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Development Media Learning Based on Interactive Multimedia Using Macromedia Director MX

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Abstract
Improving the quality of education is a very important concrete element. in effort improvement quality resource man. In line with That, the thing that very important for noticed is a problem performance learning. Problems A common problem that is often faced by students, especially university students, is that there are still quite a lot of them who have not been able to achieve satisfactory learning achievements. The learning process at Gunadarma University extends beyond classroom sessions and also utilizes multimedia-based learning media. However, multimedia-based learning is one-way. Based on the problems above, interactive multimedia-based teaching materials were created. called learning media for basic concepts of Image Processing This application presents material interactively accompanied by animation, audio, video. and is equipped with evaluations in the form of practice questions. The results achieved from the creation of this learning media are that students can understand the Image Processing course. It is hoped that this application will facilitate the teaching and learning process and improve the quality of learning achievement.

INTRODUCTION

Improving the quality of education is Wrong One element concrete which is very important in efforts to improve the quality of human resources. In line with that, a very important thing to pay attention to is the issue of academic achievement. A common problem that often arises faced by participant educate (Kadarsih & Fitria, 2022).

In particular, there are still quite a lot of students who have not been able to achieve satisfactory academic performance (Beru Perangin-angin, 2017). In fact, there are many factors that cause academic performance to fail in the field academic Good factors that are within the student and factors that are outside the student, such as the level of intelligence low, lack of motivation learning, less effective learning methods, minimal frequency and amount of time for learning, low levels of self-discipline, learning media or teaching materials that there is still not enough provision from the campus and so on (Setyowati et al., 2020).

To achieve satisfactory learning outcomes, an increasingly advanced university education system supported by technological developments is essential (Raibowo et al., 2023). Multimedia technology promises great potential. in changing the way a person learns, to obtain information, adjust information And and so on (Anggraeni et al., 2021). Multimedia also provides opportunities for educators to develop learning techniques to produce maximum results (H. M. Manurung & Simaremare, 2022). Likewise For students, with multimedia it is hoped that it will be easier for them to determine what and how students can absorb information quickly and efficiently. Information sources It's no longer solely focused on textbook text, but goes beyond that (Putri et al., 2021). The increasingly sophisticated and evolving capabilities of multimedia technology will make it easier to obtain the information you need (Muslimah et al., 2025).

The Image Processing course is one of the subjects taught by Gunadarma University to undergraduate Information Systems students. Most of the material in the Image Processing course is delivered in class, and the media is still in the form of textbooks or downloads from the staff site. Therefore, the author conducted research to find out whether multimedia-based learning media can help student (Kuswanto et al., 2017).

Information Systems undergraduate students in understanding the Image Processing course, especially the basic concepts of image processing. Research data This will later become the basis for the author in developing interactive multimedia-based Image Processing learning media.

Preliminary research

Was conducted to collect data on the development of information and communication technology within Gunadarma University. This data is input the main thing background to the development of interactive multimedia-based Image Processing learning media, starting from various data and needs obtained through (Wardhana et al., 2021). preliminary research on the implementation of the development of interactive multimedia-based learning media materials (S. Manurung & Pangabean, 2017).

Based on preliminary research Which has writer do that the respondents' responses who stated that they strongly agree and agree regarding the need for the development of information and communication technology and the development of learning media for basic concepts of Image Processing, the total percentage is above 60% (Ningsih, 2023). This means that the need for interactive multimedia for the Image Processing course as a learning medium is very appropriate (Sukmaningrum et al., 2023).

Limitation Problem

In connection with this problem, then The author tries to create an interactive multimedia-based learning media application for the Image Processing course with material on basic concepts of Image Processing (Rachmadtullah et al., 2019). Discussion of the material This equipped with animation, video, Text and audio. This multimedia-based learning also includes practice questions, which students are expected to use to determine their understanding of the material (Fakhri et al., 2018).

Objective Study

The purpose of this research is to develop interactive multimedia-based teaching materials for the Image Processing course, specifically the basic concepts of Image Processing at Gunadarma University. This application is expected to facilitate the teaching and learning process and improve student achievement.

METHOD

This research is research and development (Research and Development) of learning media, specifically in the form of learning through materials. teach based multimedia Interactive learning materials for the Image Processing course on basic image processing concepts are more responsive or reactive than proactive (Septiani & Rejekiningsih, 2020). This means that they are a development of other teaching materials, complementing existing teaching materials (Dhanil & Mufit, 2021).

So, this isn't creating a completely new learning tool, as if interactive CDs or computer-based learning didn't already exist. Therefore, the research framework generally follows this sequence: collect data on the current state for needs diagnosis, analyze the data, develop and select alternative courses of action, test the new model, examine the response, collect new data for diagnosis, repeat the analysis and development process, and revise the model.

