

Scientific teaching materials based structured inquiry assisted by animation media

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Scientific teaching materials based structured inquiry assisted by animation media

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Abstract. The Problem of science learning at schools usually relates to teaching materials. Teaching materials used as study guides are usually not in accordance with the character and environment of students. This research aims to develop scientific teaching materials based structured inquiry assisted by animation media. The development procedure in this research uses the Dick & Carey model which has 10 development stages namely asses need to identify instructional goal, conduct instructional analysis, analyze learner and contexts, write performance objectives, develop assessment instruments, develop and select instructional material, develop instructional strategy, design and conduct formative evaluation of instruction, revise instruction, design and conduct summative evaluation. The quality of developed product was assessed through feasibility test by two experts and one teacher as a user. Feasibility aspects that are assessed are the content, presentation, language, graphics, and learning media. The feasibility percentage of each aspect was 84%, 88%, 85%, 79% and 83%. The average result of the feasibility presentation value is 83,8%. In conclusion, scientific teaching materials based structured inquiry assisted by animation media is very feasible to be applied in the learning process in junior high school.

1. Introduction

Teaching material is one of important elements which influences a successful learning. Predominantly teaching material contains knowledge aspect (facts, concept, principles, and procedures), skill aspect, and attitude aspect. There are many teaching materials used as learning guideline at schools which have no contextual procedures, even still there are many abstract science materials that cannot be understood yet by the students, and the last but not least the learning is still teacher centered. Contextual learning materials can improve students' motivation in learning because they have correlation to students' surrounding environment and curriculum 2013 assertion in the learning process is emphasizing on students' potency development by using scientific approach [1,2]. One of the learning model which is viewed in line with the scientific approach principles is inquiry learning model because it can train the students to understand more on the dependency between theory, investigation strategy, and observation and in the learning process it can utilize animation video which ease the students in understanding the materials [3-8].



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Teaching materials which can improve students' skill and comprehension towards the materials learnt have been developed widely such as contextual based teaching materials, audio-visual based teaching materials, local wisdom integrated teaching materials, and digital integrated teaching materials [9-12].

The purpose of this research is to know the properness of teaching materials being developed. The teaching materials being developed cover contextual materials related to daily life with structured inquiry based and this product will be completed with learning media such as videos caused the materials chosen are abstract.

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2. Method

This research was a development research (Research and Development/R &D) which makes a product in the form of Science teaching materials structured inquiry based with animation media assistance for grade VIII of Junior High School. The stages of development procedures taken were conducting preliminary study and designing product development procedures which would be developed.

6 Preliminary study was a very important stage in order to obtain initial information for conducting product development. This preliminary study consisted of literature review and field study. Literature review was done to learn the concept or theory related to the product being developed. Literature study is very important as the foundation of making development, details of learning materials in the form of framework based on Standard of Competence (SK) and Basic Competence (KD) which were made as the foundation of teaching materials, meanwhile field study was conducted to know the suitability of the result of literature review with the condition in the field. Field study covered class observation to see the real condition in the field in the form of what teaching materials had been used in the teaching and learning process and to know the learning experience directly.

The procedures of product development used referred to Dick and Grey model which had ten stages of development, they were [13]; (1) Identify instructional goal by choosing the core competence and basic competence used to achieve the learning purpose. Basic competences which becomes the reference in this research were; 3.1 Analyzing movements of living creatures, movement system in human, and the efforts to keep the health of movement systems and 4.1 Presenting the work about various health disorders on human movement system; (2) Conduct instructional analysis which is by determining the learning activities conducted by the students to achieve the learning purposes; (3) Analyze learner and contexts by collecting data of grade VIII students to know their characteristics and collecting the data about the school facilities; (4) Write performance objectives by making competence achievement indicators (IPK) in line with chosen KD; (5) Develop assessment instruments by developing questions' instrument in the form of 10 multiple choice questions and 5 essay questions, the purpose was to measure students' learning skill after conducting the learning process activities; (6) Develop and select instructional material by making the product in the form of structured inquiry based Science teaching materials in the form of printed media with contextual learning materials and completed with learning media made by using macromedia flash professional CS 6 containing animation videos which would support conceptual understanding towards the movement system of living creatures materials; (7) Develop instructional strategy by choosing structured inquiry learning model which would be implemented in the learning activities; (8) Design and conduct formative evaluation of instruction evaluation, after the product was done then it would be validated by validators consisting of two Lecturers of Graduate Program in Science Education and one practitioner who was a science teacher at school. The results of score given by the validators then converted into score criteria of product properness level which were 0-12 not appropriate, 21-40 less appropriate, 41-60 quite appropriate, 61-80 appropriate, and 81-100 very appropriate [14]; (9) Revise instruction from suggestions/comments given by each expert validator and practitioner. The purpose was to complete the initial design of science teaching materials being developed; and (10) Design and conduct summative evaluation by conducting try out on the product which had been developed in the learning process activities. Development procedures were conducted only until the ninth stage.

3. Result and discussion

Based on the identification which had been conducted in the preliminary study stage at some Junior High Schools grade VIII related to science teaching materials used as the learning guideline, it can be concluded that the teaching materials used are not contextual yet, and they seldom use learning media and the learning process is still teacher centered, thus structured inquiry based Science teaching materials with animation media assistance is developed.

This Science teaching material is related to the materials about the movement system of living creatures and predominantly contains knowledge aspect (facts, concepts, principles, and procedures), attitude aspect, and skill aspect. Figure 1 below is the example of display science teaching materials structured inquiry based with animation media assistance which had been developed.



