

THE DEVELOPMENT OF AIR-THEME INTEGRATED SCIENCE TEACHING MATERIAL USING FOUR STEPS TEACHING MATERIAL DEVELOPMENT

PENGEMBANGAN BAHAN AJAR IPA TERPADU TEMA UDARA MELALUI FOUR STEPS TEACHING MATERIAL DEVELOPMENT

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan, menguji kelayakan, memaparkan karakteristik, dan menguji keterpahaman bahan ajar IPA terpadu pada tema udara untuk siswa SMP kelas VII melalui Four Steps Teaching Material Development (4S TMD). Penelitian dengan metode Research and Development (R&D) ini dilatar belakangi oleh tidak tersedianya bahan ajar IPA SMP yang disajikan secara terpadu melalui tema udara. Pengembangan bahan ajar IPA terpadu tema udara terdiri dari tahap seleksi, strukturisasi, karakterisasi dan reduksi didaktik. Berdasarkan uji kelayakan, bahan ajar telah memenuhi aspek kelayakan isi, kelayakan penyajian, kelayakan bahasa dan kelayakan kegrafikan. Karakteristik bahan ajar meliputi kedekatan tema bahan ajar dengan siswa, dan kesesuaian bahan ajar dengan standar BSNP. Berdasarkan uji keterpahaman, bahan ajar telah memenuhi aspek keterpahaman dengan kategori tinggi. Hasil penelitian ini adalah bahan ajar IPA terpadu berupa buku dengan tema udara yang telah melewati empat tahap pengembangan yang dapat digunakan sebagai bahan ajar pendamping pembelajaran IPA.

ABSTRACT

The purposes of this study are to develop, to test the feasibility, to describe the characteristic, and to test the students understanding about integrated science teaching material about air using Four Steps Teaching Material Development (4S TMD). The Research and Development method was use to develop integrated science teaching materials which is involving all science perspectives that are not presented in junior high school science book. The air theme was chosen in this study since it can be explained using biology, chemistry, physics, and earth and space science perspectives. Development the teaching materials was consists of selection, structuring, characterization, and reduction didactic steps. Based on the of feasibility test results, the teaching material is qualified in content, presentation, language, and graphic feasibility aspects. The characteristic of this teaching material expose the closeness theme with student daily lifes and its compatibility with National Books Standard. Based on the understanding test results, the teaching material is qualified in understanding aspect with high category. It can be concluded that the teaching material qualified to be used as supplement teaching material of science learning.

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Keywords: teaching material, integrated science, theme of air, 4S TMD.

INTRODUCTION

According to the Regulation of National Education Minister No. 22 of 2006, biology, physics, chemistry, and earth and spaces scien-

ce should be integrated as science learning. Through an integration of science learning, students are expected to learn about science comprehensively and to gained significant experience with activities that are more efficient and effective. Integrated science teaching gives students an opportunity to understand the nature surrounding with more experiences, because in integrated science students have

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opportunities to learn science through several disciplines.

The substance of science subjects in junior high school is an Integrated Science (Regulation of the National Education Minister No. 23 of 2006 concerning curriculum structure). Therefore, science should be taught as a subject in their entirety or integrated, and should not be separated between biology, physics, chemistry, and earth and space sciences. It was intended to junior high school students can recognize science as a science that is more intact. In the development of integrated science teaching materials, the whole theme or issue of science on various types of objects and levels of the organization can be used as learning materials.

Integrated learning model is one of learning model in the the curriculum implementation of 2013 recommended to be applied at all levels of education, from elementary through high school levels. The learning model is basically a learning approach that allows students either individually or in groups actively seek, explore, and discover the concepts and principles that are holistic and authentic. Based on the results of research in Muqoyyanah, et al. (2010), integrated science teaching is more efficient in terms of time on the subject rather than the teaching of science separately.

In fact, the science teachers at the junior high school science teaching have not carried out in an integrated manner. Learning science is still held separately between physics, chemistry, and biology. One of the obstacles that lead teachers have not applied in an integrated science teaching is that the book provided by the government has yet to present an integrated science and the limited ability of teachers to design teaching materials integrated science (Kumala, 2013).

