

Validity of Biology Module Oriented Meaningful Learning for Student Class XI

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Abstract – Learning biology is still lacking engage students in meaningful learning. Especially textbooks used in teaching have not been able to make the students understand the concept of material and linking between the concepts learned, so that teaching material available is still less lead students to meaningful learning. Therefore, it is necessary to develop modules that are oriented in meaningful learning. Ausubel learning theory is that meaningful learning is the process of connecting new information with the relevant concepts contained in the cognitive structure. Development oriented meaningful learning module is expected to be one of the solutions to these problems. Modules were developed with a map of concepts and exercises to build a concept map. Concept Map is one of the important teaching tools in supporting meaningful learning. The purpose of this study was to produce a valid module based on meaningful learning. Validation module based sheet validation judged by three experts. Aspects assessed consist of didactic aspects, aspects of construction, and aspects of language. The results of this study indicate that the didactic aspects of 85.42% obtained with very valid criteria, aspects of construction got 81.25% with a very valid criteria, technical aspects got 85.42% with a very valid criteria and average 3 the group received 84 , 03% with a very valid criteria. Therefore, the developed modules fit for use because it has met the criteria of validity.

Keywords – *Validity; Biology Module; Meaningful Learning.*

I. INTRODUCTION

Material or substance biology is basically the facts, concepts, principles, laws and theories (Lufri, 2007). Learning biology is one area that challenges learners to construct knowledge and develop understanding of the concept. Biological material has many concepts that are interconnected, thus the use of textbooks alone are not efficient enough to help

learners in learning. The role of the teacher as a facilitator in the learning process is required to provide teaching materials to facilitate the learners to build a meaningful understanding of the concepts, understand the concept of learning itself, as well as the link between the concept that one with another concept.

The results of the questionnaire responses of participants did not study of biology can be seen 62% of students stated that learning biology fun, but 77% said biological material is still elusive, 62% of students stated teaching materials common biological yet to make students understand the concept, and 80% learners stated teaching materials that are used not assist learners linking between the concept of one and the other concepts.

According to interviews with participants stated that some of the materials that are considered difficult is the structure of plant tissues, motion system and the human circulatory system. The difficulty in this matter as many related concepts, many mechanisms of learning materials such as blood circulation mechanism, the mechanism of bone formation so that learners find it difficult to understand. The problems caused by the learning resources provided by teachers not in accordance with the needs of learners.

In response to the need for teaching materials especially for material movement system and the human circulatory system. Module as one written teaching materials can be an alternative to overcome the problems of learners in understanding the subject matter. Developed module is a module-oriented understanding of the concept for learners to generate meaningful learning. Ausubel has developed the theory of *meaningful* learning. Ausubel theory of learning is meaningful learning which is a process to linking new information on relevant concepts contained in the cognitive structure.

Waers (2015) states that to help make learning more meaningful for students, teachers need to find and implement ways to help learners reconstruct new knowledge into the frame of mind of students of knowledge that already exists and to establish a framework for construct new knowledge. Concept maps allow students to connect different concepts to show their relationship to one another. This method can be used in various fields of study. One area of the study could be mid-level biology class. The literature review will look at how the concept map is built; map the concept of impact is on learning how to map the concept of supporting literature, the perception of concept maps by teachers and students, and pene

Map concept is one tool in the learning meaningful because the concept maps developed on the basis of theory meaningful learning. So that the teaching materials are given exercises to create their own concept map so that learners are able to connect between the concepts contained in the material being studied. According Vallori (2014) Concept maps are a useful tool for representing knowledge visually. According to Novak (1985), Concept maps or a map of learning is a dynamic way to capture the main points of significant information. Map of

the concept of a medium of education to show the concept of systematic science, which starts from the heart of the matter until the supporting members who are related to one another.

To determine whether the modules developed in compliance or not, then develop worksheets students need to pass some tests. One from these tests is validity. Validity is an integral evaluative assessment to find out what extend the empirical evidence and theoretical reasons supporting the conclusion compatibility and other actions based on the value or measurement methods other words, is to what extend the validity of the instrument to measure what should be measured (Thompson, 2013). Validity test is done to determine the validity of the instruments used instrument was valid when what is needed to measure and disclose data of variable accurately. Based on this, there should be validated against Oriented Module *Meaningful Learning* on learning biology.

