Development of Learning Media Technology Based on Natural Science Local Wisdom Materials

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Abstract. The objectives of this study were: to analyze teacher input, find out how to compile teaching materials, and to see the effectiveness of thematic integrated teaching materials based on local wisdom of science subject material theme 3: healthy food in grade 5 elementary school students. This research was conducted due to a lack of teaching materials, teachers were unable to develop teaching materials, and students' lack of insight into local wisdom. This research uses research and development methods. The data analysis technique used descriptive qualitative and quantitative analysis techniques. Qualitative data in the form of input, criticism, and suggestions for product improvements presented in a questionnaire instrument for reviewing teaching materials. Meanwhile, quantitative data in the form of numbers obtained from product trials. The results showed that the module teaching materials were feasible and effective. The feasibility of this thematic module product is based on the results of the material expert's validation, the total score is 73 and 116 in the very good category. The results of the effectiveness test in the product trial and test using the experimental class N-Gain value were 85.30% and 88.54% in the effective category.

1. Introduction

Education is a basic human need in facing the continuing development of globalization [1], [2]. Talking about education cannot be separated from the curriculum which is one of the main elements of educational reference sources that can provide significant evidence to realize the potential of students [3], [4]. According to Government Regulation Number 19 of 2005, article 1 concerning National Education Standards, it is stated that the curriculum is a set of plans and arrangements regarding the objectives, content and learning materials, as well as how to use them as guidelines in carrying out learning activities to achieve certain educational goals. Similar opinion was also expressed [5],[6] curriculum is a design that provides a set of learning opportunities to achieve goals. Based on the above opinion, there are two dimensions of the curriculum, namely a set of plans and arrangements in the implementation of learning for a purpose, so that a teacher as an educator is obliged to facilitate all student learning activities maximally [7], [8]. The 2013 curriculum uses an integrated thematic-based learning implementation model in elementary schools [9], [10]. Integrated thematic learning is learning that integrates material from several subjects in one discussion theme [11], [12]. Thus, through integrated thematic learning, students have meaningful experiences because they can understand new concepts they get from direct experience and relate them to other concepts they have [13].
The 2013 curriculum development emphasizes various teacher competencies, namely pedagogic, personal, social, and professional competencies [14],[15]. From these competencies, teachers are required to be able to be creative educators in compiling innovative teaching materials [16], [9], [17].

Based on observations and interviews with teachers in elementary schools, it shows that there are limitations in teaching materials and in fact in the field there are still many teachers who have not been able to develop and even compile teaching materials that are in accordance with the conditions of students. The teaching materials used in schools are only the teaching materials provided by the government. The results of observations also show that the students’ lack of insight into the surrounding environment also creates obstacles in the teaching and learning process, especially those related to local wisdom products such as the origin of food and the traditions that develop from the region [18]. The general paradigm and perception inherent among educators is that making teaching materials is a difficult and stressful job [19], [20]. Educators are still lacking in developing their creativity in planning, preparing and making teaching materials carefully that can attract students' attention and make students feel challenged [21], [22]. Educators generally only provide monotonous teaching materials, using existing teaching materials without having to bother making them [21], [23].

In order to implement the 2013 curriculum, quality integrated thematic teaching materials must be realized if the nation is to be successful [10], [24], [25]. Based on this background, the researcher is interested in conducting research on the development of thematic integrative teaching materials based on local wisdom of theme 3 science material: healthy food for grade 5 elementary school students. The objectives of this study were: to analyze teacher input, find out how to compile teaching materials, and to see the effectiveness of thematic integrated teaching materials based on local wisdom of science subject material theme 3: healthy food in grade 5 elementary school students.

2. Method

This research is a research that uses the Research and Development (R&D) method. The R&D research stage consists of the following 10 steps: 1. Potentials and problems, 2. Data collection, 3. Product design, 4. Design validation, 5. Design revision, 6. Product testing, 7. Product revision, 8. Testing of use, 9. Product revision, and 10. Mass production [26], [27].

In the research conducted, researchers used expert judgment and tested the effectiveness of the product. Expert assessment was carried out by two research subjects, namely integrated thematic material experts and media experts in the preparation of teaching materials. Where the subject here is in charge of evaluating and validating the product of this research, namely an integrated thematic teaching material module based on local wisdom of theme 3 science material: healthy food for grade 5 elementary school students. The product effectiveness test is carried out by calculating using the N-gain formula.