The dimensions of the development study in this proposal refer to the Gepart model, as quoted by Miarso (Darmawan, 2018)below:

1. The purpose of the study: to work on, create and find new solutions related to course tutorials. processing image on the basic concept material of Image Processing for student Gunadarma University.
2. The results of the study are something that can be applied, not only in the form of conceptual and procedural models, but also in the form of physical models.
3. The values to be achieved are in accordance with current advances in learning technology, namely in the form of interactive multimedia- based learning .
4. The impetus for conducting research is an innovation effort.
5. success criteria using performance standards include: effectiveness, efficiency, and attractiveness.

1. The conceptual basis is the operational teaching materials for the image processing course.
2. The paradigm used as a reference is approach effectiveness and relevance.
3. The assessment implementation process is as follows:
   a. Identification situation.
   b. Description alternative.
   c. Formulation solution.
   d. Design testing.

Research Stages and Steps

This research and development consists of three stage in where steps

The research refers to the R & D cycle of Borg and Gall (Setiawan et al., 2022) with an explanatory description that has been modified and aligned with the actual research objectives and conditions, as briefly described in Table 1.

Table 1.
Stages Model Development

Stage	Step	Activities
Pre Developer with Model	1	Research and data collection beginning Study introduction Compilation of results study Introduction Analysis need Design model
Developer with Model	2	**Making material teaching -based multimedia interactive.** - Creating Structure Navigation and design page - Create a script (frame) program -Record narrative and edit it with Adobe programs Audition 3 in studio audio visual - Record video intro with technique

		blue screen (screen) blue) using Mini DV camera. Process taking picture done in studio audio visual - Edit background back (blue) screen with use Adobe programs Premiere Pro. - Record video Tutorial on how to use the operating system service
Evaluation of Model 3	Evaluation of Model 3	Image Processing with Blue Berry Flash Back
Implementation of Model 4	Implementation of Model 4	-Converting AVI video format to Flash Video (FLV) file format using Xilisoft Video Converter
Revision of Model 5	Revision of Model 5	-Creating a basic concept application

Discussion

Analysis Problem

Learning Which using technology information and communication or using multimedia is called interactive multimedia-based learning media. The use of This learning media is intended to assist lecturers in delivering material and also help students understand it. Furthermore, the content of the lesson can be modified to be more engaging and understandable, challenging objectives become easier, and stressful learning environments become more enjoyable (Faridi & Saleh, 2018). Using multimedia-based learning media can integrate various media into the learning process. so process learning will develop well, thus helping lecturers create interactive presentation patterns (Fang & Chen, 2021).

The learning process at Gunadarma University is not limited to classroom meetings but also utilizes various supporting media. These include interactive multimedia (interactive CDs and e-learning), CD-ROMs containing e-books of course materials. provided to students, TV edu via Gunadarma University's local television channel, and the internet in the form of a website that provides course materials that students can download. While these media make it easier for students to access course materials, the learning provided is one-way (Yulianci et al., 2021).

Image Processing course is one of the materials taught by University Gunadarma to undergraduate students majoring in Information Systems. Most of the material in the Image Processing course is presented in class, particularly the basic concepts of Image Processing (Pratiwi et al., 2023).

In addition, from previous research conducted on the development of information and communication technology to improve the quality of education, it was found that students need other teaching materials that can help the learning process. student. Material teach This in the form of media learning based interactive multimedia such as computer applications based learning that the author is currently using for (S. R. Manurung, 2020).

Solution Problem

Based on the analysis of the problems above, the results showed that the use of interactive multimedia-based teaching materials is very necessary in helping the student learning process, especially for the Image Processing course regarding the basic concepts of Image Processing (Lokoc et al., 2018).

To solve this problem, the author developed an interactive multimedia-based learning medium called the Basic Concepts of Image Processing Learning Media. This application contains a course on basic concepts of image processing presented in a computer-based learning format that includes programmed tutorials and drills and practices (Aini & Mufit, 2022).

Design of Learning Media Applications for Basic Concepts of Image Processing

Design Structure Navigation

Navigation structure is the structure or flow of a program (navigation) which is a design of the relationships and work chains of several different areas and can help organize all the elements in this application. Navigation structure The one used in this program is a mixed Navigation Structure, which is a combination from the structure linear, non-linear, and hierarchical (Hayati et al., 2025). The reason for using this mixed navigation structure is due to the highly interactive nature of this navigation structure, where will produce application which allows users to freely browse this application program.