Based on observation, learning resources used by teachers in schools are still in the form of books published by the government, the Student Worksheet from deliberation subject teachers, and some relevant books from particular publishers. Teaching materials used by teachers of junior high school is not present in an integrated science. Integrated science teaching materials used by teachers is a collection of teaching materials of study chemistry, biology, and physics are used in the book. If viewed in terms of content, between chemistry, physics and biology there are still no relation to one another.

Based on the results of several studies

that have been done, the integrated science teaching shows a positive effect on student learning outcomes. Results of research conducted by Listyawati (2012) revealed that the development of the integrated science in junior high school can improve student learning outcomes. Something similar is obtained by Kumala (2013) who found that the development of the integrated science teaching can improve students' understanding and performance. Research conducted by Yuliati (2013) found that the integrated science is an effective teaching material in improving students' higher-order thinking. Furthermore Yuliati advises science teachers to use integrated science teaching materials as one of teacher and student study guide. The use of integrated science teaching materials needs to be adapted to the curriculum used in the school. The adjustment relates to the incorporation of some basic competence from different semesters. Therefore, when designing the syllabus for teaching science, teachers should assess related basic competencies and form the theme and customize the theme of integrated science teaching materials. Based on some of the results of these studies it is clear that learning science in junior high school should be done in an integrated manner, so that the development of integrated science teaching materials is essential to keep the integrated sciences teaching can be accomplished.

One way is to use the science combines webbed models. Webbed model is an integrated learning model that uses the theme as the basis for learning. This learning model combines the various disciplines or the various subjects which are bound by one theme (Fogarty, 1991). This learning is a model that tries to combine several subjects through one theme. So in junior high school, science is no longer separated into aspects of physics, chemistry aspect, or aspects of biology.

Presentation of concepts in integrated science were started from the phenomena of nature which is close to the students' daily life and assisted with the theories of science. Decision of chosen phenomenon should be close to the students daily life was directed so that students can more easily understand the material. The contextual phenomenon can also increase students' motivation to learn science. Phenomenon is the basic knowledge for students in studying science. Science teaching materials presented with the real problems and deliver contextual learning can facilitate the implemen-

tation of the science learning (Lang & Olson, 2000). Air theme is one theme that is close to the students. Humans live in the bottom layer of the atmosphere which called the troposphere. Symptoms of atmospheric and weather occur at this layer. The proximity of the air theme with the daily life of students is expected to increase students' motivation to learn science and students more easily understand it.

In order to support the achievement of learning and teaching optimally, teaching materials is a component that is very important and needs special attention. There are still a lot of teaching materials that the spread and the depth of the material is not in accordance with the level of development of students so that not easy to be understood by the students (Anwar, 2014). Development of integrated science teaching materials in junior high school should also consider the level of breadth and depth of the material; the truth of the material; the structure of matter; as well as the graphic aspects and presentation of the material. In the processing of materials, there are four steps that must be taken before the instructional materials feasible to be delivered to students. The four-steps are selection process, structure, characterization, and reduction which is called Four Steps Teaching Material Development (4S-TMD). This process is the stage of how the teaching materials processed, prepared, and presented by the teacher as teaching materials or ready studied by students as self-teaching materials (Anwar, 2014).

The purpose of this study was to develop and to obtain integrated science teaching materials on the theme of air using a four-step development of teaching materials (4S-TMD).

METHODS

This research was designed by using Research & Development (R & D) method. The research focused on process and product development of integrated science teaching materials using theme of the air through a four-step development. The research instrument used in this study consists of five instruments: (1) instruments of suitability in concepts, indicators and core competencies; (2) instrument of suitability in map-concept, macro-structure, and systematic of teaching materials; (3) instruments of characterization of the concept; (4) instrument test of the feasibility of teaching materials; (5) instrument test of students

understanding about teaching materials. The tests used in the characterization stage of the concept were in the form of multiple choice questions and test of writing ideas. The study involved five experts in the selection and structuring; 99 students at the stage of characterization of the concept; and 12 junior high school teacher in eligibility test of teaching materials.

