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Development of Computer Assisted Instruction as a Means of Independent Learning

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Abstract: The rapid development of Science, Technology, and Arts (IPTEKS) affects the process of administering education can no longer be done conventionally. Learning methodologies need to adapt to technological developments so that they can be implemented efficiently and effectively. This challenges education experts to continue to learn in developing learning methods and strategies. How the learning process is carried out in a short time, and not always face-to-face between lecturers and students but getting the results as expected. One alternative to overcome this problem is to use computer-assisted instruction (CAI). This study aims to develop multi-media computer-assisted instruction (CAI) as a means of independent learning. This research is a research and development (R&D) research using the Multimedia Development Life Cycle method according to Luther (1994), which includes six stages of development, namely concept (concept), design (design), material collection, assembly (manufacture), testing (testing), and distribution (distribution). At the testing stage, an alpha test was carried out by experts, while at the distribution stage students were tested with indicators of usability, ease of use, ease of learning, and satisfaction. The conclusion from all aspects of validity, practicality, and feasibility testing, it can be ignored that the multimedia computer-assisted instruction (CAI) is valid, practical, and feasible to be used as a means of independent learning.

Keywords: *Multimedia; computer assisted instruction (CAI); self-learning.*

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INTRODUCTION

One form of innovation that is currently developing is educational technology. The increased use of technology in the classroom has been the focal point of several studies over the past decade (Murray & Rabiner, 2014, Kim, Baylen, Leh, & Lin, 2015; Ghareb & Mohammed, 2017;). Technology is in the form of new products developed by educational experts that provide convenience, especially in using various

existing equipment. Through the use of this technology, Lecturers and Students get very significant benefits related to learning practices and strategies, as an alternative to achieving learning efficiency and effectiveness, when technology is used consistently in the classroom (Eisenman, Edwards, and Cushman, 2015; Kim, Kim, Lee, Spector, & DeMeester, 2013).

Several research results that have been carried out prove that the integration of

technology that is applied correctly can significantly improve student achievement and increase student activeness in interactions with at-risk students (Kim. et al., 2013; Darling-Hammond, Zielezinski, & Goldman, 2014); Hilton, 2016; Collins & Halverson, 2018). The results showed that there were many advantages in the learning process using technology as a learning tool in collaboration with additional resources (Eady & Lockyer, 2013; Alaniz & Wilson, 2015; Hwang, Lai, & Wang, 2015; Bulman & Fairlie, 2016; Ghareb & Mohammed, 2017; Rose, Carter, Brown, & Shumway, 2017).

Currently the learning implementation process has changed from face-to-face learning to distance learning, changes in the implementation of learning have resulted in several problems such as educators who are not used to it, lack of interaction and difficulty in concentrating students during learning due to an environment that does not meet the standards in carrying out learning. The many problems that are felt by students during the distance learning process need to be balanced with media and materials that can help students in independent learning outside of lecture hours, because the most important principle in distance learning is that students must be able to manage their learning independently in the learning process. Distance learning is currently needed learning resources that can help students learn outside class hours, one of which is by using learning media that includes video, animation, text, images and sound.

One of the efforts that can be done by education experts is to utilize computer technology in the learning process or better known as Computer Assisted Instruction (CAI). In this case CAI can be interpreted as an activity file where students can interact with courses programmed on a computer, Lecturers/Teachers act as facilitators who act as supervisors and computers are learning environments (Abdullah & Mustafa, 2019; Soparat, Arnold & Klaysom, 2015). The use of CAI generally refers to any computer-accessible educational software from which students obtain information and exercises, as well as questions, to achieve specific learning

objectives in a computer system. Learning materials can be presented through the CAI program using various methods such as simulations, tutorials, games, problem solving, drill and practice, discovery, and inquiry (Heinich R: 1989).

Computer-assisted learning (CAI) is a key element of a technology-based learning environment that helps improve student achievement and build/enhance student motivation (Harandi, 2015). The use of computer-assisted instruction (CAI) is a complex method and allows students to interact with words and numbers which is much different from traditional written instruction (Sivaram & Ramar, 2014). With regard to this technology, many schools support the use of computer-assisted learning models (CAI). This can provide flexibility and more opportunities for lecturers to serve all students more effectively. One of the advantages is that students can choose the structure and pace of learning when using CAI in the classroom (Hudson, 2014). With the help of this computer program, lecturers can provide more opportunities for students to progress at their own pace, and can receive continuous feedback about their learning progress (Gardenhire, Diamond, Headlam, & Weiss, 2016). The presence and intensive interaction between lecturers and students has a very important meaning because students can convey the hopes and aspirations that these students want to achieve (Adebisi et al., 2015; Hudson, 2014).