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Collecting data in this research is the collection of qualitative and quantitative data. Qualitative data, namely data generated in the form of criticism and suggestions from material experts which will later be used as improvements. While quantitative data is data collected based on expert judgment on the feasibility level of the resulting teaching materials organization.

In the preparation of integrated thematic teaching materials based on local wisdom, theme 3: healthy food for grade 5 elementary school students using a research instrument in the form of a questionnaire or questionnaire that will be given to experts.

The validation of teaching materials is carried out by experts who are truly proficient. The validation of the design of teaching materials is carried out by analysing the expert assessment
questionnaire related to the decision making of the design achievement indicators and the integrated thematic teaching material, so that the existing weaknesses and strengths can be identified.

The data that has been obtained, whether used as qualitative data or quantitative data, are arranged systematically in order to obtain general conclusions. It is clear that the two data analysis techniques have very prominent differences when viewed from the form of presentation. Qualitative descriptive analysis does not use statistical data but in the form of words both in writing and orally, while quantitative descriptive analysis reverses direction with qualitative descriptive analysis, namely in the form of numbers and proxied.

Data from the quantitative and qualitative criteria are used to show the validity of the teaching materials prepared. If the range of values in the percentage of achieving the goal reaches a score of 67-80, in other words, “Good / Feasible” or “Very Good / Very Appropriate”. Then the teaching materials compiled are valid.

3. Results and Discussion

3.1 Results

Based on the results of the interview, it is known that the curriculum applied in SD Negeri 2 Purwogondo class 5 is the 2013 curriculum, where the learning process uses an integrative thematic approach. The interview activity is shown in Figure 1 below.

![Figure 1 Interview activities with grade 5 teachers](image)

In implementing thematic learning the teacher uses several learning resources such as the school environment and teaching materials. In addition, teachers and students use thematic handbooks and worksheets as the main teaching materials. However, the teacher assessed that the thematic handbook used had several weaknesses, namely that the material in the handbook was too much and heavy enough to be completed within a specified time. The practice questions for students were also incomplete. In addition, materials that require direct activity sometimes cannot be implemented properly.

From the results of the interview, it was also known that there were several obstacles faced by teachers and students in learning. The obstacles faced by the teacher include limited teaching materials and the inability to develop teaching materials independently, the teaching load is too much, students do not get supplies from home, students pay less attention when learning takes place. While the obstacles faced by students are the lack of knowledge of students about the surrounding environment, especially those related to local wisdom products such as native food and traditions that developed from their area during teaching and learning activities.

Based on these potentials and problems, an integrated thematic module is developed that can be used as a solution. Furthermore, the researchers conducted the data collection stage. In data collection, the researcher carried out the research planning stage, the researcher conducted a study of the results of preliminary research by identifying and analyzing problems and needs, namely finding and collecting reference material from several thematic textbooks that were in accordance with the 2013 Curriculum and preparing the equipment and applications needed in material development. In product
design, researchers carry out activities: analysis, development planning, and design. The results of product design development in the form of Thematic Module prototypes that have been printed and packaged in modules, then submitted to material experts and media experts to be validated and evaluated, so that they are of value. Thematic Module design revisions are carried out in accordance with suggestions and input from material experts and media experts. After revising the design, the researcher tested the product. The data from the material expert's assessment are presented in Table 1.

| No. | Indicator                                                                 | Score |
|-----|---------------------------------------------------------------------------|-------|
| 1   | Compliance with KI, KD                                                   | 4     |
| 2   | Suitability to student needs                                             | 5     |
| 3   | Conformity with the needs of teaching materials                          | 5     |
| 4   | The truth of the material substance                                      | 5     |
| 5   | Benefits for adding insight into knowledge                               | 5     |
| 6   | Conformity with values, morality, social                                 | 4     |
| 7   | Legibility                                                               | 5     |
| 8   | Clarity of information                                                   | 4     |
| 9   | Conformity with Indonesian language rules                                | 4     |
| 10  | Use of language effectively and efficiently                             | 4     |
| 11  | Clarity of purpose                                                       | 5     |
| 12  | Serving order                                                            | 5     |
| 13  | Give motivation                                                          | 3     |
| 14  | Interactivity (stimulus and response)                                    | 5     |
| 15  | Completeness of information                                              | 5     |
| 16  | Book completeness                                                        | 5     |

| Total score | 73 |
|-------------|----|
| Category    | Very good |

From table 1, the material expert provides an assessment of the quality of the material in the thematic module in terms of the feasibility of the content, the aspect of language feasibility, and the feasibility of presentation with a total score of 73 (very good criteria). While the data from the media expert's assessment are presented in Table 2.