The data obtained from the development then be analyzed to produce a conclusion. Data analysis is broadly divided into two parts, namely data analysis results from concept characterization and data analysis from feasibility teaching materials as well as students understanding about teaching materials. Data analysis from the characterization phase aims to identify the concepts that are difficult to understand by students. The results of the data analysis phase of characterization became the basis for the reduction process, namely reduction of the level of difficulty concept. Analysis of data from feasibility testing of teaching materials aimed to investigate the characteristics of teaching materials in terms of appropriateness of content, presentation, linguistic, and graphically. Analysis of test data students understanding aims to determine the category level of difficulty of teaching materials. The analysis was performed by calculating the correct answers from the main idea and then dividing it with the overall main idea then multiplied by 100% based on the following formula:

$$K = \frac{Jb}{S}$$

with:

K = level of understanding

Jb = average student correctly answered the main idea;

S = Number of students

From the scores obtained, grouping data of understanding the text is done by Rankin and Culhane categories:

Table 1. Criteria in understanding the text

K	Level of understanding
$60 < K \leq 100\%$	High (Category Independent)
$40 < K \leq 60\%$	Medium (Instructional category)
$K \leq 40\%$	Low (Category Difficult)

RESULTS AND DISCUSSION

Development of integrated science teaching materials on the theme of air have done by using 4S-TMD includes four main stages, namely the selection, structuring, characterization and reduction. The exposure of the results of each of these stages are as follows.

Selection Stage

At this stage, development of indicators was derived from the basic competence that fit with the theme of air which were based on analyzing of the core competence and basic competence (BC) associated with air. Indicators that have been compiled then developed into a description of a concept that refers to several textbooks. Description of BC, indicators,

and the concept selection phase results then validated by five experts. This validation aims to see: (1) the suitability of BC indicators; and (2) the suitability of the concept by indicators. Competence is taken in the selection phase consists of six core competencies were developed into 31 indicators. After completed the validation process and consider the advice of the valuator, the indicator increased to 32 rounds. Of the 31 indicators organized, mostly rated valid by the valuator and are in accordance with the basic competencies are taken. Description The concept was developed based on indicators and quoted from several textbooks declared valid by all valutors. In the selection phase, the obstacles encountered is difficulty in developing operational indicators with consideration of achievement of KD on

Table 2. Systematic Teaching Materials

Chapters	Sub Chapters	Contents
The air and its constituent components	The definition of	Evidence of the presence of air Properties of air
	The air component	Gas compositions in the air Elements and compounds in the air
	The air as a homogenous mixture	Concept of mixture Types of mixture
	Understanding the wind	Definition of wind Naming the wind
Wind	The process of wind	Source energy of wind Heat convection Air pressure
	Factors influence the direction of wind motion	Air temperature Heat and specific heat of earth surface Wind benefits for plants
	Benefits of wind	Wind benefits for animals Wind benefits for humans
	Energy transformation in living being	Respiration Photosynthesis
Air and Life	Air as the protector of living things	Protector of the space objects Protector of UV radiation Protector of extreme temperature
	The role of air on the weather cycle	Physical changes
	Understanding air pollution	Definition of air pollution The sources of air pollution
Air pollution	The impacts of air pollution	Acid rain Depletion of ozon layers Greenhouse effect The direct impact on humans

teaching materials and linkages indicators on the theme of air. As a result, the indicators developed cannot fully explore the KD selected. The results in the selection are the description of the concept of the development of indicators that have been validated by experts.

Structuring Stage

At this stage, the description of the concept resulted from selection process is based on scientific structure taking into account the cognitive structure to be built on students. Scientific structure of matter/concept was developed through the preparation of the macro-structure by considering didactic elements to make students more easily understand the teaching materials. The cognitive structure of students through the preparation of concept maps constructed by considering the hierarchy of the concepts included in teaching materials. A prepared teaching material has been developed and consists of four chapters with each of chapters related to the air theme. Systematic of prepared teaching materials with the air theme were shown in Table 2.

According to Ausubel (Dahar, 1996) in order to achieve meaningful learning, the teacher must know the concepts that have been owned by the students. Novak suggested that concept maps are one way of knowing. Ausubel theory about learning underlies the emergence of the idea of a concept map, according Dahar (1996) concept maps are used to express meaningful relationships between concepts in the form of propositions (two or more concepts a concept linked by words in a semantic unit).