The purpose of this study was to develop a learning media for Computer Assisted Instruction media which was developed to be tested to measure the feasibility of the media before it could be used in the implementation of learning.

METHOD

This research is a Research & Development (R&D) research using the Multimedia Development Life Cycle approach by Luther (1994). The development of this multimedia method is carried out based on six stages, namely concept (concept), design (design), collection of materials,

assembly (manufacture), testing (testing), and distribution (distribution).

The CAI multimedia trial was carried out by 6 experts, and the evaluation of the trial was carried out by 24 students of basic subjects. students conduct trials by sharing multimedia remotely (dare). Followed by the implementation of research

CAI interactive multimedia development is carried out by following the Luther (1994) method

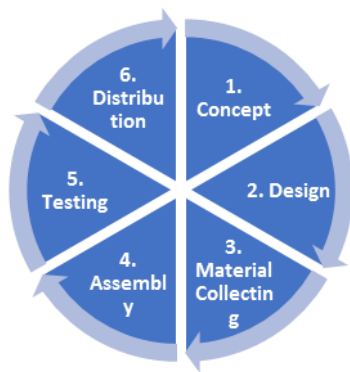


Figure 1. Research Stages According to Luther

Concept

At the concept stage, this is done by identifying the type of multimedia based on student characteristics, what problems occur in learning in computer basics courses, and how the expected learning outcomes of these courses.

Based on the concept stage, then multimedia with a branching structure is built, which requires students to complete each stage in learning based on the instructions that have been given in the multimedia

Design

At the design stage, design a storyboard to describe or describe each scene, with all multimedia objects and links to other scenes and flowcharts (flowcharts). The following is presented al.

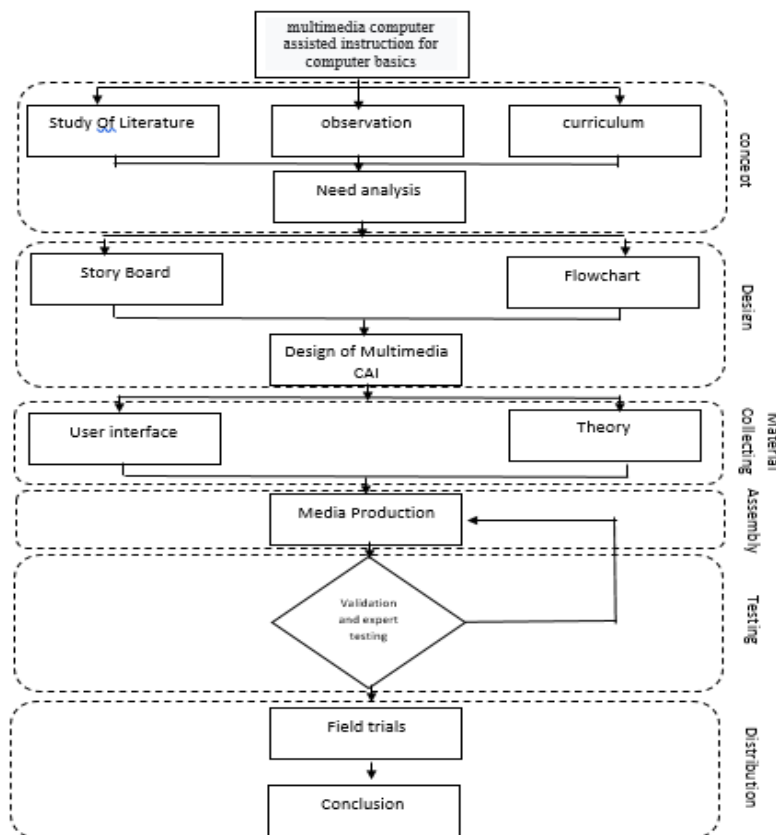


Figure 2. CAI Interactive Multimedia Development Design Using the Luther Method

Material collecting

The material collecting stage is carried out by collecting all material that is by the curriculum and related to basic computer lectures, besides that at this stage analysis is also carried out related to the needs of animation, sound, and video that support the development of CAI media.

Assembly

The assembly stage is the stage of making all multimedia objects or materials. Making multimedia based on storyboards, flowcharts, and navigation structures in accordance with the designs that have been made/planned.