II. LITERATURE STUDY

A. VALIDATION

Trianto (2010) declared invalid means that the vote has been providing accurate information about the teaching materials developed.

According to Darmodjo and Kaligis in Widjajanti (2008) Indicators used to declare that the resulting product can be used valid indicator as follows.

1) Terms didactic

Terms didactic regulates the use of materials that are universal.

2) Constructs

Terms construct an aspect that relates to the use of language, sentence structure, vocabulary, level of difficulty, and clarity in teaching materials.

3) Technical requirements

technical requirements is a requirement that emphasizes the presentation of teaching materials in the form of text, images, and performances in teaching materials.

B. OVERVIEW OF THE MODULE

Sudjana and Rival (2003) states that the module is a unitary type of learning activities planned, planned to build individual learners achieve learning objectives.

Modules for learners to have some merit. According Santyasa (2009) the benefits gained from learning to use

the module are: to increase learner motivation, because every time the task lesson was clearly limited and according to ability, after the evaluation, educators and learners versed in the module in which participants students have been successful and on the module which has not been successful, learners achieve results according to ability, learning materials more evenly divided in a semester, educators more effectively for teaching materials prepared based on an academic level.

C. MEANINGFUL LEARNING

Ausubel (1968) has developed the theory of *meaningful learning*. Ausubel theory of learning is meaningful learning, which emphasizes that the knowledge is not memorized any meaningful it must be understood. Lufri (2007) states meaningful learning is a process to linking new information on relevant concepts contained in a person's cognitive structure. According Vallori (2014) on meaningful *learning*, cognitive development of the learner includes the process of assimilation and accommodation. *Meaningful Learning* implies a longer retention than on memorization, occurs when people connect new concepts with a familiar concept that already exists.

The concept or principle which is required to apply the theory as presented by Dahar Ausubel (2011), namely: the initial setup, progressive differentiation, learning *superordinate* and *integrative* adjustments.

a. Initial setup

Initial setup direct learners to the material to be learned and help them to recall the pertinent information that can be used to help discover new knowledge. An initial setup can be considered a kind of mental relief and presented before the new material.

b. progressive differentiation

During the meaningful learning takes place, it should be development and elaboration of concepts *tersubsumsi*. According to Ausubel, progression concept works best if the elements of the most common, most inclusive concept is introduced first, and then just given things that are more detailed and more specific than the concept. The process of drafting this kind is called *progressive differentiation*.

c. learning the superordinate

As long as information is received and associated with the concepts in the cognitive structure (*Subsumsi*), the concept was to grow and differentiate. Process *subsumsi* this can continue until at some point discovered new things. Learning *superordinate* this occurs when the

concepts that have been studied previously known as the elements of a concept that is broader, more inclusive.

d. Adjustment integrative

According to Ausubel, in order to teach not only by progressive differentiation is concerned, it should also be shown how the new concepts associated with the superordinate concepts.

Waers (2015) states that to help make learning more meaningful for students, teachers need to find and implement ways to help learners reconstruct new knowledge into the frame of mind of students of knowledge that already exists and to establish a framework for construct new knowledge. One way that can be done by the teacher is using concept maps in class. Novak (2006) stated a concept map is a graphical tool for organizing and representing knowledge. Map of concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line that connects the two concepts.

According to Novak's (1985) concept map is meant to represent the concept of meaningful learning in the form of propositions. Map concept, as noted by several authors, among others is some resources to organize, represent, and store knowledge. They are based on a framework of concepts and relationships that are connected by a proposition or words, arranged hierarchically, and can play an important role in the learning process, represent and share knowledge from a constructivist perspective (Vazquez, 2013).

III.METHOD

Type of research is a research and development or *Research and Development* (R & D). The main objective is not to formulate a development study or test the theory, but developing effective results to be used in schools or other institutions. Module development oriented *Meaningful Learning* models a Plomp (2013). Plomp development model consists of three stages: the initial investigation phase (*preliminary research*), stage of development or produce *prototype* (development or *prototype* phase) and a stage of assessment (*assessment* phase).