Making concept maps in the structuring phase aims to help students build the cognitive structure of students in the subject matter or concepts to be learned. Preparation of a concept map is a process that involves identifying the concepts of a subject matter and arrangement of these concepts. In its simplest form, a concept map consists of only two concepts are connected by the conjunctions to form a proposition. In concept maps can be observed how one concept related to another concept.

To control the work of writing the whole text of teaching materials (textbooks), each chapter or subject teaching material was analyzed and mapped into the model text representation in the form of macro structures. The macro-structure is a two-dimensional model, i.e. the dimensions and dimension progression elaboration. Dimensions mapped progression down while the elaboration dimension map-

ped to the side (Setiadi, 2014). The structures shows the macro function and maintain the clarity of the relationship between textual units and accuracy of the material structure of science subjects represented in varying degrees. Criteria accuracy is achieved through the application of discourse in the dimensions of progression, while the criteria of clarity are achieved through the function explanation of the subject matter in dimensions elaboration.

Air theme is a theme that its scope is quite broad, resulting in a decrease in the macro-structure for teaching materials divided into four macro-structures based on the division of teaching science through integrated chapter. The air theme in science presents the material that starts from the phenomenon then narrowed to the conceptual abstract concept. Therefore, to make students more easily understand the material intact from the concrete to the abstract, the teaching materials presented with various representations. Representation is a configuration (shape or composition) that can describe, represent or symbolize something in a way (Goldin, 2002). Representation is something that represents, describe, or symbolize objects and/or processes. Multi representation is representing the same concept in a different format, including verbal, images, graphics, and mathematics (Prain & Waldrup, 2007). It can be concluded that multi representation is a way to express a concept through various forms.

In terms of level of representation, there are three levels of representation, namely the level of macroscopic, microscopic and symbolic level. The level of representation in the form of macroscopic phenomena was observable by the senses. Microscopic Level refers to the qualitative representation of a concept or the material presented. Level can be a symbolic representation in the form of symbols, mathematical equations, diagrams, graphs, images and others. Development of teaching materials is conditioned theme uses three levels of representation. Multi representation has three main functions (Ainsworth, 1999), namely as a complement, limiting the interpretation and understanding of the builder. The first functions, multi representation used to provide a representation that contain supplemental information or help completing the cognitive processes. Secondly, the representation is used to limit the possibility of interpretation error in using another representation. Third, multi representation can be used to encourage students to build in-depth understanding of the situation.

The results of the preparation of teaching materials theme multi representation in the air are three levels of representation of the concepts of selection results. The results of the preparation of the next multi representation combined with concept maps and macro-structure to be a draft of teaching materials in their entirety.

The final results of the structuring phase are teaching material that has been structured by considering the integration and multi representation of the concept. A difficulty in the structuring phase is to develop an integrated concept of the macro-structure of physics, biology, chemistry, as well as earth and space science. Every concept has a different character, when viewed in terms of its multi representation. In preparation multi representation, difficulties encountered when drawing a concept into levels of representation.

Characterization Stage

At characterization step, the concepts that have been restructured then tested to 99 students through characterization instruments. Samples were taken purposively. Sampels of 99 students drawn from three classes, namely from the excellent class, medium class and low class. Class category featured, medium and low. At this stage, the paragraph with a percentage of less than 67% included in the reduction step didactic. The number paragraphs that should be reduced are listed in Table 3 as follows.

Table 3. Number of paragraph should be reduced

Chapter	I	II	III	IV
Number of paragraph should be reduced	11	7	4	7

From the results of characterization and analysis of the paragraphs which must be reduced by a few facts related paragraphs are categorized difficult, namely: (1) paragraph explaining abstract concepts; (2) paragraph explaining the concept in the text with a complex structure; (3) paragraph explaining the concept without an example; (4) paragraph explaining concepts without accompanying picture.