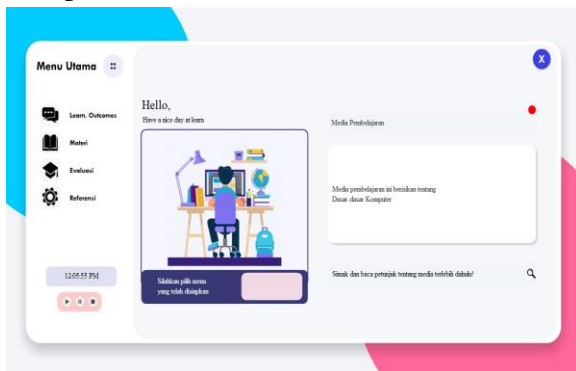


Figure 3. Interactive Multimedia Computer-Assisted Instruction

Testing

The testing phase (testing) is carried out after completing the assembly stage by running multimedia and evaluation, whether there is an error or not. The first stage at this stage is also called the alpha testing stage, which is tested by multimedia makers and other experts in the multimedia field to

measure the extent of the feasibility of the multimedia that has been developed.

RESULT AND DISCUSSION

Based on the results of trials conducted on the material aspect, the results obtained were 90% for the truth criteria (content validity), for the presentation category, the score was 86.67%, in the writing category it got a score of 86.67%, for the readability aspect of 90%, and the evaluation aspect obtained a score of 93.33%.

The test results on the media aspect for the display criteria obtained a score of 93.33%, the navigation aspect was 90%, the animation aspect received a score of 95%, for the audio and sound aspects obtained a score of 95%

Tabel 1. Mean Validity for Each Variable

NO	Variable Criteria	Average validity (%)
1	Theory	89
2	Media	93.3

Distribution

At this stage, an evaluation of the multimedia that has been developed is carried out by conducting tests on students who are taking computer basics courses. The results of the evaluations that have been carried out on these students are categorized into 4 categories, namely usefulness, ease to use, ease of learning, and satisfaction (Lund A.M, 2001)

Table 2. Performance Category

Confidence intervals (p=0.05) per scale						
Scale	Mean	Std. Dev.	N	Confidence	Confidence interval	
<i>Usefulness</i>	1.109	0.555	24	0.222	0.333	1.331
<i>Ease Of Use</i>	0.909	0.483	24	0.193	0.290	1.102
<i>Ease Of Learning</i>	0.958	0.565	24	0.226	0.339	1.184
<i>Satisfaction</i>	1.036	0.486	24	0.195	0.292	1.230

Practicability Test

For the practicality test results of each category has a value of ≥ 0.8 both from the aspects of usefulness, ease of use, ease of learning and satisfaction, it can be said to be very practical, in detail it can be presented in table 3 below:

Tabel 3. Practicability test results

Scale	Practicability	Information.
Usefulness	0.845	Very Practical
Ease Of Use	0.887	Very Practical
Ease Of Learning	0.852	Very Practical
Satisfaction	0.853	Very Practical

To further clarify the practical results of the product in the form of multimedia, the average value of each category is presented in the following graph

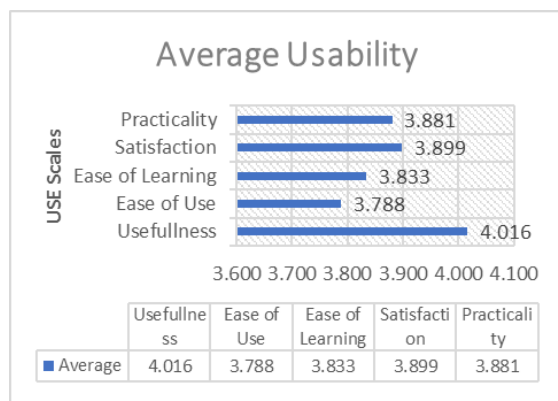


Figure 4. Graph of the Average Value of the Performance of the Practicability Test Findings

CONCLUSION AND RECOMMENDATION

The research that was carried out was developed using the Luther method, namely through 6 stages, namely concept, design, material collector, assembly, testing, distribution. The results of this study show the feasibility and practicality of the media developed through validity tests carried out with expert judgments, namely three material experts and 3 media experts, then proceed with the next step, namely practicality to measure the level of practicality used based on Lund AM (2001), namely concept, design, material collector, assembly, testing, distribution.

Based on the results of trials conducted on the developed media, CAI media can be implemented in learning. For further development, this research needs to be carried out with a larger number of experimental samples and test effectiveness to see how much influence the media has on learning outcomes.

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