At the stage of the initial investigation conducted analysis of the problems and needs of learners, curriculum analysis, and analysis of the concept is done to get a clear picture of the product to be developed. Furthermore, the development or prototype phase. Validity test is done on the prototype II with the appropriate testing this specialist

expertise of each. Validation of the results of research conducted by four experts and one teacher. Then, be revised based on suggestions and feedback from the experts so that the modules meet the needs of users and can be applied to real class.

Analysis of the data validity of using modules obtained from the analysis of the data collection instruments based on questionnaires filled out by some experts. The data analysis begins by determining a score for each item. Scoring validation based on Likert scale, such as in Table 1.

Table 1. Determination Score Criteria Based on the response to a Likert Scale

Score	Category
4	Very agree (SS)
3	Agree (S)
2	Less disagree
1	Disagree

Source: Joseph (2007)

After that, the assessment results are tabulated and calculated to percentages.

Based on the validity of the obtained value, the assessment criteria specified module validation criteria as in Table 2.

Table 2. Category Validity Module

Validation Value (%)	Category
0-20	Invalid
21-40	Less Valid
41-60	Enough Valid
61-80	Valid
81-100	Very Valid

Source: Riduwan (2009)

IV. RESULTS

Initial investigations undertaken include curriculum analysis, analysis of the concept and analysis of learners. Analysis of the needs of learners who have done obtain the results that 100% of students want modules that include concept maps, 87% of students agreed that in practice there are modules to create their own concept maps, and 100% of

students want colored modules. Learners are more inclined to like bright colors like blue, pink, green, and red.

Stage Further analysis aims to determine curriculum Core Competence and Basic Competence has been determined. Oriented module *meaningful learning* was developed at KD 3.5 Analyzing the relationship between network structure constituent organ systems and associate with bioprosesnya motion so as to explain the mechanism of movement and impaired function that may occur in the human motion system through literature study, observation, experiment, and simulation; 4.5 Presenting the work on the use of technology in treating motion systems through the study of literature; 3.6 To analyze the relationship between network structure constituent organ of the circulatory system and hooking up with bioprosesnya so as to explain the mechanism of blood circulation and impaired function that may occur in the human circulatory system through the study of literature, observation, experiment, and simulation; 4.6Menyajikan papers on abnormalities in the circulatory system, heart, and blood vessels that lead to the human circulatory system disorders. Derived indicators have been adapted to the curriculum of 2013. The next stage is the analysis of the concept that aims to identify, elaborate and formulate the main concepts that will be presented in the study of matter on the module. Based on the indicators and learning objectives have been developed; researchers define the main concepts of material motion system and the human circulatory system.

Once formulated indicators and learning objectives to be achieved in the material motion system and the human circulatory system, the next step is to design modules. Presentation of the modules in the form of printed teaching materials created by using *Microsoft Office Publisher 2007*. Study of written material by using the kind of writing *cambria* with size 12. Any subtitles given a different color so that raises interesting color variations.

- Choose a module format.
- Make the design of the display cover.
- Determine the core competencies, basic competencies and learning objectives.
- Drafting instructions for using modules for learners and teachers.
- Identification of the subject as well as supporting theories that can be included in the components of the module with the relevant sources.
- Making exercises associated with the material as well as create an answer key.

Learning-oriented modules *Meaningful* that have been designed, then do step evaluation (*self-evaluation*) using a check list to check for errors that may be found on the module, so that a given module of the validator is better than the initial draft. The revised module will be continued at a later stage.

The next stage is validated by the professor as an expert validator. Modules validated by some experts. Validity modules include didactic aspects, aspects of construction, and technical aspects. Validator in the validity of this process is Dr.

Darmansyah, ST. M. Pd as a technology expert, Mr. Dr.Abdurrahman, M.Pd as a linguist, Dr. Ramadan Sumarmin, M.Si as expert learning materials. In addition to providing assessments on the validation sheet that has been provided, the validator also provide suggestions for improvements to the modules that have been designed that are useful in the development of the next module. Analysis of the results of the validation by experts can be seen in Table 3.

