Prototype of sliding whiteboard as physics learning media based on thinking processed review

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ABSTRACT

Whiteboard is one of the learning medias used by the teacher in classroom. It has a great role in physics teaching and learning process. As media of learning, a whiteboard also has an important role in students' thinking process. This paper discussed about the design of sliding whiteboard based on students' assimilation of thinking in information processing that written on the whiteboard. The result of sliding whiteboard designs served as a prototype. The prototype was made from 10 cm x 18 cm plywood and rope as a slider. This prototype is expected to became an alternative model in addition to fix stage or theater seat model. In addition, the whiteboard sliding model will be accompanied by a module and user manual. Impact of the prototype on student learning was discussed.

Keywords: assimilation, physics learning media, sliding whiteboard, thinking processes

1. Introduction

Choice of learning media as one of the learning component, could be one of the key aspects of a learning process. Each type of media has its certain characteristics that is necessary to be understand. With that of understanding one can critically select a suitable media that fit to the needs and conditions in the field (Wiratmojo & Sasonohardjo, 2002; Smaldino et al., 2011). A media is actually a tool to convey or delivers concept (Sudjana, 2005; Sadiman et al., 2009; Daryanto, 2010; Arsyad, 2010; Munadi, 2012) in a way that thinking process is involved (Daluz et al., 2011; Kristiyanto et al., 2015).

Along with the findings of the students' thought about the processing of information from the whiteboard, it is necessary to design a whiteboard that can maximize students' thinking process in order to process information. A whiteboard is a very functional media of learning, because it always available in every classrooms both in urban and rural areas or in any remote areas.

Usually, teachers or lecturers put less attention to the design of whiteboards used in teaching practice. The result might disrupt the learning process that should be understood by the students. In the case of low writing presentations where less supportive whiteboard use, some less proficiency students became discouraged to think and feel like they were left behind in learning compare to the rest of the students in their classroom (Cowan, 2010).

The assimilation of the thinking process has actually be done optimally. One way to increase the stimulation of the thinking process is accessing information (reading) on the whiteboard. Therefore, the information on the whiteboard should be intact, nothing is hindered, and the process of emerging the letters or writing should be able to be observed by students (Beacham et al., 2002; Kristiyanto, 2017).

The design of the whiteboards that fit into this thought process became essential. The whiteboard design could be either a fix-whiteboard or a sliding whiteboard. A research conducted by Kristiyanto et al. (2016) had develops an instruction manual on how to use the media based on the fix-whiteboard. Therefore, the appropriate design of learning media would help teachers or lecturers. If there is still a fix-whiteboard in classroom, we then recommend to replace one with the sliding board. This paper aims to describe the design of sliding whiteboard as a media of learning that suitable with the thinking process of students.

2. Materials and Methods

This study was conducted by reviewing the recommendations of the thinking process findings related to processing information presented through the whiteboard. The results of the study recommend the need for sliding whiteboard formulated in the form of the next sliding drawing design followed by the prototyping of the image design (Kristiyanto, 2017). This sliding prototype was made from 10 cm x 18 cm wooden plywood which acts as a blackboard, a thread that acts as a hook and a blackboard holder, wire as a directional rail to the whiteboard, as well as a nail as a pulley that can attach the yarn to move the board up or down (Figure 1). The design of this sliding prototype is also equipped with puppets that act as teachers and students. Evaluation the effective of the proposed sliding whiteboard design by observation form.
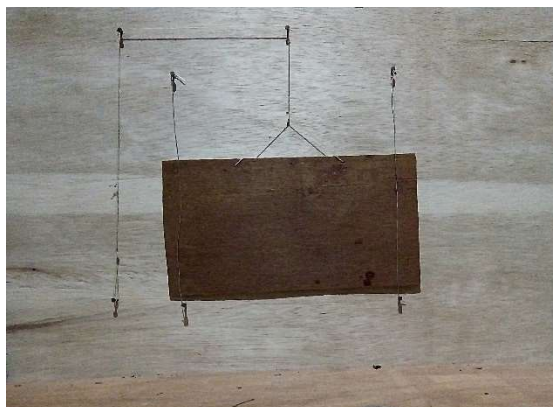

Figure 1. Prototype sliding board.