At this stage of characterization it is found that the students have difficulty in understanding the description of the concepts presented only with text, so the need for a reduction in the level of difficulty concept (reduction in didactic) through multi representation of the

concepts presented to build understanding (Ainsworth, 1999). Representation in the form of images and text must be incorporated into the manufacture of textbooks in order to create effective communication (Vinisha & Ramadas, 2013). Their multi representation can effectively build and strengthen students' understanding of science (Adadan, 2013). Based on these facts subsequently lattice reduction as a basic didactic reduction was arranged. Lattice reduction didactic prepared taking into account the character of the concept of implied or explicit in each paragraph, namely: (1) If the concept is complex, the lattices were structured to simplified the concept through particular and generalize mechanism; and (2) If the concept is abstract, the gratings are arranged to be able to concretize the concept through images, symbols, example or analogy.

Obstacles encountered in this stage are the inability of students to determine the main idea and 'lack of students in working on characterization instruments. In connection with these constraints, the anticipation is done so that results are not biased by not using the data from students who are not serious about a given instrument.

Reduction Stage

At this stage, the draft of the teaching materials has been prepared as a result of the structuring phase is then reduced by grating obtained in step characterization. Reduction step is a step to reduce the level of difficulty concept. Reduction performed per paragraph. Paragraph which was reduced is a paragraph that is quite difficult to be understood by students. Criteria paragraph elusive by the students are (1) the paragraph at least be answered correctly by students on writing the main idea; (2) paragraphs are classified into paragraphs that are difficult to understand by the students; (3) at least answered correctly by students on their multiple choice questions.

In this study, the paragraph which entered the reduction is a paragraph that meets at least two criteria. The reduction of the level of difficulty in the concept phase reduction is carried out in several ways, including (1) the annotations in the form of images, symbols, sketches and experiments; (2) use of analogies; (3) generalization; and (4) particular machanism. After paragraph with elusive has been reduced, re-arranged into paragraphs instructional materials intact. The result of the reduction step is teaching material in the form of a book called

air that consists of four chapters. The last stage of this research is to test the feasibility of a book that refers to the criteria listed by the National Books Standards. The results of the feasibility test of feasibility aspects of the content of the book are presented in Figure 1.

There are nine aspect examined in the feasibility test content, namely: (1) the scope to test the suitability of the concept by KI and KD; (2) the accuracy of the material to test the concept of truth; (3) recency to test concepts and references recency; (4) productivity insight to test the content of elements encouraging students; (5) curiosity to examine the efforts of teaching materials to foster the curiosity of students; (6) life skills to test teaching material attempts to dig skills students; (7) diversity insight to examine the content of the values on teaching materials; (8) contextual insight to test the suitability of the examples on teaching materials to the environment; (9) coherence to test the integration of teaching materials. Based on the contents of teaching materials due diligence air theme, found that of the nine aspects assessed, seven aspects are rated according to all evaluators and the two aspects are considered not suitable by some evaluators i.e. on the content aspect of productivity and insight into the development of life skills. Revision of teaching materials is done in order to meet the teaching material aspects of productivity and development of life skills is through the addition of activities (Mini Project) at the end of each chapter.

Test the feasibility of languages includes seven aspects: (1) the suitability of language with the cognitive development of students; (2) communicative; (3) and interactive dialogue; (4) straight forward; (5) coherence; (6) the rules

of the language; (7) the consistency of terminology and symbols. Based on the test aspects of language teaching materials, found that in general from seven aspects of language has been valued according to all teachers. There are three aspects of language that gets criticism from teachers, namely conformity with the development of learners, candor sentence, and compliance with the rules of language. Revisions were made in order to fulfill this aspect of teaching materials is to simplify the structure of the sentence on teaching materials. The results of due diligence on the feasibility aspect language books more is presented in Figure 2.

Based on the due diligence aspect of teaching materials, the results presenting that the air theme in general all evaluators have met to assess three aspects of the presentation. Of the four indicators that relate to the presentation techniques, two indicators were assessed according namely the systematic consistency of presentation and the logic of presentation. While the coherent of the concept indicators, five of the 12 teachers assess that teaching materials do not meet the coherent aspect in presenting the concept. Revisions to respond to the assessment and the advices of five teachers were made by changing the order of chapters. The chapters in the book then transposed by considering the closeness of the sub theme of each chapter with students concepts. Thus the chapters in teaching material are ordered as (1) Air and Life; (2) Wind; (3) Components Air Compiler; and (4) Air Pollution. The results of the presentation of the feasibility test are presented in Figure 3.