Table 3. Results of Analysis Validation Module

A. DIDACTIC

No	Indicator Assessment	Validator			Validation Value (%)	Category
		1	2	4		
1	Indicators developed learning has been referred to the Core Competence.	3	4	4	91.67	Very valid
2	Indicators developed learning has been referring to the basic competency.	3	4	4	91.67	Very valid
3	Description of the material can invite learners to be able to associate the concepts in the material.	3	4	4	91.67	Very valid
4	translation of the learning objectives in accordance with the indicator	3	4	4	91.67	Very valid
5	Highlights material in accordance with the indicator module.	3	3	4	83.33	Very Valid
6	Compliance with the characteristics of learners	3	3	3	75.00	Valid
7	Study modules build thinking of learners in the analysis of the topic matter.	4	3	3	83.33	Very valid
8	Modules developed to help learners understand the concept of learning appropriately.	4	3	4	91.67	Very valid
9	Learning in the module help learners construct knowledge.	4	3	3	83.33	Very valid
10	Module linking between the textual and contextual material.	4	3	3	83.33	Very valid
11	Learning to use modules to help students to learn independently.	3	3	4	83.33	Very Valid
12	Modules developed to improve the effectiveness of learning.	3	3	3	75.00	Valid
	Total	40	40	43	85.42%	Very valid

B. CONSTRUCT

No.	Assessment Indicators	Validator				Validation Value	Category
		1	2	3	4		
1	Module displays a clear title material.	3	3	3	4	81.25	Very valid
2	KI and KD learning module clearly written.	3	3	4	4	87.5	Very valid
3	Formulation indicators easy to understand learning.	3	3	3	4	81.25	Very valid
4	Formulation of learning objectives easily understood.	3	3	3	4	81.25	Very valid
5	Indicators oriented learning in meaningful learning (<i>Meaningful learning</i>).	3	3	3	4	81.25	Very valid
6	Goal-oriented learning meaningful learning (<i>Meaningful learning</i>).	3	3	3	3	75	Valid
7	Basic studies clearly written material.	3	3	4	3	81.25	Very valid
8	Subject was written systematically so that it meets the learning objectives.	3	3	3	4	81.25	Very valid
9	Organizing sub-chapter on the module systematically arranged.	3	3	3	4	81.25	Very valid
10	Materials on the module developed with the right concept.	3	3	3	4	81.25	Very valid
11	Several studies describe material that develops new knowledge of previous knowledge.	3	3	3	3	75	Valid
12	Use of analogies to some discussion and understanding of the concept of material support meaningful learning.	3	3	3	4	81.25	Very valid
13	Map concept outlines a clear relationship between one concept to another.	3	3	3	3	75	Valid
14	Module displays images that support the learning material.	4	3	4	4	93.75	Very valid
15	Modules developed using logical language.	3	3	4	3	81.25	Very valid
16	Modules developed with a language that is easily understood.	3	3	3	3	75	Valid
17	Modules have been using terms corresponding to the concept of the material.	3	3	4	4	87.5	Very valid
18	Writing module using the right language.	3	3	3	4	81.25	Very valid
	Total	55	54	59	66	81.25	Very Valid

C. TECHNICAL

No.	Indicator ratings	Validator				Validati on Value	Category
		1	2	3	4		
1	The use of punctuation in the module is correct.	3	3	3	3	75	Valid
2	Type interesting article on the module.	4	3	4	4	93.75	Very valid
3	Font size on the module can be read clearly.	3	3	4	4	87.5	Very valid
4	Color <i>background</i> support display clearly written.	4	3	3	4	87.5	Very valid
5	On the module color combination looks attractive.	4	3	3	4	87.5	Very valid
6	Identification of the <i>cover</i> . clear	3	3	3	4	81.25	Very valid
		21	18	20	23	85.42	Very Valid

Validation of the third aspect of the analysis of the results table based module validation by experts that includes aspects of didactic and technical CONSTRUCTS showed an average score of 84.03% with a very valid category. These results

indicate that the module has been developed can be used in learning. On average these three aspects can be seen in Figure 1.