3. Results and Discussion

The effective of the proposed sliding whiteboard design was developed by thinking processed indicators. Fixing the students in processing the information about the writing on the whiteboard was hard if it was to use static or fix-whiteboard. When the teachers did the teaching practices, it would be difficult for them to overcome the problem. Besides the teachers, the students who sit in front could also prevent the students sitting behind them. To overcome this problem, there were several ways to do as follows:

1. *The classrooms need to be modified as the cinema/theater room model.*
   This design required the seats in the back row have be higher than the front row. The purpose of this design so that students who sit in the front row would not prevent students sitting behind them. There were a lot of classrooms using this model, but the teacher did blocks the information he wrote on the whiteboard. Turning a regular classroom into a cinema/theater model would require considerable time and cost.
2. *The seating arrangement (chairs) is arranged to become circle form.*
   This design produced a seating arrangement to form a semicircle with a whiteboard as the center of the circle. The purpose of this design did the same so that students do not obstruct their views on the process of the appearance of writing or letters on the whiteboard. In this kind of classroom model, the teacher did prevent the students to process the written information when writing on the whiteboard. This classroom model would be difficult to be created in Indonesia, because it would require a very wide space.
3. *Replace the fix-whiteboard with the sliding whiteboard.*
   Sliding whiteboard is a whiteboard that can be moved up and down as needed (Barany et al., 2011). The use of sliding whiteboard allows the teacher to raise the whiteboard so that the line of writing can be above the head of the teacher while writing, and making it visible to students. Replacement of a fix-whiteboard into sliding whiteboards was relatively easy and inexpensive because it only adds pulley and rail systems.

Based on the three solutions above sliding whiteboard was the easiest and cheapest solution. Sliding whiteboards only change the whiteboard instead of the room or the classroom seating arrangement. This paper aimed to describe the design of sliding whiteboard as a media of learning that suitable with the thinking process of the students.

Hamalik (1986) as cited in Arsyad (2010) suggests that the use of the learning media in the learning process can generate a new desire and interest, create motivation and stimulation of learning activities, and bring the psychological influences to the students. It was not only to motivate the students, but it even brings psychological influences for the students to prefer lessons even though it was not interesting at the first time.

This research begins with a search for constraints on the design of a whiteboard model on which can interfere with the students' thinking process in general (fix-board based). Based on the results of the research that has been done by Kristiyanto, et al. (2016), the use of whiteboard should be considered appropriate to support the students' thinking process. From the results of the study, it is not easy for all teachers to join it because of the pattern of teaching that has been commonly done by teachers with fix-whiteboard board-based. The shortage of whiteboard that already exist in the classrooms usually still not meet many aspects of the teaching and learning process. The shortcomings include the visual aspects that students still work on it, the inappropriate use of whiteboards by teachers. These things are the underlying things to design the sliding whiteboard.
The design phase begins with the search for the solutions to the fix-whiteboard problem. When there is a problem with the use of whiteboard, there will be another easier solution. The solution obtained is the design of sliding whiteboard model (Barany et al., 2011). The design of this study will use a whiteboard with its usage module. In this stage, the sample is made by drawing board design and miniature whiteboard by using styrofoam based on the recommendation of the research. In the development stage, the miniature of sliding whiteboard is made. In this phase the observation is done by looking at the possibility that there is a lack of a sliding board (Bauerlein, 2011).

Implementation stage is conducted also by observation by putting the miniatures of teacher and students, as shown in the Figure 2. It aims to predict how the condition of teaching will happen later, and also the process of writings in teacher still hindered or not, in assisting thinking process assimilation. Sliding whiteboard testing is done in the learning process. In this phase, there is also a test of execution using the form of implementation.

Figure 2. Simulation to use sliding whiteboard

Evaluation was done during the implementation phase. From the evaluation results, it will be seen whether sliding whiteboard is effectively used in the learning process or not.

4. Conclusion and Remarks

This prototype became one of the alternative models of solution besides the stage model of fixed board, as well as theater seating arrangement. The continuation of this research will be to make the standard sliding board slays in a real classroom setting, its usage module, and the influence test on student learning outcomes.

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