Koflusa learning media for static fluid

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Abstract. This study aims to analyze the feasibility of Koflusa (Kotak fluida statis) as a learning medium. The research method used is the development of ADDIE model which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The steps in this study are: 1) Analysis of curriculum, school needs, and media development requirements; 2) Making Koflusa learning media designs; 3) Realizing the Koflusa learning media designed; 4) Validation of experts; and 5) Revision of expert validation results. The results of this study indicate that Koflusa teaching aids are suitable for learning media with a percentage of 85.91%. The conclusion of this study is that Koflusa is suitable for use as a learning medium. This study recommends that further research was conducted to determine the effect of Koflusa on other variables such as the understanding of students' concepts.

1. Introduction

Physics according to Collate and Chiappetta [1] a body of knowledge, a way of thinking, and the way investigations. Physics is also a subject that is closely related to how to systematically find out natural phenomena [2]. In physics learning at school, students are not only enough to understand the concept of physics mathematically but also is able to understand basic concepts and how to solve a problem in a systematic way [3]. Physical materials, including static fluid material, are generally physical material that not only require a verbal understanding of concepts in the classroom, but also non-verbal skills. This requires students to carry out real learning in order to improve their understanding of the material being studied.

One way that can be used to overcome this problem is to use a variety of learning media that are varied and in accordance with the learning material being studied. The use of media in the learning process, especially teaching aids, can create abstract concepts into concrete, so as to motivate and improve understanding of the material being studied [4]. Learning media in the form of teaching aids can make an abstract concept to be concrete so that it can be reached with a simple, visible, and perceived mind [5]. Learning media can help students to experiment with key principles of combining existing knowledge with their own knowledge and reflecting on existing knowledge as their own knowledge [6]. In this regard, this study intends to develop a physical learning media on static fluid material as one of the alternative media in the process of learning physics in class.

One of the learning media that can be used during the physics learning process in static fluid material is Koflusa (Kotak fluida statis) which is the result of the development of *Science in Box* by Abdurrahman [7]. The reason for choosing Koflusa as a learning medium was made because the material used to make this learning media was easy to obtain, so that this learning media could be made by anyone including educators who teach in rural areas.
2. Methods
The type of research used is the research of the ADDIE model development which consists of five stages: Analyze, Design, Develop, Implement, and Evaluate [8]. The development was carried out in the form of making modified Koflusa from Science in Box. The making of Koflusa was based on the unavailability of static fluid props at the school where the study took place. Expert validation and revision of expert validation results have been conducted so that Koflusa is feasible to be implemented.

Participants from this study consisted of two expert lecturers as validators, one physics teacher as a validate, and 19 students of Bina Muda Cicalengka High School in West Java Province. More detailed students consist of: four students in class XI MIA B, five students in class XI MIA C, five students in class XI MIA D, and five students at class XI MIA F.

Expert validation and field testing using questionnaire with a number of statements based on guidelines for making physics teaching aids issued by the Ministry of Education and Culture [9]. The statement of the expert validation questionnaire consists of seven aspects, namely: linkages with teaching materials, suitability with the intellectual development of students, equipment durability, accuracy of tools, efficiency of tools, safety for students, and aesthetics. The statement of the field test questionnaire consists of four aspects, namely: implementation, continuity, suitability, and acceptance [10]. In addition to using the questionnaire, the field test also used the worksheets of students as practical instructions that were made according to the guidelines for making teaching materials [11]. Scores for expert validation questionnaire statements and field tests based on Likert scale [12] contained in Table 1.

| Category                | Score |
|-------------------------|-------|
| Strongly Agree (SA)     | 4     |
| Agree (A)               | 3     |
| Disagree (D)            | 2     |
| Strongly Disagree (SD)  | 1     |

The analysis technique of expert validation test is done by calculating the average score of each aspect [13]. Furthermore, the average score obtained is converted into eligibility criteria according to Wisdom [10]. The eligibility criteria referred to are listed in Table 2.

| No | Score Percentage | Category                  |
|----|------------------|---------------------------|
| 1  | 80% - 100%       | Valid / Decent            |
| 2  | 60% - 79.9%      | Fairly Valid / Fairly Worth|
| 3  | 40% - 59.9%      | Less Valid                |
| 4  | 0 - 39.9%        | Invalid / Not Eligible    |

3. Results and Discussion
Inadequate Koflusa development results can be seen in Figure 1. Koflusa is a learning medium made from materials around the environment that can explain six sub fluid static materials, namely: hydrostatic pressure, Pascal's Law, Archimedes Principle, surface tension, capillary symptoms, and associated vessels.
Based on aspects related to teaching materials, value of education, equipment resistance, tool efficiency, safety for students, and aesthetics, Koflusa learning media is categorized as feasible, while for accuracy aspects Koflusa learning media tools fall into the category quite decent. Expert validation results can be seen in Figure 2.

In the overall results of expert validation on Koflusa have a percentage of 85.91% and are included in the categories worthy of being used as learning media. The results of the validation of Koflusa learning media experts are in accordance with previous research which states that teaching aids are Science in Box suitable for use as learning media [7].

The results of field test analysis on aspects of implementation, compatibility with the environment, and acceptance and attractiveness indicate that Koflusa is suitable for learning media, while for the sustainability aspect Koflusa learning media is categorized as quite feasible. Based on these four aspects, Koflusa learning media as a whole is categorized as feasible with a percentage of eligibility of 85.33%. Interpretation of students' response analysis results is shown in Figure 3.
Based on the results of expert validation and the results of field tests, Koflusa is suitable for use as a learning medium. The results obtained from this study indicate that Koflusa meets the criteria as a medium of learning, namely: can change abstract concepts into concrete, improve understanding of material, and can help students to experiment with key principles of knowledge [4]–[6]. In addition, Koflusa can still be developed with several more improvements such as the use of basic materials from acrylic, so that it can be an effective props. The use of goods around the environment in the making of Koflusa proved to be effective in overcoming problems of learning media that often occurred in schools in the interior.

4. Conclusion
The conclusion of this study is that Koflusa props are suitable for use as learning media for static fluid material. The use of Koflusa is expected to be an alternative media for schools that have difficulties in procuring media for classroom learning.

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