The Development of Teaching Aid in The Implementation of Natural Science in The Curriculum 2013 Junior School

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Abstract. The purpose of this study was to develop the teaching aid required in the curriculum implemented 2013 science subjects at the junior level. The method used in this research is the Research and Development. In this article will be described in the description of the development of the teaching aids that have been generated. Teaching aids consist of three pieces, namely water filtration magical, electric convection box and Musschenbroek bimetal. Based on the expert validation, then all three devices have fulfilled the requirements as teaching aids. Where all three can be used to demonstrate the concept of separation of mixtures, air convection, and thermal expansion of the metal. All three are decent teaching aids used to learn science subjects at junior in implementing the curriculum in 2013.

Keywords: development, teaching aids, Natural Science, implementation, curriculum 2013

1. Introduction

Learning is a complex process that occurs in every person throughout his life [1]. One of the keys to success in the classroom is the availability of facilities and infrastructure to study one or several concepts. Moreover, to teach science subjects in junior high. According [2], junior high school students still classified as children, where they are generally enjoying the activity, not the result of activities. Junior high school age children typically range from 12-15 years, during this period various problems must be overcome to develop commitment, so they have a good identity and mature [3]. Along with the increasing age of the child, it is a way of thinking of students will move from the concrete to the abstract [4].

Natural science, is the science related to natural phenomena and systematic material systematically arranged, generally accepted that a collection of observations and experiments [5]. Natural Science also called the science, has three components that can not be separated, namely products, the scientific process, and scientific attitude. Science as a product has a meaning of science is an organisation of facts, concepts, procedures, and laws of nature. Science as science processes explain the findings obtained from the scientific or scholarly work. While science as a gesture has a meaning that the scientific attitude underlying scientific processes that are useful in producing science [6]. At the level of Junior School are expected to emphasize last learning Salingtemas (Science, environment, technology, and society) integrally geared towards learning experience to design and create a masterpiece through the application of the concept of science and competence of scientific work wisely [7].

Natural Science does not only contain a collection of facts and concepts alone but Natural Science is also a mindset in dealing with natural phenomena around. Natural Science as a human
attitude, is the application of process skills. Science process skills include: observing, measuring, draw conclusions, controlling variables, formulate hypotheses, make charts and data tables, create operational definition and conduct experiments. Natural Science as a process/method, Natural Science implementing stages in the implementation of the scientific method of learning Natural Science. Natural Science as a product, is merely a collection of the results of the empirical and analytical activities undertaken by scientists for centuries.

Meanwhile, the Natural Science should provide a meaningful learning experience for students, by studying the Natural Science, the students will get used to having the right attitude, skills properly apply the scientific method, which in turn will affect the student's personality, so it is very appropriate lessons to be taught taught in junior high. Natural Science is a field of science that studies the natural phenomena. So that the Natural Science is not just a collection of formulas but more than that is a way of knowing how nature works. So that is not enough just to teach science is taught in theory alone but also need to be taught how the theory was obtained. One unit of science as a process, product and attitude expected to be achieved through the implementation of the curriculum, 2013. For the existence teaching aids where teaching aids are equipped with supporting implementation. In this case, the research to develop Natural Science teaching aids that can be used to teach science in junior high. This research aims to develop the teaching aids required to implement the curriculum in 2013 in science subjects in secondary school.

2. Methods
The study design used in the form of Research and Development with Brogg patterns and Gall (2003) that has been adapted. To further the design shown in the following chart:

![Figure 1. Design of Research](image)

Analysis of the data used is the method mix analyze. That is using qualitative and quantitative

3. Result and Discussion
Based on the analysis of the teaching aids needed to teach science had previously obtained material analysis and needs teaching aids in the table 1 [8]