Proponet aspects of the presentation of the material in the indicator relating to the introduction to the use of books judged to be

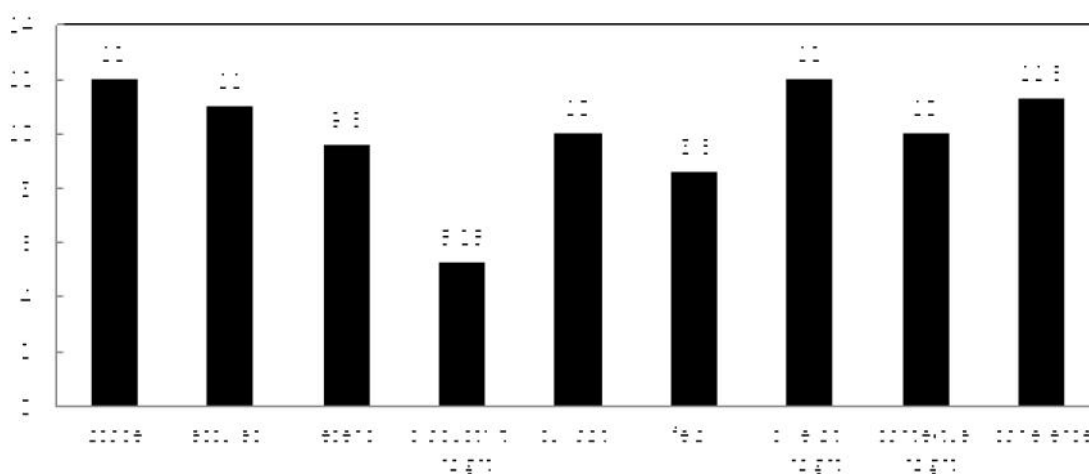


Figure 1. Graph of Content Feasibility Scores

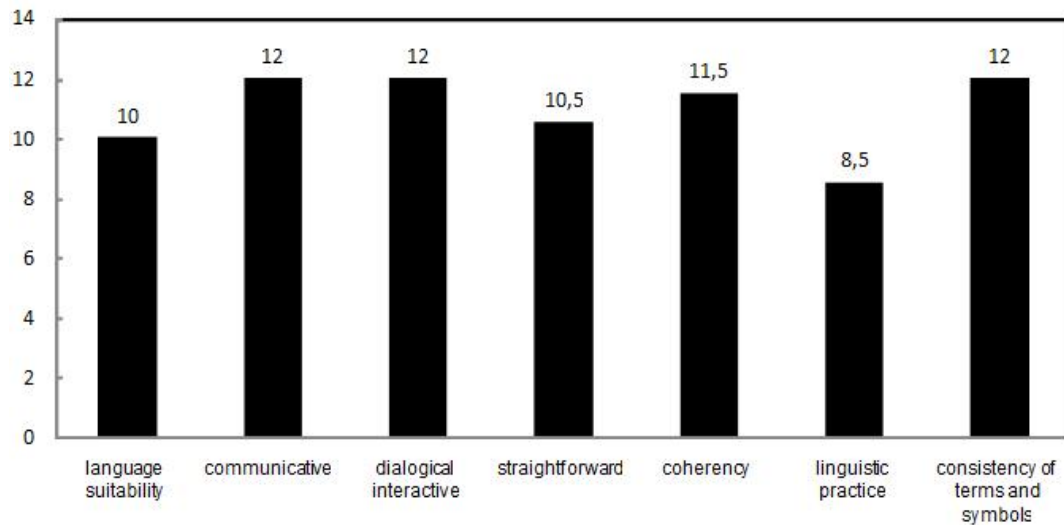


Figure 2. Graph of Language Feasibility Scores

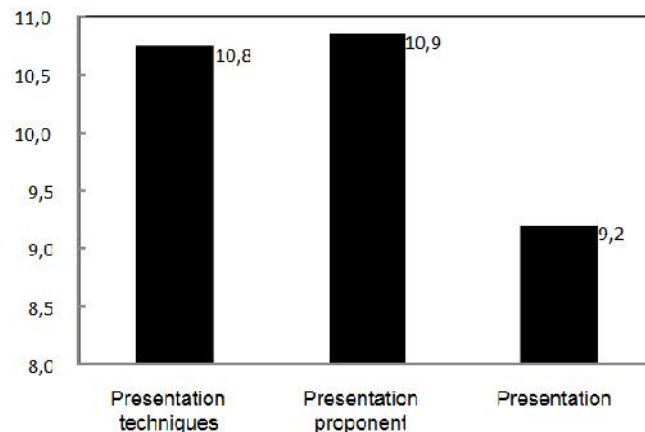


Figure 3. Graph of Presentation Feasibility Scores

appropriate by six teachers. Revisions were made to the book is by adding a special page book usage instructions. This page contains the contents of the book in general and the function of each part of the contents of the book.

In terms of presentation, the teacher also considers that the lack of teaching materials involving students, three teachers stated teaching materials are not centered to learner. This is because most of the teaching materials in the form of descriptions of concepts and facts. Seven teachers assess teaching materials are not present feedback for self-evaluation, because it is not equipped with teaching materials for each answer key questions that exist. Revisions were made to respond to the criticism of teachers to the teaching materials on the presentation aspect is the addition of the instructions for use of books at the beginning of the book and answer key additions of any

