Developing Instructional Multimedia for Science at Elementary School.

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Abstract

The research aims (1) to develop feasible instructional multimedia software for science of Fifth Grade Elementary Students as a learning resource, and (2) to see the enhancement of students' learning achievement on science.

The subjects of the research were 57 fifth grade students of elementary school. This research was conducted at State Elementary School 4 of Wates by using research and development. The development method was conducted in five steps: (1) pre study, (2) learning material analysis, (3) development process, (4) field testing, and (5) socialization. Pre-study consisted of literature and field studies. The development process included need analysis, ability analysis, multimedia design development, material and media expert validation, and hypothesis development. Field experiment comprised preliminary field testing, main field testing, and operational field testing. The instruments used in this research included evaluation observation sheet and interview guidelines.

The findings show that generally all aspects in the developed learning multimedia are considered satisfactory with a mean score of 4.34. Results of research indicate that: (1) the multimedia development phase of science study is conducted through the product development, test field, and dissemination; the assessment of the material expert reveals that the learning result aspect is in the good category with a mean score of 3.86 while the content aspect is in the good category with a mean score of 4.00, the assessment by the media expert suggest that appearance aspect is in the very good category with a mean score of 4.66 while the program aspect is in the very good category with a mean score of 4.60; field testing indicates that the learning aspect is in the very good category with a mean score of 4.41, the content material in the very good category with a mean score of 4.39 and the media content is in the very good category with a mean score of 4.46. (2) The use of multimedia in science learning process can enhance students progress, proven

by KKM achievement of 75, which means that 72.89% increaseng of KKM from the first percentage of 14.29% to 87.18% after the field testing. The increase in the percentage of KKM gained by student is categorized very good. Therefore, the developed learning multimedia in this research is possible to apply in science study at Elementary School.

Keyword: Development, Multimedia, Science

I. Introduction

Improving the quality of education is one the very important element an effort to improve the quality of human resources. Correspondingly, a very important thing to note is the problem of learning achievement. A common problem faced by learners in particular is about the students who have not been able to achieve a satisfactory learning achievements. Actually, many factors that cause learning achievement is a failure in both the academic factors as well as factors that are beyond the students themselves such as a low level of intelligence, lack of motivation to learn, the less effective way of learning, the lack of frequency and amount of learning time, low levels of self-discipline and the lack of learning media or teaching materials provided by the school. To achieve a satisfactory learning achievements should be supported by the increasing quality of education system and technological development. Multimedia technology has promising potential in changing the way a person to learn, to acquire information, customize the information and so on. Multimedia also provides an opportunity for educators to develop learning techniques that produce maximum results. Similarly, for students, with multimedia it is expected they will be easier to determine what and how students can absorb information quickly and efficiently. Source of information is no longer focused on the text of the book simply but more than that. Capabilities of multimedia technology is getting better and will increase the ease in getting expected information.

Science subjects is subject taught to students in Elementary School 4 Wates. Most of the material in science subjects is given pay much attention to a simple, abstract and

manual. In fact, if you the lessons of science, it seems to relate to how to find out about the systematic nature. Science is not just a mastery of knowledge in the form of a collection of facts, concepts or principles, but also a process of discovery. Science education is expected to be a vehicle for learners to study itself and its natural surroundings, as well as prospects for further development to apply in everyday life. With respect to its material scope science subjects are highly abstract. So it needs to be delivered using multimedia learning. The authors therefore conducted a study to determine whether media multimedia-based learning can help students understand the material in the form basic concepts of science, especially natural events. The research data will become the basis of the author in developing learning media for science subject.

Preliminary studies are conducted to collect data on the development of information and communication technologies in the Elementary School 4 Wates. The data is the main input tas the basis of developing multimedia-based science learning media, departing from a variety of data and needs obtained through a preliminary study on the implementation of the development of multimedia-based instructional media materials. Based on preliminary research that the author has done it showed the respondents strongly agree and agree 60 % on the need for the development of multimedia teaching elementary science. This means that the need for multimedia for science subjects as a medium of learning is very appropriate.

1. Limitations of the problem Product

Due to these problems, the author tries to learning multimedia applications for science subjects focusing on nature of events. Discussion of this material comes with animation, video, text and sound. Multimedia-based learning also provides exercises on the material through wnich students are expected to know their own progress in the understanding   of   this   material

2. Research Objectives

The purpose of this study was to develop an interactive multimedia-based teaching materials on the subjects of materials science focusing on natural events in the Elementary School 4 Wates. This application is expected to facilitate the process of learning and to improve learning achievement.

