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The Web-based Module of Changes in Objects

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Abstract. To understand the changes of substances contained in such a kind of substance and substance characteristics then need a deep study of the concept. In this concept is expected to understand the changes of objects such as substance type and substance characteristics. Types of substances and characteristics of substances through physical changes and chemical changes and means of separation consisting of two or more substances. The principle of separation of the mixture is based on differences in physical properties of its constituents, such as substances, particle size, melting point, boiling point, magnetic properties, solubility, and so forth. This study aims to produce a web-based module of changes in objects that are valid, practical, and have effectiveness of student learning outcomes and activities on natural science learning. The experiment was conducted on 30 children in South Sumatera. The case of the development of the learning module of change of the object is influenced by the child's understanding of the concept. Expected to be adapted by world teachers.

1. Introduction

The curriculum has been set by the government to replace the Education Unit Level Curriculum that has been valid for approximately 6 years. The curriculum is set in 2013 so that the curriculum is known as the 2013 curriculum which has three aspects of assessment, namely aspects of knowledge, skills aspects, and aspects of attitude and behavior. The core of the 2013 curriculum is the mindset, strengthening of curriculum governance, deepening and expanding the material, strengthening the learning process. Competence of science for junior high school education level in 2013 curriculum physics, chemistry, and biology aspects have been integrated in science subjects. Science is concerned with how to systematically find out about nature, so science is not only the mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of discovery. The science-learning process emphasizes the provision of hands-on experience to develop competencies to explore and understand the natural world scientifically.

Science course serves to provide knowledge about the natural environment, develop skills, insights, and technology awareness in connection with its utilization for everyday life. Science subjects in elementary schools begin to be taught in the lower classes by giving more knowledge through observation of the various types and temperatures of the natural environment as well as the artificial environment. Science is the building or sequence of concepts and conceptual schemes that are interconnected as a result of experimentation and observation "science has the meaning of referring to the knowledge that is in the system of thought and theoretical concepts in the system, which includes all kinds of knowledge, about anything" [1].

Science is a theoretical approach derived or arranged in a peculiar or special way of observation of experimentation, inference, theorizing, experimentation, observation, and so on one way to another [2]. The same is also expressed science is a knowledge of the universe that relies on data collected



through observation and experimentation so that it contains human products, processes, and attitudes [3]. Concept is an idea that unifies the related facts of science then the principle is generalization of the relationship between the concepts of science [1]." Further Referring to the opinion of these experts can be concluded that the science is an organized investigation to find patterns or natural order to provide knowledge. Such knowledge may be facts, concepts, theories, laws, principles of the natural environment in relation to their utilization for everyday life. Material Changes the objects used in the research are material is anything that has mass and occupy space. The mass of a material is not affected by the gravitational force of the Earth. Therefore, the mass of a matter matter will always remain everywhere. The weight of the material will vary depending on the place. Weight is a measure that represents the magnitude of the Earth's gravitational force experienced by a material. Because it is influenced by the gravitational force of the Earth, the weight of matter will vary depending on the position of the material from the center of the Earth. The closer the poles of the Earth, the greater the gravitational force of the Earth, the greater the weight of matter. Conversely, the nearer the equator, the smaller the gravitational force of the Earth, the lower the material weight. So, the same material, if placed in a different place gravitational force then the weight will also be different.

The material in nature can be a single (pure) substance and can also be a mixture. Pure substances are materials that are composed of only one kind of substance. Mixture is a material composed of two or more substances. The change of matter is the change of the nature of a substance or matter into another substance whether it be new or not. Material change is divided into two types, material change physically or physically and chemical material changes. Physical change is the change of a substance that does not produce a new kind of substance. The characteristics of physical changes are not formed a new type of substance, substances that undergo changes can return to their original shape and changes that occur only followed changes in physical properties. Chemical change is the change of a substance that produces a new kind of substance and a change that is eternal. Characteristics of chemical change is the formation of new types of substances, substances that change can not return to their original shape. The changes that occur are followed by changes in chemical properties through chemical reactions, during chemical changes, the mass of substances before equals the mass of substances after the reaction.

The conception of science learning as an increase in knowledge and understanding is more positively correlated with empathy [4]. The study suggests a correlation of empathy with knowledge and understanding. Empathy by creating the desire to help others, experiencing emotions similar to the emotions of others. The relationship between empathy is difficult to achieve with knowledge and understanding. Science learning should be conducted in scientific inquiry to foster thinking ability, work and be scientific and communicate it as an important aspect of Life Skills.

