Chapter 18
Visual Programming–Based Visual Learning Media to Learn Programming Technique With Fuzzy Rating

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ABSTRACT

Programming techniques is a difficult subject for the majority of students at vocational high schools in Indonesia. One of the problems is that the teaching-learning process still uses textual learning media with no interaction with students. Visual learning media offers some advantages to attract the attention of users, interact with users, involve users, and multimodal for users. Because of this, it is necessary to develop visual learning media to utilize visual programming to make it easier for students to understand programming techniques. The aims of this chapter are to determine the learning media feasibility utilizing visual programming to find the students' responses to utilizing visual learning media and to applying fuzzy rating for the feasibility and students' responses toward media learning based on visual programming. The research results showed that fuzzy preference can be applied to assess the learning media feasibility and students' responses to the use of visual learning media utilizing visual programming.

INTRODUCTION

The industrial revolution 4.0 that we are facing nowadays has an impact on the use of computers. As a result, the use of computers has become part of daily needs. Almost all human activities are related to computers. This can be seen from the progress of computers utilization in the sectors such as smart manufacturing sector, the internet of things (IoT) sector, industrial internet sector, and cloud-based manufacturing sector (Vaidya et al., 2018). Computer appearances have some types such as PCs, mobile

phones, tablets, laptops, iPads, etc. The varieties of computer devices make them easier for people to access data or information. This data or information, in the education area, is manifested in the form of learning material. The ease of delivering this learning material makes it easy to be accessed by students both during learning in the classroom and outside the classroom. Several studies have examined the use of these computer devices for learning. Utilizing mobile phones can assist the students to improve understanding and mastering in the course of speech signal processing learning material (Zhao et al., 2017). According to Pruet et al. (2014), using laptops and tablets makes it easy to access low-cost learning technology, to identify students' learning styles, and to find out students' attitudes towards tablet computers utilize and how these are related to their academic performance. The use of computers in education has also been growing rapidly. They can be manifested in the form of computer applications. These computer applications can be applied to support in the learning process of the students to comprehend a subject. Some researchers have used a computer application to assist the students in order to make easier to learning a subject. The subjects that has been investigated by some researchers are as follow: science (Barak et al., 2011; Rutten et al., 2012), robotic (Major, 2014), speech signal processing (Zhao et al., 2017), and computers programming (Kazimoglu et al., 2012; Claypool, 2013; Ouahbia et al., 2015).

In the learning process, it needs a learning material to teach in the class. Good learning material is able to attract students' attention and also able to motivate students to learn that learning material (Claypool, 2013). How to make a learning material is interesting for the students? One of the ways is by accompanied by a learning media. Learning media that are manifested in visual form will be more interesting when it compared to a learning media with just texts only or non-visual. Learning media using visuals can involve student motivation and interaction in learning. The computer application can be used as visual learning media. The manifestations of visual learning media based on the computer can be represented such as simulations, animations, and games. Each of these computer applications has the advantages to be applied to learning material. According to Barak et al. (2011), animation as learning media that implement to study the field of science can improve learning outcomes and motivate students. That matter is supported by Lin & Robert, (2011) which states that animation can assist learners' gain and retention of concepts and processes scientific. According to Major (2014), learning media in the form of computer simulation make it easier for students to understand the material of computer programming and also increase students' motivation to learn. According to Rutten et al (2012), learning using media computer simulation can improve learning processes and outcomes from students. Computer games that are used as learning media also own the capability to support students in the learning process. Computer games can be used as solutions to overcome the difficulties of learning in computer programming and increase students' motivation in the use of serious games in the learning process (Ouahbia et al., 2015). Computer games can also be used to develop capabilities in computer programming (Kazimoglu et al., 2012). Each learning media with this computer application has excellence specifications tailored to the material delivered to students.

Learning computer programming using conventional methods, there are still discovered that many learners perceive difficult to understand that subject. Learning to computer programming is recognized as being problematic for students (Thota & Richard, 2010). According to Ouahbia et al. (2015) stated that a number of researchers have put on record some difficulties encountered by students that learn concepts of basic programming. One of the records is computer programming learning that is considered a difficult subject and also the lack of learning media used by to assist in explaining the learning material. The existing media is still conventional consequently the students feel to be inconvenient to learn a subject if the media learning only based on textual learning. Therefore, it is needed learning media

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