials, the language used should be a simple language and easy to understand.

The four aspects of the validation of biology module based on project-based learning that has been described is a unified whole and mutually supportive for the perfection of biology module based on project-based learning developed. Trianto (2010) states valid means that the assessment has provided accurate information about teaching materials that are developed, in terms of didactic, constructive or technical. This is also stated by Arikunto (2008), if a data generated from a product is valid, then it can be said that the developed product has provided a description of the development goals correctly and in accordance with reality or the real situation. A very valid assessment of the developed project-based biology module, indicating that the module can be used as teaching material in learning.

V. CONCLUSION

From the result of the research, it can be concluded that biology oriented biology module based on project of evolution and biotechnology material is valid valid by expert (lecturer) as evidenced by the result of validity analysis obtained average value 85,83% including criterion very valid determined based on didactic aspect, constructs, techniques and languages.

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