Therefore science lessons in junior high schools emphasize the provision of learning experiences directly through the use of website technology. Learning using technology to support the success of the curriculum 2013. Learners active in gaining knowledge widely. Therefore, based on the above description, the researcher considers the need to conduct research on the development of learning modules of website-based object changes that are tested for validity, tested practicality and have effectiveness. Employing of module in education have been working in a long time. But, in the beginning it is still limited for employing of communication tool among the researchers in form of information exchange with text [5]. Learning by module can be formulated as a complete stand-alone unit and consists of a series of learning activities that are structured to help students achieve a number of clearly defined and specific objectives [6]. The service developing of communication for module based on website develop rapidly in accordance with computer developing become hypermedia [7][8]. The hope after developing a web-based module can improve learning outcomes on natural science subjects.

2. Experimental Method

Design best research by using development of model that oriented to Hannafin and Peck's product. Hannafin and Peck's development model consists of three phases of development: (1) necessary of analysis; (2) design / planning; And (3) development and implementation [9]. Furthermore, for

formative evaluation of researcher by using Tessmer. There are five evaluations, namely: (1) self-evaluation; (2) expert's review; (3) one to one evaluation; (4) small group; (5) field test.

For every phase of Hannafin and Peck's development of revision and evaluation were done to reduce errors during development. The phase of development was limited to self-evaluation so that researcher modified it by Tessmer's formative evaluation. The location of the study in SMP Xaverius 1 Palembang. In this study, the subject of the study was the seventh graders of first semester in the academic year 2014/2015. This module based on website would be used by graders to be teaching material alternative for subject of science.

Development of learning modules with several phases of activities were listed in the development phase. Before entering the area of analysis it was determined the subjects to be developed first in the media of this lesson. The lessons that would be developed by researcher was the conversion of object. Phase of model by Hannafin and Peck namely: 1) phase of analysis necessary, identified the necessary in developing a module including the goal and objective of development. Also, identified the knowledge and skill of graders who would use the computer. The analysis was done by researcher by reviewing journals and articles of teaching material in the form of module that could help graders in the process of learning and interviewing with teachers to find the problems that occurred. Collecting the information to develop goal of module based on website development. Determining the software and hardware that would be developed. Every steps that was done in this phase was evaluated and revised appropriate with literature and expert review; 2) the design / planning, at this phase, the information by the requirements of analysis phase was transferred into the form of document which would be the goal of learning module planning. The goal was identifying and documenting the best rule to rich the goal of the module planning, Hannafin and Peck stated the design phase aimed to make the program. The program had been made after identified the necessary and decision for the goal of learning to conceive the lesson plan.

Basic competence and indicator of the competence achievement was to explain the various of characteristic substances, explaining the definition of conversion of object. Explaining the definition of conversion chemistry and the separation of the mixture. This phase was evaluated and revised subsequently based on reviewed of flowchart and story board was created too during this phase. Flowchart would show the application current while the sample story board was example of learning arrangement and interface layout would be provided to the user. The layout also included multimedia elements that were designed that appropriate to the learning process. The consideration was based on the scientific approach that had been made to ensure the learning objective that was accordance; 3) the phase of development and implementation, the researcher did the income of flowchart, testing as well as formative assessment. The storyboard document would be the base for creating a flowchart that could help the process of creating the module based on website. In this phase, that was prepared an expert validation sheet and questionnaire of the grader's response during the learning process [10].

The results of development to find out the effect for the quality of learning that was included the valid, effectiveness, attractiveness, and effectiveness of learning. To ensure development of application was done correctly, the development phase would be reviewed regularly back to the scientific approach, flowchart and storyboard that had been planned in the phase of design. One important step in this development phase was validation with experts. The process to see if the module based on website was developed by the researcher successful appropriate with expectation or not, the researcher did the evaluation formative.

Formative evaluation phase [11], namely: 1) self-evaluation, in this phase overcome the error of development study at the time, consists of analysis and design were conducted by researcher. In this phase it was done during the phase of necessary analysis and design phase; 2) expert review, the design result that was developed by the researcher was given to the expert to be validated. Validation is a measure that states the validity of an instrument so that it is able to measure what kind of object that will be measured. Validity of instrument test that is used by validity of material test, design of learning and validity of media [12]. Suggestion that was given to the expert review then it was improved by the researcher of the module based on website; 3) one to one test, it was tested by seventh graders consist of three graders in SMP Xaverius 1 Palembang with high ability, average, and low.

One to one test was done to know the practicality. Researcher conducted unstructured interviews and the characteristic was available then it was invited the graders to give some comments/ criticisms, suggestions of the module based on website that they had operated. It was to identify and reduced some errors that exist in in the module based on website so, the product that was resulted could be used by graders easily.