problems that exist in each chapter. The answer key is presented at the end of the teaching materials.

Based on the test of graph aspect, in general, teaching materials have been assessed in accordance by all evaluators for all indicators. Only for indicators related to the book cover design and illustrations of some evaluators judged that teaching materials do not meet this aspect. This indicates that the illustrations used in the book cover needs to be improved in order to give rise to the appeal of the student. The results of due diligence on the feasibility graph aspect book is presented in Figure 4.

Development of teaching materials starting theme approach is one way to get closer to the students' science learning context. By choosing the theme that close to student life, learning science more meaningful for students since what they learned is easy and often en-

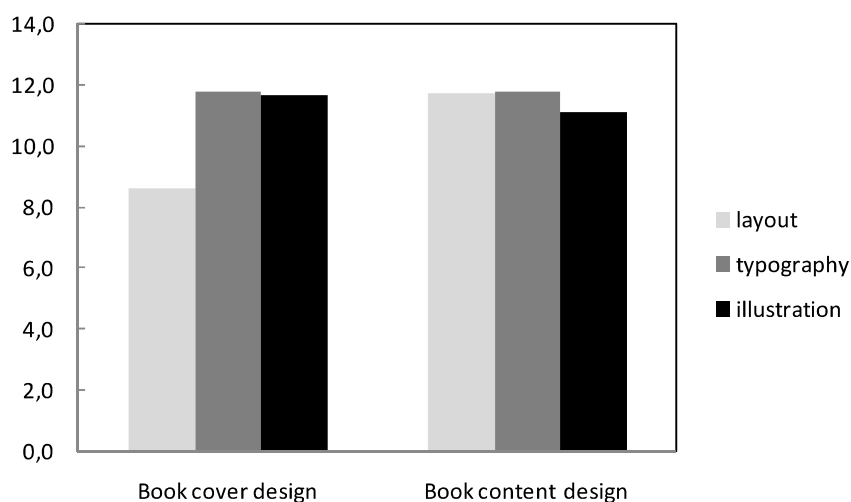


Figure 4. Graph of Graph Feasibility Scores

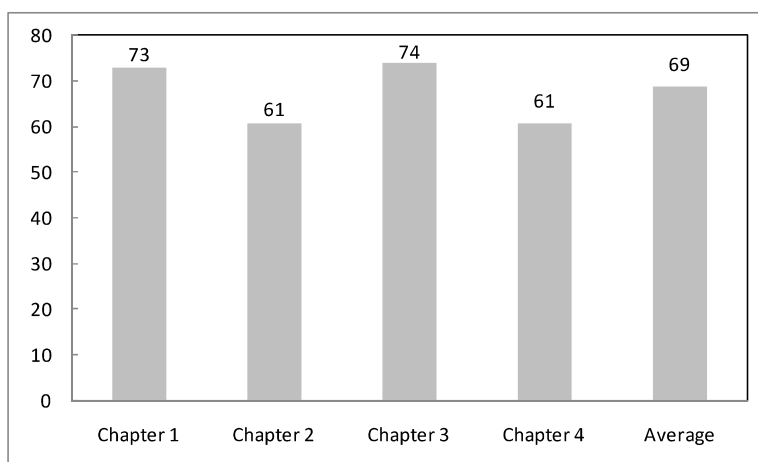


Figure 5. Graph of Understandable Feasibility Scores

countered by the students. Understandable teaching materials were tested with the writing test is the main idea of a paragraph of teaching materials. Based on the writing test of the main idea obtained by 99 students, the results were shown in Figure 5.