Table 1. Requirement Viewer tool in the implementation of the natural science curriculum 2013 class VII junior school
| No. | Subject Matter | CC | BC | Teaching aids |
|-----|----------------|----|----|----------------|
| 1   | The object of science and observations | 1 | 1.1 | Caliper measurement tools, made of wood large size that can be affixed on the board / wall |
|     |                | 2 | 2.1 |                             |
|     |                | 3 | 3.1 |                             |
|     |                | 4 | 4.1 |                             |
| 2   | Classification of objects, | 1 | 1.1 | No teaching aids |
|     |                | 2 | 2.1,2.2, 2.3,2.4 |                             |
|     |                | 3 | 3.2,3.3 |                             |
|     |                | 4 | 4.2,4.3 |                             |
| 3   | Classification of Living Beings | 1 | 1.1 | No teaching aids |
|     |                | 2 | 2.1,2.2, 2.3,2.4 |                             |
|     |                | 3 | 3.2,3.3 |                             |
|     |                | 4 | 4.2,4.3 |                             |
| 4   | Systems of Life Organization | 1 | 1.1 | Model of animal cells |
|     |                | 2 | 2.1,2.2 | Model of plant cells |
|     |                | 3 | 3.4 |                             |
|     |                | 4 | 4.5, 4.6 |                             |
| 5   | Change objects around Us | 1 | 1.1 | Water purification, simple chromatography, simple microscope |
|     |                | 2 | 2.1, 2.2 |                             |
|     |                | 3 | 3.5 |                             |
|     |                | 4 | 4.6, 4.7 |                             |
| 6   | Energy and Life System | 1 | 1.1 | No teaching aids |
|     |                | 2 | 2.1,2.2, 2.3 |                             |
|     |                | 3 | 3.6 |                             |
|     |                | 4 | 4.8, 4.9 |                             |
| 7   | Temperature and Change | 1 | 1.2 | Thermistor heat |
|     |                | 2 | 2.2 |                             |
|     |                | 3 | 3.7 |                             |
|     |                | 4 | 4.10 |                             |
| 8   | Heat and displacement, | 1 | 1.1 | Some teaching aids are developed are: heat transfer by conduction, heat transfer in a variety of materials, gas convection. |
|     |                | 2 | 2.1 |                             |
|     |                | 3 | 3.7 |                             |
|     |                | 4 | 4.10,4.11 |                             |
| 9   | Interaction with the Environment Living Beings | 1 | 1.1 | A chart of interaction between living organisms in ecosystems and global warming scheme |
|     |                | 2 | 2.1, 2.2 |                             |
|     |                | 3 | 3.8,3.9,3.10 |                             |
|     |                | 4 | 4.12,4.13 |                             |

Based on the table then developed three teaching aids to teach the curriculum in 2013 at the junior level. All three teaching aids are water filtration magical, electric convection box, and Musschenbroek bimetal. All three of these tools have been validated experts and revision of the final product. Each device is shown in the following explanation:

a. Teaching aids filtering magic

Teaching aids are made of the main material in the form of transparent acrylic sheets and prison. This tool is the height of 1 meter. Box each level can be assembled, and students
can have a broad creative space to determine the best cleaning results by dismantling pair. In addition to a series of filtering tools are also provided water purification materials in the form of fibres, gravel, sand, zeolite. There are six boxes where the box above to enter the dirty water then the ultimate box is to accommodate the filtrate. The next four squares in the middle can be used to find the appropriate modifications to obtain the best filtrate. So in addition to cognitive of these tools can also be assessed in terms of affective and psychomotor. As a result of the validation of acquired expert advice to include indicators of clear water standards by using a pH meter (Figure 2).

Figure 2. Filtering Magic

b. Box convection electric

Known convection box because its shape is a box (Figure 3). The materials used to make this tool is made of acrylic and glass. The difference from previous convection box is usually used candles as a source of heat in the box. While on these tools candle bulb replaced with some three pieces. Electric convection box is the advice given by the validator expert that the new value is arising from pre-existing convection tubes. To use these teaching aids to learning, the variable heat source can be varied to obtain optimal results. The heat source (both lamp) connected to an electric current. As the materials used in these tools is smog bomb/mosquito repellent

Figure 3. Box Convention Electric
4. Conclusion
Based on the analysis needs of teaching aids, then developed the three teaching aids natural science in junior high. All three of these tools have been validated skilled and revised products. Each tool has a specification for use in science teaching.

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