

Development of physics teaching materials based-contextual by integrated local wisdom to improve mastery of physics concept

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Abstract. This research is a development research that develops contextually based physics teaching materials by integrating local wisdom. This research has a role as the basis for the development of textbooks of physics of high economic value. This research intends to mastery of physics concept. The teaching materials developed using the R & D model with the development model used are Borg & Gall (1989) and Kemp & Dayton (1985) model consisting of; (1) research and data collection through survey, (2) planning, (3) preparation of printed materials in the form of student worksheets, (4) expert validity test, (5) product revision, (6) small field trial, (7) product revisions, (8) large-scale field trials, (9) final product revisions, and (10) dissemination and implementation. The trial of teaching materials was conducted by students of physics education program with one group pretest-posttest design. The results showed that the overall teaching materials that made are feasible to use. This is indicated by the validation result done by 3 experts are consecutively for assessment from content expert 84%, assessment of media expert 78% and percentage of assessment from a teacher of the lesson (practitioner) 87%. For legibility percentage of the average percentage of 94% which means it is in the easy category. Improved learning outcomes with the N-gain score: class A with a score of 0.81 and class B score of 0.80 with high criteria. And the response of students with equal to 76% is in category good enough.

1. Introduction

The world of education plays an important role in improving quality human resources. Improving the quality of human resources can be done through quality learning activities. Learning activities to date is a strategic choice to achieve competent individual goals. However, it is still far from expectations because so far lessons in school are still quite a lot that is forwarding information from educators too. If this is not immediately addressed through an adequate learning innovation it will be a bad experience for. Therefore, learning should focus on the process of transformation and not simply transfer knowledge just like that. All that will be achieved by preparing facilities/infrastructure and adequate infrastructure as the main support in learning and should be utilized optimally [1][2].

One of the supporting learning that needs to be developed nowadays to equip existing facilities or infrastructures is the availability of adequate teaching materials. With adequate teaching materials, can learn and discuss teaching materials before learning begins. In addition, teaching materials are also able to provide clear guidance on the competence to be achieved [3][4]. Although the availability of physics teaching materials today is already a lot, most of the existing physical materials are still less



digestible, especially in schools that are located outside the city or suburbs. This is because the style of language is too complicated, the issues raised are never experienced or known by, the images shown are less clear and tend to the pictures are still foreign to consumption. When assigned to find sources in the library or the internet, there are some problems that they encountered, among them: (1) often find the source of the material less valid (incomplete); (2) authors of materials (articles) on the internet are often unclear especially those sourced from blogs and after analyzed many found misconceptions; (3) take only the easy material, while the relatively difficult to dispose because it is not understood, so afraid to present. In this context, teaching should become a profession which requires further qualifications and abilities [5].

Generally, based on the writer's observation as a mentor, reviewer, or validator, the book resulting from the research work tends to: (1) be a "scattered knowledge description"; (2) written with a word processing program not specifically for publishing; (3) the layout is rigid, boring, and does not support proper viewing as a book; (4) images or photos accompanying without adequate editing of photos and (5) less accurate content, language and presentation aspects. Based on these conditions it is necessary to make a new breakthrough to produce teaching materials that provide a good source of material and orderly arrangement, systematic, varied, and rich in information [3][6]. In addition, it must have a strong appeal as it will affect interest in the material. Therefore, the teaching materials should challenge, stimulate, and relationships between the material taught to the real situation, so that it can help understand the subject matter. Based on the description one of the solutions that can be done is to develop contextual based teaching materials. Contextual learning is a creation-oriented learning as close as possible to the "real world" situation. Through contextual learning can help educators relate to material taught to real situations, so it can help to understand the subject matter [7][8]. With adequate teaching materials, can learn and discuss teaching materials before learning begins. In addition, teaching materials are also able to provide clear guidance on the competence to be achieved by students. By applying the contextual learning principle it is expected that learning will be more meaningful for because it will work scientifically and experience itself not just transfer educators' knowledge to. Thus the teaching materials developed will include the problems or phenomena-phenomena of physics that is common or familiar to make it easier to receive or absorb the subject matter [9].

