The Development of Interactive Learning CD Based on Discovery Learning Science Subject on Animal and Plant Growth Materials Grade IV

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Abstract:
This research aims at producing interactive learning CD which is used in Science subject on animal and plant growth material grade IV. The method of this research uses Research and Development. The research and development process is adapted from research and development model by the version of Borg & Gall. This interactive learning CD is tested to students of elementary school grade IV. The test has three steps; they are initial field test with 10 students as subject, primary field test with 10 students, and field implementation test with 50 students. The data are obtained through observation and direct surveillance at school. The data analysis uses descriptive quantitative analysis technique. The development result is in the form of the interactive CD which can be used as a media in Science learning grade IV of Elementary School. The result of the research shows that this learning CD after the materials expert testing, media expert testing, and design expert testing, the learning media produced in the final materials testing stage is categorized as decent, with the assessment average of 93.3. In the stage of final media expert and learning design expert, the learning CD is categorized as felicitous, with the assessment average of 92.6. Then the final result of field implementation is categorized as felicitous with the score of 90. Moreover, in the effectivity test also emerged that the use of learning CD impacts on student’s learning result.

It can be concluded that the interactive learning CD on animal and plant growth materials for Science subject grade IV of Elementary School is declared as feasible and can be used as one of the learning sources.

Keywords: Animal and Plant Growth, Interactive Learning CD, Science.

Introduction:

Education is one of the factors, which holds an important role to ensure life sustainability of a country, because education can increase and develop human resources quality; therefore, education is not as means only but also providing better future generations, through this effort, education quality is hoped to be changed through the teaching and learning process. Teaching and learning are interaction or reciprocal relationship between teacher and students, factually, educational activities are activities between people, by people and for people; that’s why a discussion about education cannot be separated from the discussion about people, which generally stated that education is given or conducted in order to develop all human potentials towards positive direction.

Learning is one of the teacher’s conscious efforts to help her students or protégés so that they can learn according to the needs and interests. In another word, learning is planned efforts in manipulating...
Learning resources so that learning process occurs in a student. According to Sadiman, in a learning process, a student is the subject who learns and a teacher is the subject who teaches. Teaching can be defined as a process to help someone or group to do an effective teaching and learning activity.

Based on the definition above, characteristics of learning can be identified as follows: a. In the learning process, a teacher has to consider a student as an individual who has dynamic elements which can develop if provided supporting condition. b. Learning emphasizes more on student’s activities because a student is the one who learns not the teacher. c. Learning is a conscious and deliberate effort. d. Learning is not an incidental activity, without preparation. e. Learning is an assistance which enables students to learn. Learning is an aimed activity. The aim must be unidirectional with the student’s learning goal and curriculum. The student’s learning goal is an optimal development, which includes the aspects of cognitive, affective, and psychomotor.

From the observation result on 10 May of 2017, science learning activity is done by speech method and picture media in explaining materials. Generally, the lesson ran well, but when explaining about the process of animal growth which could not be observed directly, half of the students did not comprehend the materials well. Science learning process in class gets used to having a handbook (LKS) and this situation causes no interaction among students. There are many students who look bored in class that tend to make them chat, joke, and play with their seatmate, which is in line with the research done by Hana from Jogjakarta State University. In her research, to avoid such a thing, a teacher has to choose and organize more interesting learning material, to motivate and impress students to study it. In this case, teacher’s professional ability and supporting media are needed.

Science and technology development encourages more the renewal efforts in the exploitation of technology results in the learning process. This condition demands teachers/tutors to be able to use tools provided by the school, and do not rule this out that those tools are suitable for development and demands of the times. Teachers, at least, can use cheap and efficient media, which although it’s simple, yet is a must in an attempt to reach the expected learning goal. Therefore, teachers must have adequate knowledge and comprehension about learning media.

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Discovery derived from the word “discover” means found and “discovery” is an invention. According to J Brunner invention method is not limited for something unknown to a child, but includes all kinds of knowledge for herself by analyzing and comprehending the concept of using her own mind. Discovery learning by J. Bruner makes four reasons:

1. An individual himself only can learn and develop his mind by using a method.
2. He believes that, if a teacher is successful with this method, learners feel satisfied with what they did.
3. He emphasized that the only way, which learners learn discovery techniques, is that they must have opportunities to discover.

He supposed that one of the best results of the discovery method is that to aid learner’s mind better and learners maintain their mind enduringly.

In using invention method, students have a chance to gain the actual experience needed if a child wants to comprehend and internalize invention concept in
science, teacher role during the implementation is as a director if needed.