The questionnaires, suggestions and comments would be base to improve the module based on website that was develop by researcher. After the development of product had been improved then conducted the limited test; 4) Small group test, to know if the module available to be used and to know the practical and liveliness of graders in a small scale of module that was developed. The test of was conducted by took eight graders of seventh graders in first semester for the sample. The graders had some characteristic with the others who were subjected to study. At the end of the learning in small groups, the graders were given questionnaire to see students' learning outcomes. Subjects of this phase did not include three students who had participated in one to one evaluations [13]. In addition, researcher was supported by observer who would conduct documentation activities and recorded how graders conducted learning process by using module based on website that was developed by researcher. This study by observation to observe of graders activities that was done by observer and the questionnaire to know the graders response.

After the learning was complete the researcher give the test to see the outcomes of graders learning and were given a questionnaire and asked them to fill it to get information about; (A) whether the learning activity was interesting and systematic; (B) which parts of the material in the multimedia learning that was difficult to understand and what the reason is; (C) whether the questions and instructions were clear enough; (D) which test items were not relevant to the learning material; And (e) If it was relevant between the learning objective and the material contained in the media of learning; (4) organized discussions with the graders to get more detail information when that was possible; (5) analyzed the data that was collected as feedback to revise the media learning product.

The results of the questionnaires, suggestions and comments in this phase were intended to improve and refine the website-based module developed by researcher to be more effective. After the development product had been improved the next phase of conducting into field test; 5) Field test aimed to know the effectiveness of website-based module in the learning outcomes and liveliness of graders. The class was used for the field test by the target class of study. The implementation of the field test was begun by the pre-test and ends by the post-test. Products that had been tested in the field test must fulfill with the quality of criteria. Focus of questions that need to be used as a standard of field test, including (1) ability to be implemented; (2) continuity; (3) effectiveness; (4) compatibility with the environment; (4) acceptance and attractiveness.

According to [12] suggests that there are three quality criteria are: validity, practicality, and effectiveness. The effectiveness would be measured in this field test was the website-based module to the l' learning outcome before using the module and after using the module. If the results was obtained had reached at least 70% then the module declared could be used by graders properly for teaching and learning process science subject. Researcher provide a pretest for measuring the graders' ability first to the learning material that had been developed. The end of the lesson gave the researcher a posttest to know the effectiveness and observations were still conducted during the learning process to see the liveliness of the graders.

Technique of collecting data of this study was done by researcher through the walkthrough data, interview, questionnaire, observation, documentation, and outcome of the learning test. The walkthrough was conducted in the phase of expert review that was used to know the validity of the website based module. Interviews were conducted of necessary analysis and evaluation activities. In the necessary analysis activities were conducted interviews to explore the information was needed in the formulation of the problem. In the evaluation activities of the one to one phase that aimed to know the weaknesses and shortcomings of the website-based module that was developed.

Questionnaire activities in a small group evaluation aimed to get information in the form of comments and suggestions by the graders. Observations were used in the small group evaluation and

field test activities. Assessment of graders activities during the learning process to know the practicality. The test of the learning outcome was used during the evaluation of the field test phase.

3. Result and Discussion

Phase analysis needs researchers to collect data by conducting literature study through reference books on php programming to be installed on the computer, besides, researchers also collect journals related to the development of website-based teaching materials through internet media as an additional reference material. At this phase the researcher also formulates the objectives and learning materials of Natural Science class VII especially on the material changes of objects that ultimately produce RPP as a guide in the implementation of learning. The results of RPP attached. At this phase the evaluation and self-revision. After all the needs are identified the next step is to design phase.

The design phase, the information from the needs analysis phase is transferred into a document form. Researchers drafted Flowchart and story board. Flowcharts and story boards will show the flow of apps while the storyboard examples of learning sequences and interface layouts will be provided to users. The layout also includes multimedia elements that are design appropriate to the learning process. The consideration is based on the scientific approach that has been made to ensure the learning process. At this phase the researcher also formulates the objectives and learning materials of Natural Sciences class VII especially on the material changes of objects that ultimately produce RPP as a guide in the implementation of learning. Researchers conducted an evaluation and revision based on literature review.

The development and implementation phase of the researcher will develop the design of website based module design then implemented and evaluated through the pilot phase. One important step in this development phase is validation with experts. The process of obtaining data from experts, researchers use validation sheets that are used to assess whether the design of website-based modules in the system will be more effective than the previous one or not.