But other problems that arise at this time is the moral degradation of children of the nation that is quite significant. The modern currents increasingly affect the moral erosion of children of the nation. It is necessary to develop character as one way to overcome the moral crisis at this time, either by maximizing the function as an educator not only as a teacher or with educational media and teaching materials. Therefore, in the development of teaching materials physics other than contextual based but will be integrated with local wisdom as a solution of mental degradation of the nation's children. Moral coaching is an important part of our national educational objectives since the education of the subject of the curriculum of basic and secondary education has an important and strategic role in the mental and national identity of the nation. And learning that comes from the value of local wisdom is also important for self-development [10]. Local wisdom can be understood as a human effort by using the mind (cognition) to act and act on things, objects or events that occur in a certain space. Thus it can be concluded that local wisdom is a set of knowledge, values, behaviors, and how to behave towards certain objects and events in the environment that is recognized goodness and truth. By integrating local wisdom in contextual-based physics teaching materials, it is hoped to make it easier to understand and accept the physics lesson. In addition, it can take lessons from the phenomena of physics that poured teaching materials in the form of moral messages as a local wisdom, so that the understanding of physics and moral concepts to be better. And so that the developed learning materials are more easily accepted by students should be integrated with other aspects that can make students interested in the material to be delivered [6].

Integrating local wisdom in educational and learning activities is potential to create an innovation with newness. The integration of local wisdom into education can be done in various forms and purposes, among others: (a) local efficiency as a model, which can be an example to be imitated and

practiced in everyday life; (b) local wisdom as content / lesson content that can serve as examples taught; (c) local wisdom as an inspiration, which brings up new ideas in learning. One example in the study of physics of local wisdom as a model of balanced living behavior is to visualize the concept of bullet motion against the XY axis, where the direction of the Y-axis shows a person's relationship with his God and the direction of the X-axis shows the human relationship guarded. In other words, life beginning at point 00 gradually rises and forms a certain elevation angle (the more it goes to 450, the more it leads to a harmony of life, where the relation between fellow human beings and the creator is balanced [13].

By integrating local wisdom on contextual learning will certainly help to encourage mastery the students' physics concepts. Mastery of concept can be interpreted as the ability of students in understanding the meaning of scientific, both theoretical concept and its application in everyday life. Mastery of concept is part of the results in the learning component. Thus conceptual mastery is part of the learning outcomes in the cognitive domain. Cognitive learning aims to improve students' understanding of learned concepts [11][12].

2. Methods

2.1 Design Research

This research is a development research that develops context-based physics teaching materials by integrating local wisdom. This research is as the basis for the development of textbooks of Physics of high economic value. This research intends to increase understanding of physics concept. The teaching materials were developed using an R & D model with one group pretest-posttest design. The development model used is Borg & Gall [15] and Kemp & Dayton [16] model consisting of; (1) research and data collection through survey, (2) planning, (3) preparation of printed materials in the form of student worksheets, (4) expert validity test, (5) product revision, (6) small field trial, (7) product revisions, (8) large-scale field trials, (9) final product revisions, and (10) dissemination and implementation. At the stage of research and data collection conducted a study of physics study material of contextual contents in physics of study of the content of local wisdom in physics. At the planning stage collect references to teaching materials, selection of appropriate design programs, the selection of attractive layouts, and preparing materials for evaluation in teaching materials. At the stage of preparation of teaching materials will be produced a draft of teaching materials, which then in the next stage of the draft is tested the validity of experts with the composition of one expert physics teaching materials, one media expert and one practitioner (physics teacher).

2.2. Instrumentation

There are several types of instruments used in this research, namely: 1) Sheets Assessment of teaching materials, in the form of assessment instruments used to ensure that developed learning materials appropriate to use, among others: validation assessment sheet, legibility level and assessment sheet of difficulty level of teaching materials; 2) Test Instrument, in the form of validated and validated Rating Sheet and subsequently used as a Student Results Test Instrument (THB) of the student; and 3) Likert-scale questionnaire instrument, intended to obtain user response of developed material.

3. Results and Discussion

Based on the results of data analysis from the questionnaire distributed to the students as much as 17 people in the preliminary study that all learners need a new reference to facilitate the physics concept mastery. Basically, learners need a contextual learning, both in the delivery of concepts and questions given must be contextual as well.

Table 1. Preliminary study results.

No	Aspect	Description
1	New reference	96% is needed
2	References that facilitate to mastery the physics concept	92% is needed
3	Contextual teaching materials	81% is needed
4	Involving local wisdom in teaching materials	92% is needed

The results of needs analysis in the table above show that learners need new references that make it easier for them to master the concept of physics. After that, followed by the preparation of teaching materials based on the results of physics material studies, the existence of contextual content and local wisdom to enrich the knowledge of learners using the program Adobe in design and pay attention to the selection of an interesting layout so that produced teaching materials for chapter mechanics. The resulting teaching materials are then validated by 3 experts to determine the feasibility of content, language, presentation and display images.

Table 2. Recapitulation of expert validation test results.