| No. | Indicator                                                                 | Score |
|-----|---------------------------------------------------------------------------|-------|
| 1   | The conformity of the size of teaching materials with ISO standards       | 4     |
| 2   | Selection of paper types                                                  | 4     |
| 3   | Quality of paper material                                                 | 4     |
| 4   | Print quality                                                             | 4     |
| 5   | Ease of carrying modules                                                  | 5     |
| 6   | Safety level in use                                                       | 5     |
| 7   | Convenience in use                                                        | 5     |
| 8   | Ease of use                                                               | 4     |
| 9   | Binding Quality                                                           | 4     |
From table 2, media experts provide an assessment of the quality of the media in the thematic module in terms of the aspect of media appearance, aspects of graphic quality, and aspects of the content of teaching materials with a total score of 116 (very good criteria).

Testing is done by testing small group products and testing large group products. Field trials in small and large groups are carried out by trying out teaching material products to teachers and students as potential product users. The results of the small and large group tests are used to revise the product. Product revisions are carried out in collaboration between researchers and teachers. Small and large group trials are carried out to get a product that is better than the previous product and is ready to be tested in the next test. Testing is done by experimenting, namely by calculating the effectiveness of the product. The results of the product effectiveness test for small and large groups were carried out by looking at differences in student achievement scores before being given treatment and student achievement scores after being treated with the N-Gain formula.

Small group product trials were carried out in the second and third week of July 2020 in 4 elementary schools, namely SD Negeri 1, 2, 3 Purwogondo and SD Negeri 3 Robayan. While the trial using large groups was carried out in large groups of 10 elementary schools. The test will be held on the 3rd week of July and the 1st and 2nd week of August 2020.

Based on the observations of researchers during the last stage of the trial use process, there were no obstacles or problems shown by teachers and students when using the Thematic Module. As a result, no Thematic Module components were revised. Thematic Module research and development activities based on Prof. development stages. Sugiyono finished. Based on the results of product trials that have been carried out by researchers, the results are effective and feasible for mass production.

3.2 Discussion

The final product produced in this development research is a learning product in the form of a Thematic Module. Research and development of this Thematic Module is carried out in ten stages.
Research and development of thematic modules begins with the collection of preliminary information about the situation and conditions at SD Negeri 2 Purwogondo through preliminary research activities. Information and data that have been obtained from the results of preliminary research, are processed and analyzed first. So from the results of data analysis it can be concluded that the development of a Thematic Module is needed to solve thematic learning problems in class 5 SD Negeri 2 Purwogondo, namely the unavailability of supporting teaching materials that are relevant to the applied curriculum and the lack of student knowledge about local wisdom around them.

The results of the preliminary research data analysis are then used to compile a research plan and development of the Thematic Module. After the Thematic Module research and development plan has been completed, the researcher compiles an initial draft of the Thematic Module product. The design of the teaching material product is shown in Figure 2 below.

![Figure 2. Design of teaching material products](image)

After the Thematic Module product prototype has been repaired and perfected, the research process is continued to the next stage, namely product testing and usage trials, as well as revisions at each trial stage. So as to produce a final product in the form of a thematic module that is feasible and effective to use as a supporting teaching material.

The thematic module products produced from this development research are in accordance with the principles of learning: 1) the principles of attention, readiness and motivation, applied through the use of a combination of visual elements such as colors, text, symbols, illustrations / images as a means of focusing attention, besides that there is a competency map that is Explaining the abilities developed will make students more prepared and motivated to achieve this, 2) the principle of activity, by providing exercises and assignments, 3) the principle of individual differences, which is applied in the form of various material presentations and exercises [28],[29], [30].

In addition, the Thematic Module as a support for teaching materials has characteristics in accordance with the characteristics of teaching materials, namely: a) active, with assignments and exercises. Thematic Modules are able to encourage student activity; b) interesting and fun, manifested in the form of material presentation and various tasks, for example in the form of games, so that students are interested and enjoy learning; c) authentic, by involving students directly in exercises and assignments, the Thematic Module provides real knowledge and experiences for students [31].

The Thematic Module as a support for teaching materials is felt by students differently from the main teaching materials they usually use when learning. Students admit that they prefer learning using Thematic Modules. This proves that the Thematic Module has different characteristics from other teaching materials.

Validation by material experts is intended to determine the quality of the material in the Thematic Module. The material expert provides an assessment of several aspects including aspects of content feasibility, aspects of language feasibility, and aspects of presentation feasibility. Based on the data that has been obtained from the material expert's assessment questionnaire, it is known that the total
score obtained is 73 with very good criteria. This shows that the feasibility aspect of the content shows that the Thematic Module material is in accordance with the learning objectives to be achieved; the feasibility aspect of the language shows the language used in the module according to the target user; the feasibility aspect of the presentation explains that the presentation of the material in the Thematic Module is able to encourage the learning process. Obtaining the final score from the material expert shows that the quality of the material in the Thematic Module is appropriate and can be justified. This means that the material contained in the Thematic Module is in accordance with the curriculum objectives to be achieved.

The feasibility test of the media aspects in the Thematic Module is intended to determine the quality and feasibility of the Thematic Module as supporting student teaching materials. Learning by using modules helps to learn independently[32]. Module development must pay attention to student characteristics[33]. This feasibility test is carried out through validation and evaluation by media experts regarding aspects of media appearance, aspects of graphic quality, and aspects of the content of teaching materials. In the media expert validation stage the final score in terms of all these aspects was 116 which was included in the very good category. Thus, it can be concluded that based on the results of the feasibility test by material experts and media experts, the Thematic Module as a support for student teaching materials has met the eligibility criteria for teaching materials according to the National Education Standards Agency [34]. This is shown by the results of the expert's assessment of the aspects of material feasibility, linguistic feasibility, presentation feasibility and graphic feasibility in the Thematic Module getting a very good category. Which all aspects of the assessment are the eligibility criteria for teaching materials according to [34].

From the analysis of the effectiveness of small group product trials that have been implemented, it can be explained that the results of the calculation of the N-gain score are in the form of percent for the control class with an average value of 39.51% (ineffective category). While the N-gain average value for the experimental class was 85.30 (effective category). So it can be concluded that the use of Integrated Thematic Modules Based on Local Wisdom in Science Material Theme 3: Healthy Food for Grade 5 Elementary School Students is effective in improving student learning outcomes. Meanwhile, it is used without an Integrated Thematic Module Based on Local Wisdom Material. Theme 3: Healthy Food Grade V Elementary School Students are less effective in improving student learning outcomes.

From the results of the trial calculation using large group products, the N-gain score was obtained in the form of percent for the control class with an average value of 38.54% (ineffective category). While the average N-Gain score for the experimental class was 88.54% (effective category). So it can be concluded that the use of Integrated Thematic Modules Based on Local Wisdom in Science Material Theme 3: Healthy Food for Grade 5 Elementary School Students is effective in improving student learning outcomes. Meanwhile, the use without an Integrated Thematic Module Based on Local Wisdom on Science Material Theme 3: Healthy Food for Grade 5 Elementary School Students is less effective in improving student learning outcomes.

4. Conclusion

The conclusions of this study are as follows. (1) Teacher input for the development of integrated thematic teaching materials for class V theme 3 healthy food for elementary school science subjects based on local wisdom in the product trial stage, namely: local wisdom should not only cover one's own area but also review local wisdom from other regions so that students have good insight. be broader about the area around and limit local wisdom around local wisdom products, for example typical food and community traditions so that the material does not spread everywhere. Teacher input in the product trial has been revised in the use trial so that the product is feasible, (2) Compilation of integrated thematic teaching materials for class V theme 3 healthy food for elementary school science subjects based on local wisdom includes 10 steps, namely: 1. Potential and problems, 2. Data collection, 3. Product design, 4. Design validation, 5. Design revision, 6. Product testing, 7. Product revision, 8. Testing use, 9. Product revision, and 10. Mass production, (3) Based on discussion of the results of research and development of the Thematic Modules previously described, it can be
concluded that the Thematic Module products developed are effective and suitable for use as supporting teaching materials for class V students. This is based on the results of the Thematic Module product assessments from material experts and media experts, as well as an assessment of the results of product testing, the test usage that has been described in the previous chapter.

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