

Chapter 26

Development of Interactive Multimedia Learning Materials for Improving Critical Thinking Skills

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ABSTRACT

Learning materials offer students and teachers valuable assistance in physics lessons. This article was aimed at developing and evaluating interactive multimedia learning materials that are equipped with games in Linear Motion and Newton's Laws for improving critical thinking skills. The evaluation consists of an expert review, based on grades from four experts, practicality testing by 30 students, and effectiveness testing concerning students' critical thinking skills after they have used interactive multimedia learning materials. Thus, the research result shows that interactive multimedia learning materials are valid, practical, and effective. Based on this result, it appears that interactive multimedia learning materials can enhance students' critical thinking skills.

1. INTRODUCTION

Education has not been able to develop at the same pace that current technology develops. Today, rapid technological developments have caused students to become addicted, making them unable to separate from their gadgets for long periods of time. In addition, when students are addicted to technology, they

DOI: 10.4018/978-1-7998-3022-1.ch026

can have a greater preference for their gadgets than their textbooks. Based on students' behavior, it becomes clear who feels more comfortable when their books are left behind. In contrast, students can feel uncomfortable when their gadgets are left behind. For further evidence of students' addiction to technology, one can observe their level of interest in games, which is quite high, as evidenced by the students' frequent game playing outside of class. Based on a survey of 33 students, 43 percent indicated they often play games outside of class, which says that, instead of studying, students are using more of their leisure time to play games. Therefore, physics learning objectives will be difficult to achieve.

Based on Indonesia's 2013 curriculum, one of the physics learning objectives is to develop reasoning in inductive and deductive analysis to solve problems (Sunardi & Zenab, 2014). This objective shows that the 2013 curriculum emphasizes the development of students' critical thinking skills. Despite this, in Padang, the result of students' critical thinking skills measurement using the CCTST (California Critical Thinking Skill Test) showed that students' scores in each indicator is only 20-30 percent of an ideal score (Djamas, 2016).

To improve students' critical thinking skills, one effort can be made: using games in learning (Arifin, Akhdinirwanto, & Fatmaryanti, 2013; Frasca, 2001). Furthermore, Amory's (1999) research showed playing and learning are closely related. Students experience a pleasant sensation that is caused by educational games that can enhance learning effectiveness. Games can include three fun elements: fantasy, curiosity, and challenge. Computer games enhanced learning through visualization, experimentation, and creativity when playing; and when problem-solving is included, games can improve critical thinking skills (Amory, Naicker, Vincent, & Adams, 1999).

In addition to using games in learning, use of interactive multimedia can improve critical thinking skills. Interactive multimedia is reader-centered, enabling students to play an active role in deciding the way they learn (Bass, 2014), which can improve students' critical thinking skills (Ramanujam, 2010). Therefore, the aim of this research was to develop and evaluate interactive multimedia learning materials that are equipped with games for improving critical thinking skills.

2. LITERATURE REVIEW

2.1. Interactive Multimedia Learning Materials

Interactive multimedia learning materials combine various media, i.e., text, image, sound, video, animation, and simulation, and students can control the way they use them (Prastowo, 2011). Additionally, they can give students feedback, making students actively involved in learning. Although concepts in physics are abstract, animation and simulation of various phenomena and cases that are near students' daily lives can make them concrete for students to understand. In addition, videos in interactive multimedia learning materials can explain physics concepts that are poorly understood by students, enabling students to learn independently.

The interactive multimedia learning materials that were developed consist of a handout and student worksheet. The structure of the handout consists of Core Competencies (CC), Basic Competencies (BC), a description of lesson materials, questions, and references (Prastowo, 2011). The student worksheet consists of a lesson topic, class, semester, lesson guide, CC, BC, lesson indicators, lesson objectives, information about lesson materials, tools/materials that are needed in the lesson, procedures, and tasks or discussion materials (Prastowo, 2011).

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