II.   Materials

A. Study of Multimedia Learning

Multimedia terms relates to the use of various types / forms of media sequentially or simultaneously in presenting the information. Merrill et.al (1996: 168) provide an understanding of multimedia is a combination of different types of media such as text, graphics, sound, animation and video in computer applications. The same notion is expressed by Steven Hackbarth (1996: 229), namely: Multimedia is suggested as meaning the use of multiple media formats for the presentation of information, Including texts, still or animated graphics, movie segments, video, and audio information. Computer-based interactive multimedia and hypertext includes hypermedia. Hypermedia is a computer-based system That allows interactive multimedia format linking of information Including text, still or animated graphics, movie segments, video, and audio. Hypertext is a non-linear organized and accessed screens of text and static diagrams, pictures, and tables.

Hofstetter cited by Suyanto (2005: 21) multimedia is the use of computers to create and use text, graphics, audio, moving images (video and animation) by combining links and tools that allow users to navigate, interact, and communicate. Further Hofstetter cited Suyanto (2005: 21) states there are four essential components of multimedia: (1) must have a computer that coordinates what is seen and heard, that interacts with users, (2) there must be a link that connects us with information, (3) there should be a navigation tool that guides users browse the network information, (4) multimedia provides a place for users to collect, process, communicate information and ideas.

If one component does not exist, it is not multimedia in the broader sense. For example, if there are no computers to interact, hence its is mixed media, not multimedia. If there is no navigation tool that lets you choose the course of an action film, its is, not multimedia. Likewise, if we do not have the space to be creative and contribute their own ideas, it is not a multimedia but television.

Multimedia devices can be divided into hardware and software. Multimedia hardware appliance is a data processing tool that works electronically and outomatis. Multimedia hardware can work if there is a human element to understand about the instrument and can work using the tool. Multimedia is a system because it is an object-related and work together to produce a desired. Multimedia hardware system consists of

four main elements and one additional element: (1) Input Unit, (2) Central Processing Unit (CPU), (3) Strotage / Memory: (4) Output Unit, and additional elements are Comunication Link

B. Science Itself

According to Hewitt et al (2006:1), is the knowledge organization of commonsense observation, products of human thought reasonable that grew as a result of a collection of experimental processes from the past. In addition to the definition of science, science can be viewed essentially in terms of products, processes and attitudes in terms of development. In other word, learning science has the dimension of the process, the dimensions of the result, and the dimensions of the development of attitudes. This means that learning science should contain the three dimensions of science. Science as a product of an accumulation of previous efforts of the pioneering science and generally has been completely and systematically arranged in the form of text books. Science as a process is the process of getting the science that is science prepared and obtained through the scientific method. While science as a fertilizing attitude means teaching elementary science is limited to the scientific attitude towards the environment.

Understanding of science according to the Collete and Chiapetta Carroll (1994: 63) a portrait, "abstraction of That series of experiences define a class object or event". While the Collette and Chiapetta Dresell (1994: 64), describes the concept of, "wnich abstaction organize the world of objects and events into a smaller number of categories". Thus, a concept that portray science as abstractions that organize objects or events in a series of experiences. Therefore we can conclude that science deals with how to find out about the systematic nature, so that science is not just a mastery of knowledge in the form of a collection of facts, concepts, or principles, but also a process of discovery. Science education emphasizes providing direct experiences to develop the students competencies to explore and understand about scientific nature. Science education is directed to "find out" and "doing" that can help students to gain a deeper understanding of the nature around. Therefore, the approach adopted in the present study combines the experience of science and understanding science products in the form of direct experience.

III. Methods

This research method is a research and development (Research and Development) model of learning, especially in the form of learning through multimedia-based teaching materials for elementary science subjects that are more responsive and more creative rather than proactive. Its is, the development of models of teaching materials in other forms, which complement its existing teaching materials. Research and development consists of three stages, namely pre-development model, model development and application of models in which the study refers to the R & D cycle borg and Gall (1983), with modification so as to be suitable with the goals and conditions of the actual research.

IV. Result and Discussion

Research development procedure consists of 5 main steps: analysis of development needs, development of instructional design, multimedia product design development, formative evaluation of the initial product, the implementation of the final product, and summative evaluation. This study used six kinds of data, namely: data validation from subjects experts, media experts, data from only one trial, data from a small group trials, data from large groups of trials, as well as data from pre and post test test.The data obtained in this research is data in the form of subject expert assessment, media specialists, students, the results of pre test and post test and from the observation of the students while using multimedia developed by researchers, equipped with the interview data to obtain information directly about the responses of students to multimedia development. Data validation of subject experts and media experts are preliminary data that is used to view and revise the product prior to testing a large group.

A. Validation matter experts

Validation is performed by one stage. In this stage validator gives a record weakness and recommendations for improvement. Based on record the weaknesses and recommendations, the recearcher made the revised product. In general assessment of the material in a multimedia, it is well developed. The results of the validation of this suject experts serve as the basis to determine the suitability of inclusiveness and with the needs of students. Content and curriculum materials are generally described in the competencies and indicators of achievement of learning outcomes.

B. Validation of media experts

Aspects of the media in the development of products are validated by Media Experts to obtain an assessment of eligibility at the trial stage. The results given by the expert assessment shows that overall media multimedia can be concluded well developed. Suggested improvements recommended by the appearance of media experts answer key has not been proportional. In general, expert assessment of the multimedia media is good and decent in the trial.

