Application of Computer Assisted Instruction to the Development of Hypermedia Learning

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Abstract. Hypermedia is a medium that has a composition of materials that are not sequential. Using integrated text, graphics, video, and audio elements in computer software is known as hypermedia, which can make it simpler for users to switch between different types of information. Because of this, institutions will use multimedia, particularly with students who are aspiring teachers, to emphasize the importance of having strong skills before entering the sector. The Covid-19 pandemic issue has also forced the field of education, particularly in learning, to adjust to the current circumstances. Where internet learning is still practiced. Implementing a new idea that facilitates the management of the educational process is therefore crucial. This study was done to construct learning hypermedia using computer assisted instruction (CAI), which is appropriate for use in learning, in order to alleviate these issues.

Keywords: Hypermedia, CAI, Learning

1 Introduction

Education is one of the ways humans need to achieve their life goals. Education plays a significant role in the development of personality, thinking, and human potential. Students are anticipated to be able to develop more capable and superior human beings through education. Many artists have contributed to the realm of education as a result of the advent of the information age, particularly in the creation of learning media. Computer-aided learning media, which relates to information technology and communication and is currently a concern in the field of education[1]. Computer-aided applications of many kinds have started to be employed in the learning process. Hypermedia is one of the computer-based educational resources that can be employed[3,7]. The use of hypermedia learning resources enables students to investigate a range of knowledge in their own way. The creation of hypermedia learning resources seeks to aid students in mastering previously studied content. In this study[4], there are several things that will be done, namely the creation of a learning hypermedia device by applying Computer Assisted Instruction and utilizing the Web which can equip students' creative thinking skills. With hypermedia learning, it is hoped that the delivery of material will be easier to accept than delivery using books or other tools[2,5].

2 Methods

The method used in researching the development of web-based hypermedia online is research and development[6]. This method is used to produce a specific product. The hypermedia development process uses a Four-D model consisting of 4 stages:
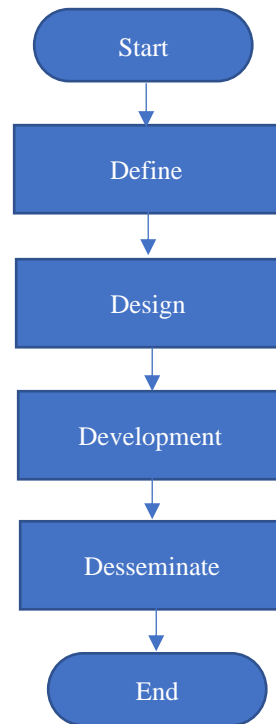

Fig. 1. 4D Development Research Procedure

a. Define

In this step, the needs of the learning hypermedia are ascertained, and various data regarding the developed learning media are gathered. Five tasks will be completed at this level, including front-end analysis, linear analysis, task analysis, idea analysis, and defining instructional objectives.

b. Design

This stage aims to design web-based learning hypermedia with reference to the defined stage. The result of this stage is in the form of a prototype by following the steps, namely: Initial design, media choice, format choice, and criterion-test construction.

c. Development

This stage is the final result, namely the revised learning hypermedia product based on the results of validation and trials. At this stage, there are two steps that will be carried out, namely: expert appraisal, developmental testing.

d.   Desseminate

This stage of hypermedia learning developed will be implemented in the Department of Electrical Engineering Education, especially for students.

3 Result

3.1 Prototyping Stage

With the use of hypermedia learning media, students do not have to bring equipment because the discussion of material on hypermedia learning media is equipped with various images, animations, and explanatory videos. The concept of hypermedia refers to two components namely: display and content. Computer Assisted Instruction (CAI) products are used as learning media that can be utilized by students.

Fig 2. Hypermedia learning page

3.2 Effectiveness of hypermedia

Learning hypermedia is the end result of this project. Students who post-test evaluate the usefulness of hypermedia. The results of the student post-test stated that 9 out of 12 students got a score of $> = 75$ which means that 75% of students passed and this hypermedia was effective to use. The following table shows how data from the pretest and posttest were:

Table 1. Data centralization and dissemination strategies

No	Data Centering and Dissemination	Pretest	Posttest
1	Lowest Value	37.5	87.5
2	Top Rated	25.0	62.5
3	Average	32.3	75.0
4	Median	37.5	75.0
5	Mood	37.5	75.0
6	Standard Deviation	6.4	9.2

Table 2. N-Gain test results

N-Gain	Value
Average	0.64
Category	keep

Based on the table above, it can be seen that the N-Gain test is 0.64 with a moderate category. The results of the questionnaire assessment stated that hypermedia is effective for use.

Table 3. Assessment of Aspects of Effectiveness

No	Indicators	Sum of values	Category
1	Achievement of learning objectives	11	Excellent
2	Ease of explaining teaching materials	11	Excellent
3	Ability to improve the understanding of the material	11	Excellent
Sum		31	Excellent

The maximum number of values of each indicator = 12
Maximum number of aspect values= 36

The three indicators show and conclude that hypermedia has a good effectiveness aspect.

Table 4. Assessment of Practicality Aspects

No	Indicators	Sum of values	Category
1	Ease of Use app instructions	44	Good
2	Ease of operation of hypermedia	40	Good
3	Operation of hypermedia in various environments	35	Good
4	Operation of hypermedia in various time variations	41	Good
	Sum	160	Good

The maximum number of values of each indicator = 12
Maximum number of aspect values= 192

4 Conclusion

Development of learning hypermedia learning media by utilizing CAI is a learning media in digital image processing courses packaged in the form of WEB. Hypermedia products are a viable alternative to traditional learning media for students. With the help of various visuals and tutorials, this hypermedia product may facilitate autonomous learning, make the learning process simpler, make the subject matter clearer, and enable students to learn at any time and from any location.

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