Figure 1. The display examples of science teaching materials (a) Forms of materials developed; (b) Material; (c) Inquiry activities; (d) Display of animation media.

The structure of Science teaching materials developed in the form of printed media consists of three parts, they are (1) Introduction consisting of cover, list of contents, directions of using the teaching materials, and map of materials concept; (2) Materials consisting of explanation about each sub-materials (the movement system of human, the movement system of animals, and the movement system of plants), the important concept, picture illustration, inquiry activity of each sub-chapters, animation video observation instruction, summary, and competence test; (3) Closing consisting of list of references and glossary. This science teaching material is completed with CD in the form of learning media made by using macromedia flash professional CS 6 which consists of media main menu consisting of subs of menu such as animation video sub menu about materials on the movement system of human, animals, and plants; sub menu Standard of Competence (KD); sub menu of concept map from the materials on the movement system of living creatures; and sub menu profile which contains the information about the media maker.

This developed Science teaching materials contains contextual materials on human movement system and the process of its investigation is that the students are trained to solve the problem scientifically, until this structured inquiry learning model is chosen. The stages of inquiry learning process are orientation, formulating the problem, formulating the hypothesis, conducting investigation (collecting data and examine hypothesis), and formulating the conclusion [15]. Meanwhile learning media in the form of animation video, its purpose is to support the developed teaching materials in order to improve understanding about the materials being taught [16].

Before conducting the try out on this initial design of structured inquiry based Science teaching materials with animation media assistance, it is first validated by the experts and practitioners. Validation is meant to know the appropriateness of the result of Science teaching materials initial design. Validation is conducted by two Lecturers of Graduate Program in Science Education and one practitioner who is a Science teacher at school as the user. These validators give their validation towards the initial design of Science teaching materials on some components such as; contents; presentation, language, graphs, and animation media design. Validation is conducted quantitatively and qualitatively on the validation sheets. Comments/suggestions written by each validator on the validation sheet are for revision to complete the initial design of Science teaching materials being developed.

Validation result by the experts and practitioner shows that all designs of Science teaching material being developed is very appropriate to be used as the guideline in the learning process at grade VIII of Junior High School because it already achieves the assessment criteria determined beforehand as presented in Figure 2 below.

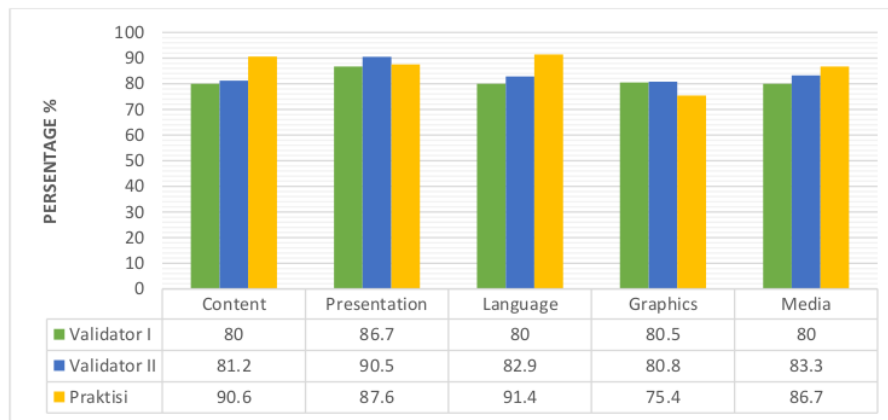


Figure 2. The results of the validity of scientific teaching materials based structured inquiry assisted by animation media developed.

Figure 2 shows product appropriateness test of structured inquiry based Science teaching materials with animation media assistance from all validators; the average of content appropriateness percentage is 84%, presentation percentage 88%, validity percentage 85%, graphs percentage 79%, and learning media design percentage 83%. Total percentage of all product items being developed is 83,8%. The conclusion is that structured inquiry based Science teaching materials with animation media assistance being developed is categorized into very appropriate to be used. There are a little revision related to the comments/suggestions from validators as mentioned in Table 1.

Table 1. Revised Results of scientific teaching materials based structured inquiry assisted by animation media.

Components	After Revisions
Content feasibility, presentation, language and graphics	<ul style="list-style-type: none"> • The layout elements display on the front cover illustrates the contents of the material. • Below the picture is equipped by the number and source. • Make a summary at the end of the material. • The editorial sentence in the competency test section has been simplified to make the question is more understandable.
The feasibility of design learning media	<ul style="list-style-type: none"> • The size of the animation media when displayed is fullscreen. • There is an object name in each moving animation. • The background image of each motion type in the material of living things has been adjusted to make it more relevant. • In the main menu the media is equipped with a concept map of the motion system essential material in living things. • In the main menu of the profile section has been completed with the main identity that are e-mail, cellphone number, address, and of supervisors names.

The validation test results are reinforced by the results of Syafrudin, Sajidan, and Sugiyarto's research that teaching materials that apply inquiry learning models have an impact on the learning process as students get active learning experiences [17]. Improve quality in the learning process to solve problems and teaching materials combined with learning media such as videos can increase motivation and improve students conceptual understanding [18].

4. Conclusion

Structured inquiry based Science teaching materials with animation media assistance is developed by using product development procedures referring to Dick and Carey model which has ten development stages. However in this research, it is conducted only until the ninth stage which is conducting revision from the comments/suggestions given by each validator with the purpose to complete the initial design of Science teaching materials being developed. Based on the results of percentage given by the validators (83%), then this Science teaching materials product is categorized into very appropriate to be used as the guideline in the learning activities of Grade VIII Junior High School.

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