The five major differences between discovery learning and traditional learning are:

a. Learning is active rather than passive
b. Learning is process-based rather that fact-based
c. Failure is important
d. Feedback is necessary
e. Understanding is deeper

Discovery learning can be facilitated through various strategies, or architectures, in the classroom. Then from those problems, researcher does a development of learning multimedia product of science subject on animal and plant growth materials, because learning media can be one of the solutions or approaches to overcome many problems in learning process, such as props limitation, teacher’s teaching method, and also this learning multimedia is expected to make the learning situation in class to be more interactive, fun, and able to operate the multimedia directly; moreover, students can learn to be independent corresponding to the level of ability and tempo of each individual, with this multimedia, it is expected that students can participate actively in the learning process in class or outside the class, so that the goal of science learning can be reached maximally.

The purpose of this research is to produce a learning multimedia product which is feasible for a science lesson in “Animal and plant growth” materials for Elementary School students.

a. Research Method:

Research method and Development is a research model which is used to produce a specific product and to test that product effectiveness. According to of Borg & Gall, research and development in education is a development model based on an industry in which the research invention is used to develop and validate the educational product. The stages needed in research according to Borg & Gall are as follow:

1. Research and information collecting; this stage includes literature study related to the problems reviewed and preparation to formulate the research framework;

2. Planning; it includes formulating proficiency and expertise related to the problems, deciding the goal which will be reached at every stage, and if possible and needed, doing feasibility study limitedly;

3. Develop a preliminary form of the product; is to develop preliminary form from the product produced. Include in this stage is the supporting component preparation, guidelines and guidebook preparation, and feasibility evaluation of supporting tools;

4. Preliminary field testing; is doing a preliminary field testing in limited scale by including subject as many as 10 subjects. In this stage, the data collection and analysis can be done by doing an interview, observation, or questioner;

5. Main product revision is doing a revision of the preliminary product produced based on the initial testing result. This revision is possible to be done more than one time, according to the result shown in the limited testing, so that the primary product draft (model) is gained and ready to be tested broader;

6. Main field testing, the main testing which includes all students.
7. Operational product revision; is doing a revision or improvement of a broader testing result, so that the developed product has been an operational model design which is ready to be validated;

8. Operational field testing; is the stage of validation testing towards operational model produced;

9. Final product revision; is doing a final revision towards the developed model in order to generate the final product;

10. Dissemination and implementation is the stage of disseminating the developed product or model.

Research Subject:

The amount of subjects used by researcher is 60 people, which consist of

1. Small-scale testing 10 students
2. Big-scale testing 50 students
Model Development Procedure:
1. Preliminary Research:

Preliminary research or needs analysis is a scientific activity which embroils many techniques of collecting data from various information sources to know the gap between the goals to reach with the real situation in the lesson. If the gap is considered as a problem that needs a solving, accordingly the gap is considered as needs. Needs analysis in this research and development is done through class observation, literary study, a visitation to PUSTEKOM, teacher interview, and student questioner.

2. Model Development Planning:

According to the result of needs analysis, the outline of media content is made consisting of materials title, Basic Competencies, Core Competencies, Indicators, and library. The next stage is to make the material description about animal and plant growth materials, to decide the standard competency, basic competency, and core competency which researcher takes according to the syllabus and lesson plan given by the class supervisor of the elementary school which has been adjusted to the 2013 curriculum. Based on the materials description, a flowchart is made to be the basic framework for making an interactive multimedia CD, which then continued to the materials developed in the form of a storyboard. Storyboard contains materials description equipped with pictures, audio, animation, and narration supporting the materials.

3. Validation, Evaluation, and Model Revision:

Validation, evaluation, and model revision covers the expert validation, small-scale field testing, and big-scale testing. This stage aims at testing the feasibility of the developed model. The expert validation is done by implicating experts in materials and language and learning media experts. This activity is done to observe the initial product and give a suggestion for revision. This validation process is called as expert judgment. The small-scale field testing implicates students as respondents, while the big-scale field testing implicates teachers and students as respondents.

a. Expert Validation:

Expert validation covers conceptual and empirical validation. To validate a concept, experts give inputs and opinions about the model draft 1 which has been made according to each skill field.

b. Small-scale Field Testing:

Small-scale field testing implicates 10 students grade IV of elementary school. The data are gained using an instrument of student’ testing questioner. Model draft II which has been made is shown to the respondents to be explored and observed using computers individually.

c. Big-scale field testing:

Big-scale field testing implicates 2 teachers and 50 students. The data gained with a testing instrument are in a form of teacher and students testing questioners. From the big-scale field testing, inputs are obtained and shortcomings are known. Based on the inputs and shortcomings, then model draft III is revised again to obtain the final model.

d. Model Revision:

The conclusion drawn from the expert validation, small-scale field testing, and big-scale field testing, results in a decision whether the model needs to be revised or not. The decision making to hold a product revision needs to be accompanied by a correction that after this product is revised; it will be better, effective, efficient, interesting, and easy for users.