The utilization of media that varied had been adapted to the characteristics of the main point of the material. The results of the script on the storyboard found that the teaching materials in the subject of science of the main point in the object conversion. Opening in the open source based website. This phase was the first step in developing web-based modules. Software could be obtained for free by opening the web www.ipasmp.com. Modified Home Page. This phase of web display was designed by researcher while there were home buttons, introductions, materials, and forums. Website design was light green modified with the characteristics of junior high school graders. User registration settings. Every user who joined the module must register first where the username and password were specified by the admin. Importing learning material. Materials that were imported include: text pages, web pages, videos and pictures. Preparation of exercises in order to test graders' skills could be made by format of quiz with multiple choice form. Create and manage tasks. Assessment of graders' answers to the evaluation was done in the website automatically.

The results of the evaluation sent by the graders would be managed by the teacher easily. Every incoming file would be known to the time and who was the sender. The results of expert reviews on the module based website can be seen in table 1.

Table 1. Expert review results on website based module

	Expert	1 st Validity	2 nd Validity	Average	Category
Media experts	1 st Validity	4,76	-	4,76	Very valid
	2 nd Validity	3,80	4,50	4,15	Very valid
Material experts	1 st Validity	4	4,5	4,25	Very valid
	2 nd Validity	3,05	4,7	3,77	Valid
Instructional design experts	1 st Validity	4,66	4,83	4,74	Very valid
	2 nd Validity	4,42	-	4,42	Very valid
	3 rd Validity	3	4,66	3,83	Valid

Based on the table 1. Expert review was conducted with media experts, materials and instructional design. Validation was done in twice. After analyzed, the average of 4.27 with the category was very valid. The advice was given to the expert review then improved by the researcher. Next prototype 1 was tested by involving three graders who had different abilities individually. At the end of the study the researcher conducted an unstructured and open interview.

Next prototype 2 which would be tested of the limited test phase. In this phase consists of eight graders who had similar characteristics by objective study. Furthermore, graders fill out the questionnaire and provide comments and suggestions so, researcher could find out the advantages and disadvantages of the development of website-based module. Graders were given a username and password and how to operate a website-based module. Results in the small group phase could be seen in table 2.

Table 2. The result of the small group phase

Activity	Result	Information
The Graders Observation	88,3%	Very good
The Graders Questionnaire	76%	Effective

Based on the observation result, the average of graders' activity was 88,3% and it was very good, it means the instructional material in the form of module of main point module was quite practical. Graders response data showed the average total Rsmmedia 3.8 and in percentage of the average number of graders response equal to 76% or 70% $< Rsm \leq 85\%$ it means positive response by the graders hence website based module developed by researcher that was effective. Observations made by the observer obtained the average of graders activities by 82.46% as a whole grader, it means the criteria was very good.

After obtaining prototype 3 that was valid and practical, then conducted field test to see effectiveness of the learning result and the graders activities. Website-based modules were tested for graders. Before the learning implemented, the first test to measure the Igraders's ability about conversion of objects by 20 multiple choice questions. The graders conducted trial of physics where job procedures were in website-based modules, the trial result must be uploaded by website-based modules that had been provided. The observation result in this phase could be seen in table 3.

Table 3. The result of observation in the field test phase

Meeting	The Graders Activity	Information
First	85,6 %	Very Good
Second	84,2 %	Very Good
Third	83 %	Very Good
Fourth	88,8 %	Very Good

Based on table 3 the field test phase was conducted during four meetings with an average of 85.4%, it means very good category. At the last meeting conducted the evaluation process by the number of questions as many as 20 multiple choice questions. Researcher conducted the tests to the graders in twice of pretest and posttest. The learning result by using website-based modules could be seen in table 4.

Table 4. The result of pretest and post-test by using website based module

Activity	Result	Information
\bar{x} pre-test score	41,42	Poor
\bar{x} post-test score	85,86	Very good
N-Gain score	0,78	Very good

Based on table 4 the average of value achieved by graders in pretest was 41.42, it means less category, while for posttest result was obtained average of 85,86, it means very good category. If the value of graders posttest one to one compared with the value of the minimum competency of criteria that must be achieved by the graders was 75, it means that the graders completed and obtained N-gain of 0.78. It showed that the effectiveness of learning by using a website-based module that was developed by the researcher, it means very good in the graders' learning result Website-based module learning of the conversion object was the last product that had some advantages. Website-based modules used a scientific approach. Provide to the graders worksheets. This module contained worksheets and got confirmation directly. Modules could be accessed by smartphone.

4. Conclusion

Based on the results and discussion, the conclusions of the study website-based module of changes in objects development was by researcher declared valid, tested its practicability, and had effectiveness in learning result and liveliness of the graders. Use of a website-based module should use a smartphone that had a high screen resolution. Internet network was very necessary in the using of learning modules. This study could be useful for teachers, graders, schools, and other researchers.

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