DEVELOPMENT OF MODULE BASE ON PROCESS IMAGE FOR LEARNING OF CIRCULAR MOTION IN SENIOR HIGH SCHOOL

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ABSTRACT

Process image is defined as a series of images of objects, events or phenomena, which the images of one and another are relatively different in terms of circumstances, position, shape, or their combinations, as a whole describes a coherently phase and a unified whole. The aim of this research is to produce a module bases on process image that appropriate for independently learning mechanics (circular motion) of students in senior high school. The appropriateness of the module is shown by validity, effectiveness, and practicality of the module as a printed media that suit for learning of circular motion in high school. This research is a research and development, by using Four-D (Define, Design, Develop, Dessiminate) design. The subject of this research is students class XI senior high school. This time, we still work in two stages (define and design), so we have produced the modul hypothetically.

INTRODUCTION

Education is one of the most important element because education creates strong human resources and able to make changes towards the development of the nation and the more advanced country (Kuswandari et al., 2013). Good education will produce a good society and able to face competition in the future. To produce a good education
then the learning process must run well and in accordance with the purpose of learning. So that students are able to absorb the lessons that are delivered and implement in life.

Physics is a science that studies and analyzes the symptoms or processes nature and nature of substances and their application (Wospakrik, 1994). Physics is presented in a simple language that is translated into mathematical language and derived from the results of research, experiments, and measurements (Pratama et al., 2015). In general students do physics problems start by using the formula. Whereas from some opinions above, physics is a science gained by analyzing the symptoms or natural processes first and then presented in simple language and math language. This often happens because students view physics as a difficult lesson so students tend to memorize it. Paramita (2015) states that physics needs to be understood through the process of analyzing an event, because understanding the correct concept will be more useful than memorizing it.

One of the subject matter in physics learning is rotational motion. Rotational motion is the motion of an object in a circular path (Giancoli, 2014). Rotation motion is one of the materials that students consider quite complicated. Rotation motion has a character that can be understood more easily by looking at events directly, but to see the immediate events associated with rotational motion is relatively difficult to do in the classroom. For that we need a media that can make students able to analyze the process of rotation motion events without having to present objects or actual events.

One of media that can make students able to work independently to analyze rotational motion is the module (Rufii, 2015). The module is one of the important components in learning as it can help students obtain important information about the learning materials (Parmin, 2012). According to Syahroni (2016), students prefer to study science by using modules. Currently, there are more general physics modules that emphasize equations of formula to solve problems and problems given to students in the form of exercise questions (Sujanem, 2012), whereas the brain receives and responds and more easily process information in the form of images. This is supported based on preliminary studies of some high school students. 51 students from 60 students stated that the material of physics is more easily understood when accompanied by an explanation of the image. So to understand the concept of rotation motion, modules are
needed in which there are images that can make students more easily analyze the incident rotation motion.

The process drawing is a series of drawings of object objects, events or phenomena, which between the images of one another are relatively different in terms of circumstances, positions, forms, and combinations which as a whole describe a coherent stage and constitute a unified whole (Sutarto in Ilmiah et al., 2016). With the image of the student process will be easier to analyze a more detailed event because in the process the process there are different stages of an event. In addition, according to Wahyuningsih (2012) the use of images in learning can make students more interested and bring the creativity of students to understand a more difficult concept. Therefore, it is necessary to develop a picture-based learning process module suitable for rotational motion material. Module eligibility is demonstrated by the validity, practicality, and effectiveness of the module as a print medium for the learning of rotational material physics in high school.

**METHODOLOGY**

This research is a 4-D development research proposed by Thiagarajan (in Ilmiah et al., 2017) consisting of definitions, design, development and disseminate. The stages of development of learning tools can be described as follows.

1. **Define**

   In the context of module development, the definition is done in various ways, namely:

   a. **Curriculum Analysis**

      In the early stages, researchers should examine the applicable curriculum in order to know the basic competencies to be achieved. The curriculum analysis is useful for what basic competencies will be defined in the modules to be developed.

   b. **Analysis of the characteristics of learners**

      A good teacher certainly recognizes the characteristics of learners who will use the module. This is necessary because all the learning-related processes must be tailored to the characteristics of the student. Things that need to be considered to know the characteristics of learners are: individual academic
ability, group work skills, learning motivation, social and economic background, learning experience sebelunya, and so on.

c. Material analysis

Material analysis is done by identifying the material that needs to be taught in this matter rotational motion.

d. Formulate goals

Before creating the module, learning objectives and competencies to be achieved need to be formulated first. This is useful for limiting researchers not to deviate from their original purpose when creating modules.

2. Design

a. Review the theories of the experts relevant to the module to be developed. Modify the module to refine the module to be ready to apply.

b. Preliminary study to identify the material characteristics and characteristics of the students so as to define the module.

c. Design the initial pattern of modules tailored to the characteristics of the material and test is limited to the school.

d. Design the initial pattern of modules based on relevant theories. Collect theories that support the module design developed.

e. Arrange design to review modules. Review modules based on conformity with the designs compiled.

3. Develop

a. Constructing an RPP that is adapted to the image-based module of the rotation material process.

b. Testing image-based modules in the process of rotation motion material through action research cycles include: plan, action, observe, and reflection to see the initial design consistency.

c. Compile the module so that the resulting image-based module of the first rotation material process

4. Disseminate

a. Test the area of the image-based modules of the rotation motion material process at 5 different secondary schools according to the above cycle.
b. Testing image-based modules of motion rotation material process that aims to see the consistency of products produced through action research cycles include: plan, action, observe, and reflection.

c. Improvement test of image-based module rotation material motion process as above cycle. Performing an image-based modification of the rotation material motion process based on the cycle sequence that has been done.

d. Arrange image-based modules of the rotation material process based on the results of the trial cycle

In this opportunity we only do until the design stage. The one that will be developed in this research idea is a decent image-based process module for rotational motion material. Module eligibility is demonstrated by the validity, practicality, and effectiveness of the module as a print medium for the learning of rotational material physics in high school.

CONCLUSION

Based on the literature review on the development of image-based learning module for rotation material for secondary school, further research is needed in order to provide more meaningful learning to the students.

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