Development of Learning Models Based on Problem Solving and Meaningful Learning Standards by Expert Validity for Animal Development Course

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Abstract. The purpose of this study is to produce a learning model based on problem solving and meaningful learning standards by expert assessment or validation for the course of Animal Development. This research is a development research that produce the product in the form of learning model, which consist of sub product, namely: the syntax of learning model and student worksheets. All of these products are standardized through expert validation. The research data is the level of validity of all sub products obtained using questionnaire, filled by validators from various field of expertise (field of study, learning strategy, Bahasa). Data were analysed using descriptive statistics. The result of the research shows that the problem solving and meaningful learning model has been produced. Sub products declared appropriate by expert include the syntax of learning model and student worksheet.

1. Introduction

The demands of the government on improving the quality of higher education in Indonesia have surfaced in various mass media and Education meetings. They have taken serious action to make this happen. A similar thing is being done also by the higher education. Level of education quality can be known by looking at the quality of the learning process, which is expected to be the key to the formation of individuals who are able to apply science properly and correctly. However, based on a preliminary study on one of the subjects in college, especially in the Department of Biology FMIPA Universitas Negeri Padang (Animals Development) found unsatisfactory results. The data found is the difficulties of students understanding the concept, the students are unable to re-explain the related material, the students cannot describe the pictures and they cannot think at a higher level.

This problem is related to the student's low-mindedness to understand the concept of animal development. The ability is often known when students take the final exam of the semester. Students tend to answer wrongly about a concept, while they should not be wrong. The conclusion is that students do not understand the concept well.

Based on the facts that have been stated previously, confirmed by the results of discussions with the lecturers of the field course of Animals Development arises an idea to solve problems or find solutions. The solution offered is to develop a model that requires students to have the ability to think high level and interpret the learning materials. Grabe and Grabe suggest that with meaningful learning the students will understand the content of the lesson more deeply [1]. Meaningful learning is much better when compared with rote-based learning [2].
This model was chosen to be developed on the grounds that students' ability after learning will improve through meaningful learning. Implementation of meaningful learning can be done by lecturers because they are professional in the field of learning so that role to prepare learners to be ready to join in society or level education [3].

In addition to the model, this research also develops teaching materials that are Problem Solving based worksheets and Concept Map based worksheets. Von Glaserveld states that with problem solving learning will lead to meaningful learning, because students will feel satisfied, happy and motivated to learn [4]. Concerning the concept map, Clinton has written that meaningful learning will be beneficial to the learning strategy of "finding relationships" between concepts [5].

This research is limited to validity test of model syntax and student worksheet. The validity of the model syntax and student worksheet is very important because it indicates the level of trust in something. Guba and Lincoln stated that the level of trust has 4 aspects, namely credibility, transferability, dependability and confirmability [6]. Validity describes the precision of the data that has been found [7]. Even the truth level of a data can be indicated from the validity of the data [8]. A good research is that the researcher can validate the research instrument as well as the data obtained [9].

2. Method
The method used in the research is development research. This research development method was adopted from the instructional development cycle model developed by Fenrich in 1997 as shown in Figure 1.

![Developmental Cycle Procedure](image)

The data collecting instrument in the study used a validity questionnaire that was first validated by the experts. Questionnaire has 5 scales with criteria strongly agree, agree, average, quite agree and disagree. Validator in this research is Dr. Yuni Ahda, M.Si., Dr. Ramadan Sumarmin, M.Si., Dr. Hardeli, M.Si., and Dr. Yerizon, M.Sc. The validation data obtained has been processed using the average analysis for the final result to interpret the entire product. These products include syntax module, student workbook based problem solving and student worksheet based on concept map. The interpretation values of validity data are (1) 1-1.79 is highly invalid, 1.8-2.59 is invalid, 2.6-3.39 is valid enough, 3.4-4.19 is valid and 4, 2- 5 is very valid.

3. Results and Discussion
Analysis of validation data by four validators to the syntax of the model obtained an average value of 4.3 with very valid criteria. The average value of the didactic indicator is 4.2, the average value on the construction indicator is 4.4, and the mean value for the technical indicator and linguistic is 4.3. Distribution of data more clearly can be seen in Figure 2.
Result of data analysis to student work sheet based problem solving got value 4.2 with criterion very valid. The average value on the indicator of eligibility of content got the number 4.3, the average value on the indicator language got the value 4.3, the average value for indicator presentation is 4.2, and the average value on the indicator graph is 4.2. Distribution of data more clearly can be seen in Figure 3.