Aspect	Average score	Category	Description
Feasibility of content	3,62	A	Very feasible
Language	3,02	B	Feasible
Presentation	3,56	A	Very feasible
Display images	3,00	B	Feasible

The validated teaching materials are then revised in accordance with inputs and suggestions submitted by expert validators who then produce draft I. The inputs and suggestions obtained are the need to improve the grammar and the images that need to be given the effect to be clearly visible. In addition, it is necessary to add a sample of contextual-based questions that contain local wisdom. Furthermore, draft I conducted small-scale trials on 7 students to know to know the legibility and level of difficulty of teaching materials. And based on data that legibility percentage of the average percentage of 94% which means it is in the easy to read. Further revised based on the results of small-scale trials and produce draft II which then tested large scale on 55 students divided into 2 classes A and B. Results revision of large-scale trial produced draft III or final product that is disseminated and applied to the learning. Here is the graph of average data on the learning outcomes of learners on the subject of mechanics by using context-based physics teaching materials by integrating local wisdom in physics students SMA N 5 Bima town semester I 2016/2017 academic year:

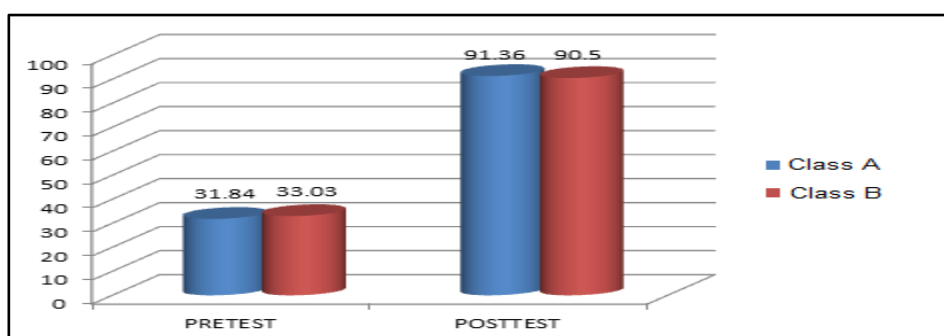


Figure 1. Graph outcomes learning students.

Based on the learning result shown by the graph in figure 2 above, it can be seen that the average value of Class A is 91.36 with the very high category of pretest average value of 31.84. So also with Class B classical average value is 90.5 from the average pre-test value only 33.03. This shows that there is an increasing understanding of physics concepts in students through learning that applies context-based physics teaching materials by integrating local wisdom. The increased understanding of physics concepts in learners is clarified by N-Gain Scores in the following graph.

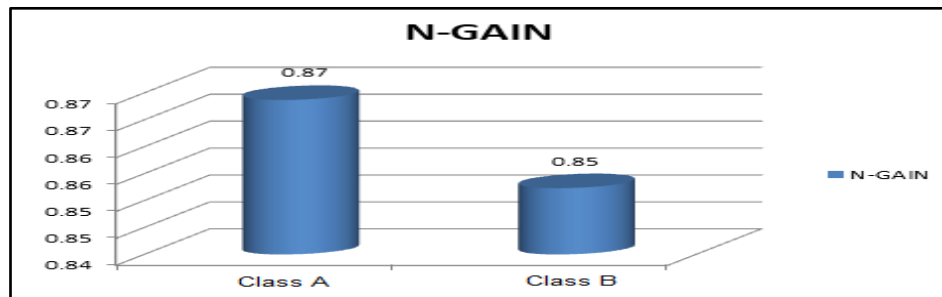


Figure 2. Graph of N-gain score analysis results.

From the graph above shows that Class A has N-gain score of 0.87 high categories. This indicates that there is an increase in mastery of physics concepts in learners. Unlike the Class B has an N-gain score of 0.85 high categories. This is because by Class A only has 25 students so that the classroom atmosphere is very conducive and the students are very enthusiastic to pay attention to what is explained by the lecturer. From the discussion results of researchers with some learners that learners are very interested in the material delivered because almost all examples of problems or problems in the teaching materials is a problem or problem, they have ever faced. In line with some research results that the contextual approach is a meaningful learning and assumes the learning objective is the situation that exists in that context, it helps students in meaningful learning and also to state abstract things [7][13][8]. And Ibrahim explains that integrating local wisdom in educational and learning activities has the potential to generate an innovation with local innovation and wisdom as an inspiration, which spawns new ideas in learning [14].

4. Conclusion

Based on the results of research and discussion, it can be concluded that context-based teaching materials to integrate local wisdom developed very feasible to be used and can improve physics concept mastery of learners on basic physics learning on the subject of Work and Energy.

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