1. The Data Collecting Technique:

The data in this research are collected using an instrument of questioners on stages of materials and language validation, small-scale testing, and big-scale testing. Those questioners contain some questions that must be answered by respondents. The respondents are asked to explore and observe the interactive multimedia CD, then fill in the questioners and give a suggestion for a further revision. Below is further explanation of instrument used in research and development.

2. Instrument Form:

An instrument used in this research is compiled in a form of questioners. This instrument refers to the better learning media aspects and supports the lesson with guided discovery method. Every aspect consists of some indicators of one or more questions. Every question is followed by four alternative answers: Very agree, agree, doubt, disagree, and very disagree. Every question in the instrument is answered by ticking the column in one of the alternative answers based on the respondent's judgment.
assessment. To know whether the learning CD is effective and impacting the student learning process, a researcher holds a pre-test and post-test using student worksheet. Then effectivity test is done to see the impact of using the learning CD towards the result of student’s learning.

Results of Research:

Materials and Language Experts Validation:
The data are gained through the questioner assessment; in which there are notes or suggestions from the experts of materials and language at the end of the questioner, in which this research the data are qualitative and quantitative. The role of the experts of materials and inputs from the media experts and students is developed and observed from the media and materials aspects. Data in a form of comments, suggestions, and revision, and the observation result done by a researcher during the testing process are analyzed in descriptive qualitative method and concluded as inputs to fix and revise the developed product.

Based on the validation data result by materials expert stage II, this interactive learning CD is categorized as “good” with the average of assessment as much as 80, so that this learning CD is feasible to be tested to students grade IV of elementary school.

Media and Learning Design Experts Validation:
Based on the validation data result by materials experts stage III, this interactive learning CD is categorized as “good” with the average of assessment as much as 80, so that this learning CD is feasible to be tested to students grade IV of elementary school.

Preliminary Field Testing:
Based on the small-scale field testing, this interactive learning CD is categorized as “good” with the average of assessment as much as 70, so that this learning CD is feasible for the further test with a revision which is suitable to the consideration in the testing and media experts suggestions.

Field Implementation Testing:
Field implementation testing is done with subjects of 50 students. Based on the field implementation testing, this learning CD product is categorized as “very good” with the average of assessment as much as 84. This field testing result shows that this interactive learning CD is very feasible to use as one of the learning sources at the school, especially in the science subject.

Discussion of Final Product Development Result:
The development of multimedia in this lesson uses Flash CS 6 software. The making process is done in steps and to produce a feasible learning CD, several preliminary field tests are done. Field tests and implementation field tests are meant to gain data which is further used for revision and improvement to produce a feasible learning CD in the learning process and is useful for its users. After the conclusion is made that this learning CD is a final product and is “feasible” to be used by students as an alternative learning media which can be used in or outside the class, here is the result preview of the interactive learning CD which has been developed as follow:
Conclusion and Suggestions:

The result of research and development of this interactive learning CD shows that this CD is feasible to use as a learning media especially in the discussion of animal and plant growth. The assessment result of the learning CD based on the development procedure of the interactive learning CD: Materials experts validation test as much as 93,3 (very good), learning media experts as much as 92,6 (very good), and in the final field implementation testing as much as 90 (very good). Generally, this learning CD is categorized as “Very Feasible”. Moreover, on the effectivity test, it is shown that the learning CD use takes effect on the student learning result.

Suggestions:

1. For students, they are expected to maximize Science lesson, inside or outside the class, to increase student’s comprehension.
2. For teachers, they are expected to deliver materials using learning multimedia (CD, LCD, and Video) to help students understand the lesson in a fun way.
3. For school, it is expected to utilize this learning CD in the learning process to maximize the teaching and learning process at school and to add more collections of other multimedia products.
4. For the next researchers, they need to conduct further research activity because of the limitation of time, to know the effectivity of this learning CD by doing a further development, or using another research method such as experimental method or class action method.

Reference: