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Development of Integrated Natural Science Teaching Materials Webbed Type with Applying Discourse Analysis on Students Grade VIII in Physics Class

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Abstract. This study aims to produce teaching materials integrated natural science (IPA) webbed type of handout types are eligible for use in integrated science teaching. This type of research is a kind of research and development / Research and Development (R & D) with reference to the 4D development model that is (define, design, develop, and disseminate). Data analysis techniques used to process data from the results of the assessment by the validator expert, and the results of the assessment by teachers and learners while testing is limited (12 students of class VIII SMPN 10 Kendari) using quantitative descriptive data analysis techniques disclosed in the distribution of scores on the scale of five categories grading scale that has been determined. The results of due diligence material gain votes validator material in the category of "very good" and "good", of the data generated in the feasibility test presentation obtained the category of "good" and "excellent", from the data generated in the feasibility of graphic test obtained the category of "very good "and" good ", as well as of the data generated in the test the feasibility of using words and language obtained the category of" very good "and" good ", so with qualifications gained the teaching materials IPA integrated type webbed by applying discourse analysis on the theme of energy and food for Junior High School (SMP) grade VIII suitable as teaching materials. In limited testing, data generated in response to a science teacher at SMPN 10 Kendari to product instructional materials as "excellent", and from the data generated while testing is limited by the 12 students of class VIII SMPN 10 Kendari are more students who score indicates category "very good", so that the qualification obtained by the natural science (IPA) teaching material integrated type webbed by applying discourse analysis on the theme of energy and food for SMP / class VIII fit for use as teaching material.

1. Introduction

Natural science (IPA) Integrated is a natural science that is presented as an inseparable unity, meaning that students do not learn physics, biology, and chemistry separately as a stand-alone subject, but all mixed together in unity. These subjects more accurately be called the natural sciences, does not need to be given an additional "stick together" in tow, because of the former is the essence of science is true, it means the science of natural born from the union of physics, biology, and chemistry, but it was born as a science natural sciences (Depdikbud, 1996). In the natural sciences known their integrated learning approach. There are 10 varieties of learning approaches, but there are several potential approaches to be applied in learning science suggested by Vogarty, (1991), among which are connected, webbed, shared,

and integrated. Integrated learning in science can be packaged with the theme or topic of a discourse that is discussed from various viewpoints or scientific disciplines are easily understood and recognized learners. In integrated science teaching, a concept or a theme discussed from various aspects of the field of study in the field of science studies. Thus through this integrated learning some concepts relevant to be the theme does not need to be discussed repeatedly in different fields of study, so the use of more efficient time for discussion and achievement of learning objectives are also expected to be more effective. Such an approach is called a learning approach webbed.

The success of the learning process is influenced by one factor, namely teaching materials. Integrated science teaching materials in circulation is still less effective, one of which is a book. Books that match the curriculum imposed by the government which integrated science textbooks that have been circulating in the school is not packed into the topic / theme despite being labeled specific integrated IPA. Presentation of the material on teaching materials are still separated by fields of study even though it was put together in a book. Based on observations in several junior high schools in the area of Kendari, integrated science textbooks that have been circulated in schools still vary in terms of type and quality. Science teacher at SMPN 10 Kendari states are still difficulties in determining the books used. That is because a lot of books that have not integrated IPA labeled in accordance with the concept of the integrated IPA. Therefore, if the quality of the existing books do not meet quality standards, particularly in relation to the concept and application of concepts, then there is the book would be wrong teaching materials. It is very dangerous world of education.Based on previous research, the development of teaching materials research conducted by Azmi Izati which resulted in the development of teaching materials through integrated science lesson study on the material chemicals for food. Azmi Izati developing integrated science teaching materials by applying an integrated learning approach cobwebs (webbed). This approach combines several topics subjects. Learning tied up with a theme that is known as thematic learning, because it uses a theme as the basis for learning in various disciplines of subjects (Indrawati, 2010).

Based on research that has been done before, researchers interested in conducting to develop an integrated science teaching material in different ways. Lies the difference that, in previous research to determine the theme is determined after an analysis of curriculum / basic competence (KD) by applying the approach to science learning the unified webbed or thematic, whereas in the present study determining the themes that will be used not only refers to the analysis of the curriculum but after incorporation of global macro-structure and the process of discourse analysis. Discourse analysis that discusses how language user digest what was written by the authors in textbooks, understand what penyapa delivered orally in a conversation, and the context also argued that accompanies the text (Mulyana, 2005). In discourse analysis contained first step is to do the smoothing text. Establishment of basic text or text smoothing and sharpening is done to establish the meaning of the concept does not exceed or reduce the text's meaning. Smoothing of text is done through the removal or insertion of the word. Elimination performed on the word excessive and could give meaning to confuse. While the insertion of the word done to further improve the accuracy of the material (Khamalt, 2012). After that, the establishment of global structures and macro-structure that ultimately merging global structure and macro-structure of each subject matter. After merging global and macro structure will be determined themes that formed the basis for the concepts that have been combined.

Based on the above background, the author will conduct research on the development of teaching materials IPA integrated by taking examples of linkages of the same material in an earlier study conducted by Azmi Izati, but the present study the authors apply the discourse analysis of the material book studied so as to produce materials teaching a new form of handouts.

2. Research Method

This research method is a research with development available model namely the development of teaching materials science research integrated type webbed by applying discourse analysis. The object of this study is science textbooks for SMP physics class grade VIII. Design research and development refers to the stage of development of Four-D model suggested by Sivasailam Thiagarajan, *et al*., (1974). This model consists of four stages of development that define, design, develop, and disseminate or adapted into a 4-D models, namely the definition, design, development, and deployment.

In this development model, an analysis of the discourse on design as the initial design phase of development. The study also only to a point develop or stage of development, and at this stage of development is only at the stage of validation expert (expert appraisal) followed by a revision, because

this research focuses on the preparation of learning tools and other reasons are lack of time and costs that are not tested try and deployment for this device.

From some of the data collection instruments, the process of developing these materials using questionnaire techniques with questionnaire instrument. Questionnaires are a number of written questions that are used to obtain information from respondents in the sense of personal statements or things he knew. The questionnaire used consisted of two parts: part I questionnaire assessment experts and part II trials in the form of sheets (response of students and teachers IPA). The assessment results are then analyzed using data analysis techniques were determined. Data collection instruments and questionnaire used in this study was modified from Indonesian National Standards of Education (BNSP).

In a questionnaire assessment of experts consists of four aspects, which includes the criteria of material criteria of presentation, the graphic criteria, criteria for the use of words and language, while the sheet test consists of two aspects, namely responses Science teacher integrated the teaching materials developed and feedback learners the integrated science teaching materials. Limited testing done to obtain direct input in the form of the response of teachers and students' responses. In this trial conducted in one school and have some students who were the respondents.

Analysis of the data used in this research is quantitative descriptive analysis. Quantization data is done with the sum score of every aspect and overall will be described in qualitative analysis. Scores are categorized into five criteria, with the formulation as used by Azwar (2007). Teaching materials are said to be feasible if the minimum score assessment results indicate the category of "enough".

TABLE 1, Rating Criteria.

Num.	Rate Range	Criteria
1.	$Mi + 1{,}5\ Sbi < X$	Very Good
2.	$Mi + 0{,}5\ Sbi < X \leq Mi + 1{,}5\ Sbi$	Good
3.	$Mi - 0{,}5\ Sbi < X \leq Mi + 0{,}5\ Sbi$	Enough
4.	$Mi - 1{,}5\ Sbi < X \leq Mi - 0{,}5\ Sbi$	Less
5.	$X \leq Mi - 1{,}5\ Sbi$	Very Less

The next step is to calculate the ideal maximum score, minimum score ideal, the ideal score and standard deviation of the ideal of every aspect. Ideal maximum score on every aspect achieved if the validator to select all the criteria with the highest score. While the ideal minimum score achieved if the validator to select all the criteria with the lowest score. Total score for each of these aspects, then substituted into the tendency of which is used as a criterion in the assessment.

3. Experimental Results and Discussion

3.1 Stage I: Define (definition)

The purpose is to establish and determine the conditions of learning that includes learning objectives and learning materials restrictions. The steps are as follows

3.1.1 Analysis of the front-end (front-end)

In the first stage is a preliminary analysis that begins with identifying problems in the form of reviews Integrated Science curriculum to learning. Based on observations at junior schools in the area of Kendari, the applicable curriculum at junior high schools in the area Kendari there are those who use the Standard based curriculum (SBC). The number of schools that still use the curriculum SBC caused by unprepared teachers and students in implementing the curriculum in 2013, and the lack of willingness of the relevant teaching materials. After identifying the problems of learning science SMP in particular curriculum, it turns out the standard of competence curriculum SBC is still fragmented between fields.

Particularly at SBC curriculum, teaching materials used by teachers in teaching integrated science mostly use textbooks. Science teaching materials used by teachers still have the presentation of the material separated. Therefore, researchers are interested in developing an integrated science teaching materials to study material that has cohesion, both in materials physics, chemistry or biology, especially the curriculum SBC. Standards of competence is taken from the standard of competence class VIII SMP curriculum SBC can be seen in Table 2

TABLE 2, Competency Standards to be Combined.

Field Of Study	Competency Standards
Physics	5. To understand the role of work, force, and energy in everyday life
Biology	1. Understanding the different systems in the human life
Chemistry	4. Understand the use of chemicals in life

3.1.2 Analysis of Students

At this stage, researchers analyzed the characteristics of the students. Characteristics of students in junior high school age are likely to experience cognitive development. According Arajoo T.V (1996) suggest that the cognitive aspects include intellectual functions such as comprehension, knowledge and thinking skills. In addition, there is an increase in intellectual functioning, memory capability in language and conceptual development.

Picture of students' characteristics, such as the level of ability or intellectual development and skills of individuals or social already owned developed to achieve the learning objectives set. The results of the study will be used as consideration for developing teaching materials.

3.1.3 Analysis of Concept

Concept analysis aims to identify the main parts in the subject matter that will be developed. In the analysis of the concept, researchers determined the basic competencies that will be used in developing teaching materials. Basic competencies selected in this study are shown in Table 3 below.

TABLE 3, Basic Competence Content Combined

Field Of Study	Basic Competence
Physics	5.3 Explaining the relations forms of energy and change, work and energy principles and their application to everyday life.
Bilology	1.4 Describe the digestive systems of humans and its relationship to health.
Chemistry	4.3 Describe natural and artificial chemicals in packaging that contained in foodstuffs.

In determining the basic competence to do with the concept of linkage analysis to the basic competence. The activities at this stage is to study the materials of effort and energy as the subject matter of physics is selected, the material that will be combined are the digestive systems of humans as the subject matter of biology and on chemicals in food as the subject matter of the chemical, which is considered the third such material independent from each other. To associate the third such material required a connecting theme. The theme chosen research as the basis for linking the material that is energy and food. Selection of the theme of energy and food due to these themes considered to be able to connect the material work & Energy, the digestive system and food additives, and researchers believe that the theme very close in the event of daily life learners. The linkage concept can be seen in Figure 1 below.

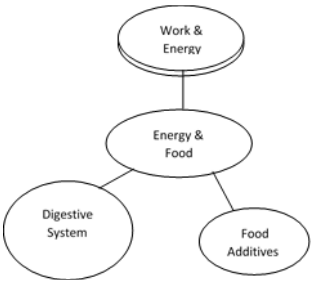

FIGURE 1 The linkage concept is tied to themes

3.1.4 Analysis of assignment

The task analysis performed to specify the content of the teaching material in the form of an outline that includes.

- Analysis of content structure,analysis of the structure of the content is aimed at detailing the assignment of part of the contents of teaching materials were developed. The results of the analysis of the structure of the content in the form of training and evaluation.
- Procedural analysis, analysis of assignment that has to load procedural activities procedure. The results of the analysis of the procedural form of a mini lab.

- Analysis of the information process, handouts should take a lot of additional information in the detailed tasks. The results of the analysis of process information such as the investigation and evaluation activities

3.1.5 Learning Objectives

Formulation of learning objectives or indicators of achievement should be based on basic competencies and indicators listed in Curriculum SBC. Here is the process of formulating learning goals based on a derivative of basic competence indicator material.

- Explaining the sense of energy
- Shows energy forms and examples in everyday life.
- Describe the types of food based on calories and other substances contained in it, as well as additives that can have an impact on health.
- Explaining the process of digestion in humans to produce energy.
- Cites the example of disorders and diseases of the digestive system that is commonly encountered in everyday life
- Explaining the link between energy and effort.
- Distinguishing the concept of kinetic energy and potential energy at a moving object.
- Applying the concept of energy and changes in daily life.
- Introduce the law of conservation of energy through the examples in everyday life

3.2 Stage 2: Design

At this stage, the draft produced teaching materials. The design phase aims to design teaching materials developed. This stage is an important stage in the study for at this stage will be developed teaching materials. Activities undertaken at this stage is the selection of teaching materials format, and preliminary design of teaching materials. The steps are as follows.

3.2.1 Selection format

Selection of the format of teaching materials intended for the design or designing learning content will be developed. The format of instructional materials selected in this study is a kind of handout teaching material has been adapted from BSNP format.

- Preliminary
  1) Cover / identity
  2) Core competencies and learning objectives
  3) Table of contents
- Contents
- Complement
  1) Example
  2) Exercise
  3) Bibliography / references

3.2.2 An initial draft

Here is a description of the preliminary design of a product that has been developed teaching materials.

3.3 Stage 3 : Development

At this stage the final form of teaching materials produced after going through revisions based on input from experts and test result data. The steps are performed at this stage is as follows.

3.3.1 Expert / Practitioner (expert appraisal) Validation

At this stage theoretically request consideration of experts and practitioners. Validator consists of expert material and linguists.

- Validator of material Once the product is produced, then the next step is to do is validate the validator material on teaching materials produced. Validation response or in the form of a questionnaire that has been made before then provided to the validator material. The first Validator material is Fahyuddin (Chemistry Education, Halu oleo university lecturer) and second validator material is Sitti Kasmiati where from Physics Education, Halu oleo university lecturer and the third validator matter is Sri Suryana Dinar from Department of Biology Education Halu Oleo University. From each of the validator at the same time provide an assessment in terms of

the presentation and graphics. Data validator votes materials to product type integrated science teaching materials webbed for SMP class VIII by applying discourse analysis on the theme of energy and food set out in Table 4.

TABLE 4,. The data Rate Validator Material

Score Group	Category	Frequency
65 < X	Very Good	2
55 < X ≤65	Good	1
45 < X ≤55	Enaugh	-
35 < X ≤45	Less	-
X ≤35	Very Less	-

- From the data generated on an expert assessment of the material to the product of teaching materials, namely from 3 validator, 2 of them who scored stated excellent category, and the first validator who scored expressed either category so that it can be concluded that the material aspect of the product of teaching science materials integrated type webbed for SMP to class VIII by applying discourse analysis on the theme of energy and food are used as teaching materials.mFeedback, biological and chemical materials should be integrated on the concepts / principles of physics, so that students learn physics as well as learn biology and chemistry.
- validator of Presentation Validator assessment data presentation of the product integrated science teaching materials webbed type for SMP class VIII by applying discourse analysis on the theme of energy and food set out in Table 5.

TABLE 5, The data Rate Validator Presentation

Score Group	Category	Frequency
29,25< X	Very Good	1
24,75 < X ≤29,25	Good	2
20,25 < X ≤24,75	Enough	-
15,75 < X ≤20,25	Less	-
X ≤15,75	Very Less	-

- From the data generated on an expert assessment of the presentation of the product of teaching materials, namely from 3 validator, 2 of them were scores expressed both categories, and the first validator who scored stated category very good, so it can be concluded on aspects of product presentation teaching science materials integrated type webbed for SMP class VIII by applying discourse analysis on the theme of energy and makaan fit for use as teaching material. Feedback, in presenting the teaching material should be added more examples of problems and exercises.
- validator of Graphics Graphics validator assessment data to the product type integrated science teaching materials webbed for SMP class VIII by applying discourse analysis on the theme of energy and food set out in Table 6.

TABLE 6, The data Rate Validator of Graphics

Score Group	Category	Frequency
65< X	Very Good	2
55 < X ≤ 65	Good	1
45 < X ≤ 55	Enough	-
35 < X ≤ 45	Less	-
X ≤ 35	Very Less	-

- From the data generated on an expert assessment kegrafisan to product instructional materials, namely from 3 validator, 2 of them who scored stated excellent category, and the first validator who scored expressed either category, so it can be concluded that the aspects kegrafisan product instructional materials science integrated type webbed to SMP class VIII by applying discourse analysis on the theme of energy and food fit for use as teaching material. Comments and suggestions, most images contained in teaching materials increased again.
- Validator Use of Words and Language Once the product is produced, then the next step is to do is validate the language validators against the teaching materials produced. Validation response or in the form of a questionnaire that has been made before then given to the language validators. Assessment questionnaire results linguists to science teaching materials unified product type webbed for SMP class VIII by applying discourse analysis on the theme of energy and food described in Table 7.

TABLE 7, Data Rate Linguist

Score Group	Category	Frequency
42,5< X	Very Good	1
35,75 < X ≤ 42,5	Good	1
29,25 < X ≤ 35,75	Enough	-
22,75 < X ≤ 29,25	Less	-
X ≤ 22,75	Very Less	-

- From the data generated on an expert assessment of the use of words and language to the product of teaching materials that score all validators declared category very well and good, so it can be concluded that the aspects of the use of words and language product instructional materials science integrated type webbed for SMP class VIII with applying discourse analysis on the theme of energy and food fit for use as teaching material. Feedback, note the use of function words between sentences

3.3.2 Limited Trial

After passing through the process of reviewing the materials experts, presentation, graph and language, then the next step is to do is to conduct limited testing of the products of teaching materials that had previously revised. The trial is given to VIII grade science teacher at SMPN 10 kendari, Tasram and Faizah and 12 respondents grade students of SMPN 10 Kendari with the aim to see the practicality of teaching materials developed can facilitate teachers bring learning materials and help students learn science subjects.

- Teacher Response

TABLE 8, The data Rate of Teacher Response

Score Group	Category	Frequency
65< X	Very Good	2
55 < X ≤ 65	Good	-
45 < X ≤ 55	Enough	-
35 < X ≤ 45	Less	-
X ≤ 35	Very Less	-

- From the data generated in response to the science teacher to product instructional materials that score all validators declared category very well, so it can be concluded that the product instructional materials science integrated type webbed for SMP class VIII by applying discourse analysis on the theme of energy and food fit for use as teaching materials.
- Student Response, the following qualitative discussion of the 25 items were given to the matter of the 12 respondents in response to integrated science teaching material type webbed for SMP class VIII by applying discourse analysis on the theme of energy and food that has been developed.

TABLE 9, The data Rate Students Response

Score Group	Category	Frequency
81,25 < X	Very Good	7
68,75 < X ≤ 81,25	Good	4
56,25 < X ≤ 68,75	Enough	1
43,75 < X ≤ 56,25	Less	-
X ≤ 43,75	Very Less	-

- From the data generated while limited trial by the 12 students of class VIII SMPN 10 Kendari are more students who score showed excellent category, so the aspect of student response teaching materials science integrated type webbed for SMP class VIII by applying discourse analysis on the theme energy and food fit for use as teaching material

4. Conclusion

Integrated science teaching materials webbed type SMPs class VIII by applying discourse analysis on the theme of energy and food are developed has gone through several stages of development with reference to the 4D development model that is (define, design, develop, and disseminate). Data analysis techniques used to process data from the results of the assessment by the validator expert (material, presentation, kegrafisan, words and the use of language), as well as assessment by teachers and learners

while testing is limited (12 students of class VIII SMPN 10 Kendari) is using quantitative descriptive data analysis techniques disclosed in the distribution of scores on the scale of five categories grading scale that has been determined. Subjects considered feasible if ratings have a minimum score in the category of "enough".

From the data generated on an expert assessment of the material to the product of teaching materials, namely from 3 validator, 2 of them who scored stated excellent category, and the first validator who scored declared good category of data produced on an expert assessment of the presentation of the product of teaching materials, namely from 3 validator, 2 of them were scores expressed both categories, and the first validator who scored stated excellent category, from the data generated on an expert assessment kegrafisan to product instructional materials, namely from 3 validator, 2 of them who scored stated excellent category, and one validator the score is expressed both categories, as well as from data generated on an expert assessment of the use of words and language of the product instructional materials namely score validator stated category very well and good, so with qualifications gained the teaching materials science integrated type webbed SMP class VIII with applying discourse analysis on the theme of energy and food fit for use as teaching material. In limited testing, data generated in response to a science teacher at SMPN 10 Kendari to product instructional materials that score all validators declared excellent category, and from the data generated while testing is limited by the 12 students of class VIII SMPN 10 Kendari that more students scores showed excellent category, so that the qualifications obtained in the pilot phase it does not require a revision or an integrated science teaching materials webbed type in SMP Grade VIII by applying discourse analysis on the theme of energy and food fit for use as teaching material.

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