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Development of science experiment media kits for elementary school students

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Abstract. The essence of the current science curriculum (aka curriculum 2013) nationally applied in all elementary schools is scientific approach to improve the students' skills and knowledge. Based on our need analysis we found that Mechanical experiment series are highly needed. The main goal of this study is to produce media kit for science experiment activities for elementary school students. The media kit consists of experimental tools kit and their experimental guide modules. We applied the 4-D model to achieve the goal. This study is on-going process; this article reports the progress status of the study.

1. Introduction

Since 2013 all schools in Indonesia throughout the nation apply the 2013 curriculum which focuses on improving the students' attitude, skills, and knowledge [1]. Along the way its implementation has gone through several adaptations and modifications as can be observed from its revision versions, such as the 2013 curriculum revision 2016, revision 2017, etc. [2-4]

One of emphases in elementary school science education is hands on experiment to improve the students' practical skills [5]. Unfortunately, based on our survey the media kits to do the experiment are scarcely found in most of the schools. This study was conducted to address this gap between the expectation and reality conditions. The main objective of this study was to develop scientific media kit for elementary school students.

2. Literature review

Science is related with daily phenomena around us. Introducing science to the students as early as possible will be beneficial to the students. Accommodating the best practices currently applied in the modern scientific approach, science experiment is one of best choices to help students construct their own knowledge and skills via hands on experience.

2.1. Learning media

Media comes from the Latin medium which literally means middle, intermediary or introduction [6]. Learning media are all physical equipment designed in a planned manner to convey information and build interaction [7]. The main function of the media according to Kemp and Dayton (in [8]) is that the media can motivate interest or action, the media can present information and the media can give instructions.



Even though the media is a tool and source of learning, the media cannot completely replace the role of the teacher. Media without teachers is an impossible thing to improve the quality of teaching. The teacher is obliged to aid students about what they should learn, how students learn it and the results to be obtained from the media used. Media is a tool and a means to achieve teaching goals, media is not the goal of learning.

2.2. Science experiment

The essence of science is a way of thinking, a way of investigating and a collection of knowledge [8]. Hungerford, Volk & Ramsey (in [9]) state that science contains two main elements, namely as a process and as a product that complements each other in the pace of progress and development of science. Science as a process is a series of scientific activities or the results of observations of natural phenomena activities to produce scientific knowledge known as scientific products. Science products include facts, concepts, principles, generalizations, theories, laws and models that can be stated in several ways.

2.3. Science Learning in Elementary School

Elementary school (aka Sekolah Dasar or SD) is one of the important components in the Indonesian national education system which lasts for 6 (six) years and is a low-level formal education level that will determine the character formation of students in the future. The learning model that is suitable for elementary school children is learning through direct experience. This learning model strengthens children's memory because it uses learning tools and media that are easy to find in the child's environment [10]. The process of learning science in elementary schools tends to start from concrete things, viewing what is learned as a unified whole, integrated and through a manipulative process, so that science learning in elementary schools must be planned. Science knowledge is built in the minds of students by students starting from the process of observing, searching for information, and drawing conclusions.

3. Methods

This study applied Research and Development approach that focus on the production of science experiment media kits for elementary school students. More specifically, we adopted 4-D model [11] which consists of four stages: define, design, develop, and disseminate. In the define stage, we started with need assessment, reviewing science elementary school curriculum, and determining the scope of the media kits. In the design stage, we proposed the lay out the media kits and its accompanying modules, and expert judgement validation of the media kits and its modules. In the develop stage we revised and finalized the media kits and its modules according to the experts' recommendations. In the disseminate stage we are going to try-out the media kits and its modules to the target users at several schools.

3.1 Define stage

We conducted the need assessment to 4 (four) elementary schools in East Java and Central Java. Based on that activity, we found that all of those schools need mechanical media kits, electric and magnetic force media kits. We took these topics as the scope of the media kits development. We consulted with the elementary school science curriculum to define the main characteristics of the media kits and its modules.

3.2 Design stage

Equipped with the information from the previous stage we elaborated the design of the media kits and its modules. We proposed a compact design of mechanical experiment media kits which can accommodate a series of simple experiments. For the modules, consulting with the curriculum demands we develop the modules with emphasis on building up the students' scientific skills. Therefore, we chose the discovery learning or inquiry approach in designing the modules. A sample of the first media kits and its modules are depicted in Figures 1 and 2. The first draft of media kits and its accompanying modules were evaluated by expert judgements. For speeding up the evaluation process we adopted

evaluation rubrics from previous projects with some adjustment and modification [12] which basically applied 5-Likert scale.



Figure 1. First draft of mechanical experiment media kits

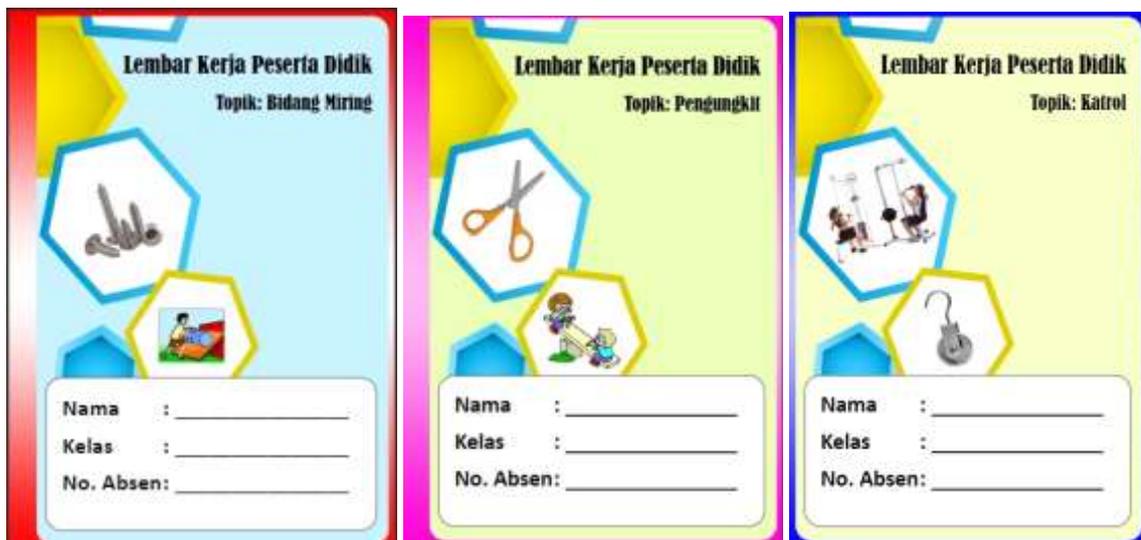


Figure 2. First draft of Mechanical experiment kits modules

3.3 Develop stage

Having the evaluation of the experts we are in the process of modifying the media kits and its accompanying modules according to the recommendation of the experts. The major revision that we had to make was to improve the media kits appearance and revised the accompanying modules to be more in line with scientific approach and STEM (science, technology, engineering, and mathematics) integration.

4. Progress and the next plan

The develop stage will be completed within the next two or three weeks, followed by the dissemination stage which will consist of a tried-out the media kits by the prospective users projected in the early up to mid of November. Soon after the analysis of the dissemination results, further modification and adjustment of the media kits, as well as its accompanying modules will be made according to the constructive comments from the users.

5. Conclusion

This study is progressing and soon will be completed. Attempting to bridge the gap between the reality and the expectation, this study will result in providing the needed science experiment media kits for elementary school students, especially Mechanical experiment. Assessing from the current progress, this result can be expected by mid of November 2021 up to early December 2021.

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