The average understandable score of the whole chapter is 69%. This value indicates that the books which have been developed have understandable with high category. Development of theme-based teaching materials that should refer to core competence and basic competence is a challenge for teachers. This is due to core competences and basic competences which both are in one grade level cannot explore the theme intact. Some basic competences relating to air contained in the grade 7 and grade 8 are partially contained. As a result there are some concepts of grade 7 to be incorporated into teaching materials that cater to the grade 8.

The advantage of teaching material based on the theme of air is that the teaching material was designed from the familiar things which were sounds and close to the students' life. In the other hand, the language used in teaching materials drawn from the fact of the research results on the characterization phase, so it is expected that the students more easily understand the teaching materials. The teaching materials are also expected support the science learning in the classroom. Therefore, teaching materials are made with a mix of text, images, tables and diagrams. Teaching materials are also expected to enable students get a hands on experience in the classroom, so that teaching materials designed to engage students through simple experiments.

Development of teaching materials on the theme of air aims to present the facts easily found students will be easier to identify examples given during the learning process. Air and

some phenomena in the air were appointed as the source material development of science. Teaching materials developed to be able to interact with students. Thus the potential for airborne or associated with air can be developed for the sake of learning in the classroom. Based on research that has been done, there are some weaknesses in teaching materials theme, namely: (1) Instructional materials starting from the determination of the air theme then continued choose Basic Competency (BC) which can be explored through the air theme. The downside of this move is more focused research theme in terms of peeling science rather than peeling basic competence to be achieved; and (2) the air theme is a theme that is broad, but not all BC in grade 7 can be explored by these materials. These materials do not contain all BC in grade 7, so it cannot be used as textbooks. Instructional materials theme this air enrichment can be used as a book is a book that contains material that can enrich textbooks (Sitepu, 2012).

CONCLUSION

Based on the results of research and discussion, it can be concluded that the development of integrated science teaching material with the theme of air through 4S-TMD consists of four steps of development that selection, structuring, characterization and reduction didactic. Resulting in the selection of teaching materials first draft that has been validated the suitability curriculum and the concept of truth related instructional materials. At this stage of structuring the draft produced two instructional materials in the form of a concept map, the macro-structure of teaching materials and multiple representations. At this stage of characterization is concluded that the 29 paragraphs of the 86 paragraphs in the category of difficult and reduced as didactic. Characteristics paragraphs are categorized difficult, namely: (1) paragraph explaining abstract concepts; (2) paragraph explaining the concept in the text with a complex structure; (3) paragraph explaining the concept without an example; (4) paragraph explaining concepts without accompanying picture. At this stage of the reduction is carried reduction in the level of difficulty of teaching materials with this type of reduction (1) the annotations in the form of images, symbols, sketches and experiments (multi representation); (2) use of analogies; (3) generalization; and (4) particular mechanism and produced science

teaching materials unified theme air.

Integrated science teaching materials in compliance with the air theme aspects of feasibility assessment based on criteria developed by the National Books Standards, namely the feasibility aspects of content, presentation, linguistic and graph aspects. Science teaching materials unified theme of the air has the following characteristics: (1) the proximity of the theme of teaching materials to students; (2) conformity with the standards of teaching materials teaching materials of BSNP; and (3) based on the writing test of the main idea of teaching material fulfills the aerial theme of understandable with high category level.

Air theme is a theme that is broad, but not all of the basic competence in grade 7 can be explored through the air theme. Teaching materials with the theme of air is only able to explore most of the basic competencies and concepts contained in it, so it is necessary to develop teaching materials with other themes that all basic competence can be explored. In addition, the teaching materials developed untested in terms of use in the classroom, so we need further research to test about its effectiveness.

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