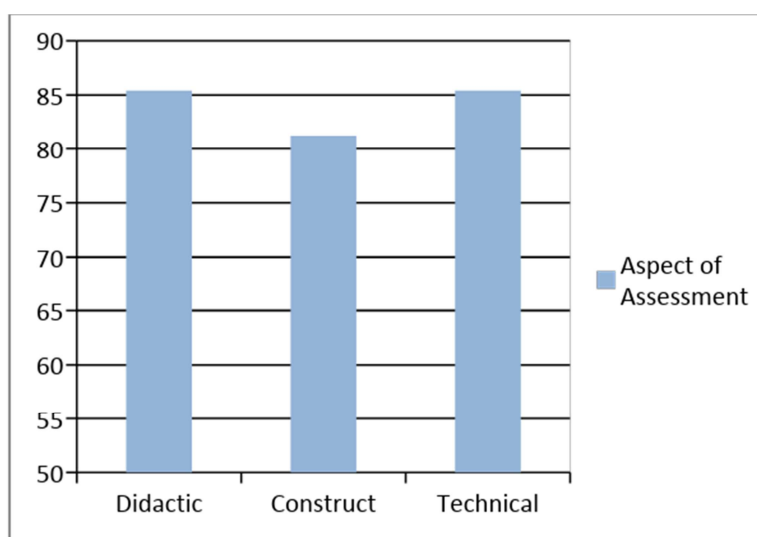


Figure 1. Data Validation Results Module by Validator

V. DISCUSSION

Validation assessment on the didactic aspects of obtaining an average value of 85.42% with a very valid category. This value indicates that the modules developed has met the terms of the preparation of teaching materials and in accordance with the demands of core competencies and basic competencies in the curriculum in 2013 that is used today.

Rate constructs validation on aspects of obtaining an average value of 81.25% with a very valid category. The module displays the title of clear material, KI and KD learning module clearly written, formulation of indicators and easy to understand learning objectives. Indicators of meaningful learning-oriented learning (*Meaningful learning*). Where the concept map is one tool in meaningful learning. So that the modules developed with a map of the concept and given exercises to build a concept map.

According to Yekta (2004), the concept mapping strategy can significantly improve memory while learning and the creation of meaningful learning. Based on an assessment can be stated that the map illustrates the concept of a clear relationship between one concept to another. Trianto (2011) stated teaching materials can help learners discover and develop concepts and to train students in finding the concept, giving rise to active learners in learning and motivate learners in the learning process.

Renat (2017) states biology learning is a rich learning concepts, between one concept with another concept related hierarchically, in other words concepts in biology is not well understood when these concepts are understood in isolation. Therefore, a concept map is needed to help learners understand the biology in a comprehensive manner. According to Mustafa (2013) developed the concept map based on the theory of Ausubel's meaningful learning will help students understand the relationship between what is learned with other knowledge. When information is absorbed completely, then later will be remembered better.

Supported also by the material on the module developed with the right concept. The terms used in the module according to the concept of the material. Several studies describe the material also developing new knowledge from prior knowledge. So that learners are also able to link the material learned with previous knowledge that has been owned by the learner. Principal study material clearly written and written systematically so that it meets the learning objectives. There is also the use of analogy in some discussion and understanding of the concept of material support meaningful learning.

The results of the validation assessment on the technical aspects of obtaining an average value of 85.42% with a very valid category. According Widjayanti (2013) the technical aspects related to the presentation of teaching materials in the form of text, images, and performances in teaching materials. The appearance of these materials can be seen from the color, background cover, and content modules.

Assessment of these three aspects shows an average score of 84.03% with a very valid category. These results showed that the modules developed meets the criteria of validity development of teaching materials that can be used to help students understand the learning material motion systems mainly on the material and the human circulatory system. Arikunto (2013) states, if a data generated from a valid product, it can be said that products be developed already provides an overview of the purpose of developing the company properly and fit the reality or the real state. After the product is declared valid by the validator, the revision of the

module in accordance with the advice given by the validator yan.

VI. CONCLUSION

Module biology-oriented learning relevant learning which has been developed is declared valid by the validator with an average of 84.03% with a very valid category. Invalid category given by experts based on didactic aspects, constructs, and technical. Based on the assessment module can be used as an innovation in the learning process by incorporating some aspects that support teaching and learning activities are oriented meaningful learning.

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