The result of validation data analysis toward concept map based worksheet got value 4.3 with criterion very valid. The average value on all indicators (indicator eligibility of content, language, presentation, graph) is 4.3. Distribution of data more clearly can be seen in Figure 4.

All products that have been developed and validated, are expected to be useful for lecturers as a consideration for use in learning, especially in the subject of Animal Development. This research can also be used as an example to develop the ability to produce learning model and student worksheet, so it is expected to create a better learning quality and different from usual. Different learning atmosphere than usual will be interesting for students to pay attention and understand the learning materials. Government demands that are in line with the background of this research so that teachers can create a
conducive learning atmosphere in order to encourage the realization of meaningful learning will be achieved.

Meaningful learning will have an impact on satisfactory learning outcomes in accordance with the learning objectives. There are three criteria to create meaningful learning that is (1) learning materials relevant to the daily life of the students, (2) the teacher's learning materials should also be meaningful for the students' life, and (3) the students' curiosity to connect the learning materials with the activities which is fun [10]. Novak explains that enjoyable learning is an integration between thoughts, feelings, and actions, which encourages students to be committed and responsible [10].

The syntax of the developed learning model leads the student toward meaningful learning. In essence, meaningful learning is much greater in meaning than just transmitting material from teacher to student. Meaningful learning builds opportunities for students to build their own knowledge, and the ability to share with other students [11]. Learning model that has been developed is the right choice in a learning process in general, and subjects of animal development in particular to give a positive influence on the process and student learning outcomes in the Department of Biology FMIPA UNP in the course of Animal Development.

The accuracy of choosing teaching materials that will be used in the learning process will accelerate the acceptance of the contents of the given material. If students easily accept the subject matter and they are able to understand it, then learning it will become more active and advanced. Judging from the aspect of the truth of the contents, the worksheet based on problem solving and student worksheet based on the concept map is considered very valid so that it can be stated that the student worksheet contains the material in accordance with the curriculum in the college, according to the stage of student development and their needs, the content of the material is correct, it is assumed to be able to increase the knowledge and understanding of the students and can create meaningful learning process, so it is good to be used as learning resource in learning in the subject of Animal Development.

From linguistic aspect, the work sheet of problem solving student and student worksheet of concept map given value is very valid because the description of the material in both worksheet of this student can be read clearly, clear explanation of information, spelling according to Indonesian rule and already using effective sentence and efficient. Judging from the presentation aspect, student work sheet based on problem solving and student work based on the concept map is considered very valid because the learning objectives formulated are clear, the design of student worksheets in accordance with the rules of development, stimulate learning motivation with color and picture, cover, build learning meaning and completeness of information. Then from the aspect of the graph, then the student worksheet is considered very valid because the selection of the right letter, font size, image layout and image selection.

Based on the assessment of the validators it can be drawn a conclusion that the model and worksheet of students can help students to improve their understanding in the course of Animal Development. Students are interested to learn by using this learning model because it can improve their understanding and ability to think high level. The validity test can provide a conclusion that the student models and worksheets that have been developed can be used in the learning process at different times with different specifications [13].

4. Conclusion
Based on data analysis and discussion, it can be made a generalization about the learning model and student worksheet (problem solving and concept map) for students in the course of animal development which has been developed has validity with very valid category. This development research has resulted in learning model and student worksheet for animal development students and can give description and input to related parties to continuously improve the quality of education, especially in the subject of Animal Development. The model and worksheet of students that have been developed will create a fun learning nuance and can realize satisfactory learning outcomes.
The research team suggested that it continues to develop the ability to be able to test the level of validity of an object, because each test of validity cannot be ascertained with absolute correctness. One reason is the ability of researchers to test and analyze the data validity. The calculation of the validity of an object will be influenced by the ability of researchers to collect and calculate data. Validity values cannot be separated from the possibility of error calculation techniques conducted by the researchers themselves. Therefore, the researcher receives all criticism and suggestion from the reader to improve the quality of this research.

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