C. One to one trial

This stage is done after multimedia content is validated by experts and media experts . Next recommendation to do is filed trial. The test results it can be concluded that multimedia learning is well developed by the researchers. It is seen from the mean assessments after conversion to the qualitative data. Assessment questionnaires obtained in quantitative and qualitative assessment, as for suggestions for improvement given the student is less attractive animation.

D. Small group testing

Small group testing conducted after trial one by one, to obtain a response to both the technical quality of media, materials and their effects on learning. Some suggestion of a pilot basis for small groups to revise and tested on large groups of test time. Test results showed that a small group, on the whole it can be concluded that multimedia learning is well developed by the researchers. It is seen from the mean assessments after conversion to the data. Compared with only one trial, there is a significant increase in scores, although it is still in the good category.

E. Testing a large group / field

Field trials are conducted after the revision based on analysis of data from a small group of test results. Operational test is conducted involving 38 students. The results of field trials can be concluded that the multimedia learning developed by the researchers is very good. It is seen from the mean assessments after conversion to the qualitative data. Compared with field trials, there is a rise in scores and the category is significant.

F. Pre test and post test

Pre test and post test are conducted performed after all test steps implemented and produce the final product of the developed multimedia. The final result postest is written

in the letters and based on the student of mastery learning. Elementary schools assess student learning outcomes by category, complete or incomplete. In this case the value is written only to see the percentage of values, not as the final value of the science subjects.

G. **Interview**

Interviews conducted in the form of free guided interviews. Interviews are conducted on some of his students after conducting field trials. Data on the interview is used to strengthen the data researchers. Observations and data evaluation results have been obtained when the field trials. Some questions from the interview is done guide are given by researchers assess multimedia aspects the difficulty in use, their general impression of the multimedia and evaluation forms. Some other questions to do an interview after the implementation of the post test or 3 days after field trials. The Questions include the effective use of multimedia for learning and as a learning resource. Qualitative interview data to corroborate quantitative data have been obtained previously from the sheet by student assessment instruments.

H. Revision Products

Development of multimedia learning to science subjects underwent several revisions, both material experts and the media experts before being made ready for field trials. After field trials, this multimedia is revised in accordance with the analysis of the results of field trials. These revisions made during the development process for multimedia are developed in strict accordance with the development objectives that have been prepared.

a. Revision Subject Expert

Revision of the development of multimedia materials experts are that the product needs additional links on each sub material

b. Revision of media experts

Validation of expert media is done only once after the media has finished. Some records that should be improved is the view of the answer key has not been proportionately

c. Revision of the trial one-on-one

Based on data obtained from the test results one by one, Multimedia developed by researchers has been rated good. Assessment of each component is also obtained good results. This means that multimedia developed by researchers deserve to be continued on a small test group.

d. Revision of the trial of small group

The analysis of data on small group trials show that multimedia learning is already very well developed. However, based on observations made in a small group trials, it showed that there are still some things to improve, including: (a) amateur video footage that is too long, (b) Replace the image are less supportive

e. Revision of the test group

Based on the analysis of results of testing a large group that has been done, the conclusions obtained that multimedia learning is well developed by the researchers. Each component assessed in a large group trials has shown excellent results. But there is one improvement that is typing the words should be improved.

V. Study of End Products

Based on the evaluation of media on the operational test, it show that multimedia developed by researchers is effective and efficient and can be used as a source of independent learning. It can be seen from the assessment of indicators associated with quality materials, quality of learning strategies and technical quality in all operational tests show very good judgment. At the operational test assessment of the overall average of 4.46 is obtained when converted into the qualitative data. It can be concluded very good based on media evaluation. The effectiveness of the use of multimedia learning is inferred through observation of the component indicators of the quality of the material. The quality of the material on the operational test showed an average rating of 4.39 indicating that the assessment of the quality components of matter can be summed up very well.

Some of the advantages of multimedia that is developed can be used as an alternative source of independent learning to overcome the disadvantages of classical learning. Students can understand the material because there are examples and illustrations, as well as a matter of evaluation to measure their abilities. In addition to the above advantages, Multimedia Learning of Science also has some weaknesses, these weaknesses include the need to use a resolution of 1280x800 or more to obtain a maximum presentation layout.

VI. Conclusions and Recommendations

From the development of multimedia learning of science, it can be concluded as follows: (1) the quality of multimedia learning of science which was developed in this study are considered effective in its use and fit to improve the quality of learning. This can be seen from the assessment of material quality, technical quality and the quality of the learning strategies. All aspect are very good category. (2) multimedia products can be used as one method to improve retention of students toward understanding the material. This can be proved from the average increase in post test (72.89) against the average pre-test (87.18) and from the students at 14.29. In addition to the observational data and interviews it shows that multimedia products are able to motivate students to learn independently.

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