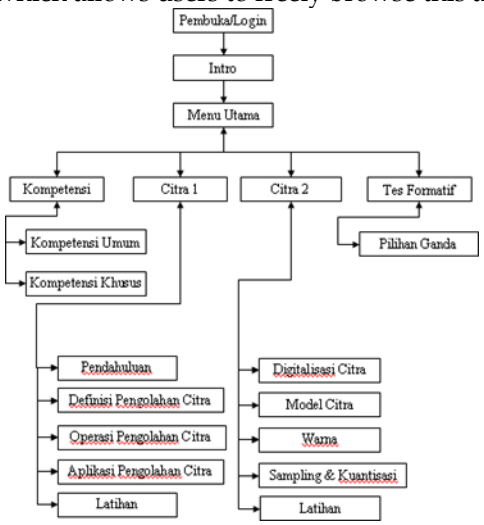

Figure 1. Navigation Structure

In designing this application page, there will be a display of the opening page, login page, main menu page, competency page, material page, practice instructions page, practice page, multiple choice formative test page, practice results page, multiple choice formative test results page. Starting from the Opening Page display symbol Gunadarma, then go to the Login Page which provides text input for the username (Hadisaputra et al., 2019). The next page is the Main Menu Page which Contains the Competency button, the image 1 sub-material buttons, the image 2 sub-material buttons, and the formative test buttons. If the competency button is pressed, the page will appear. competence, buttons The sub-material is used to display the material page and the Multiple Choice Formative Test button will display the Multiple Choice Formative Test page (Tajuddien & Faroh, 2021). The instructions page will appear before the practice page and on the Multiple Choice Formative Test page. After the questions on the practice page and the Multiple Choice Formative Test have been answered, the practice results page will appear. multiple choice formative test results page (Syahr et al., 2025).

Narrative Recording of Basic Concepts of Processing Material

The process of recording narratives for basic concept material on Image Processing is carried out in lab audio visual At Gunadarma University, the device used was Adobe Audition 3. The recorded narration

was based on a previously created script (frame). After the recording process was complete, the resulting audio was inserted into the Learning Media application for Basic Image Processing Concepts.

Video Creation for Intro Page

The intro video features a presenter providing an introduction to the Basic Concepts of Image Processing Learning Media application. The filming was conducted in the Gunadarma University audiovisual lab using blue screen techniques. Narration Which read out presenter, based on the script (frames that have been made previously. The equipment used in making the video is 1 Mini DV Camera, 2 pieces lighting and a blue cloth measuring 7 m long and 4 m wide as a backdrop. After the shooting process was completed, the resulting video was edited using a video editing program. Adobe Premiere Pro to replace the blue background with a background image (Mudinillah, 2019).

Making Video Tutorial

In the image processing operations section, there's a video tutorial on how to manipulate an image to make it look better, using the image processing operation in question. The Blue Berry Flash Back program was used to create the video tutorial.

Creating a Learning Media Application for Basic Concepts of Image Processing

Creating applications using Macromedia Director MX 2004, Macromedia Fireworks and Flash 8 with design Which made based on page design. The resulting file is named learning_media.exe (Tiarasari, 2021).

Page Opener

The creation of this opening page was designed in Flash 8 software which consists of from movie clip that displays an animation of the Gunadarma emblem (Praheto et al., 2020). Here are the steps for creating the opening page:

1. Create a new flash file with a size of 800x600 pixels
2. Change the background color to purple
3. Create a movieclip Logo_mc containing the Gunadarma logo
4. Insert the Gunadarma symbol image and Windows start up sound by pressing file > import > import to library
5. Create an animation of the Gunadarma logo in the middle of the screen where the animation shrinks and then enlarges, placed on the main timeline, at the end of the frame, add the action script Stop();to stop the movement.
6. After creating the logo animation, then import it into Macromedia Director.

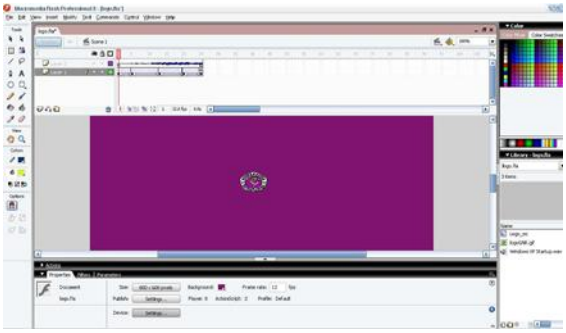

Figure 2. Making Opening Page

login page is created in Macromedia Director based on a previously created design in Macromedia Fireworks, then imported into the cast member for the learning media creation stage. Here are the steps to create the login page:

1. 1.Insert or import the Login page background that has been created in Macromedia Fireworks into the Macromedia Director cast member.
2. Enter or import Mozart music into the cast members in the same way as the first step

3. Create a Text Field to input names on the page Login by clicking Insert then selecting Control and selecting Field after That set the position of the text field.
4. Create an ENTER button using a rounded-cornered box with a black and white gradient by clicking Insert, then selecting Control, and then Push Button. Then, right-click on the button and select Script to code the script contained within it on mouse Up me go "Hello" end

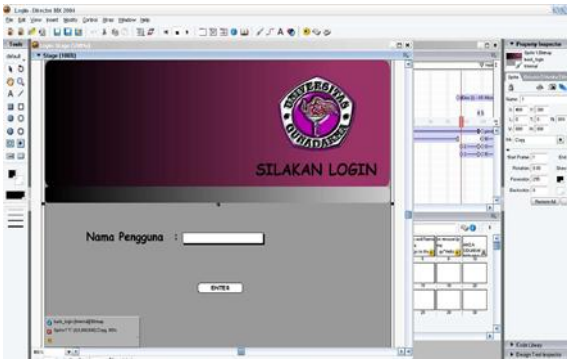

Figure 3. Making Page Login

Page Intro

Creating an intro page in Macromedia Director MX is based on a previously created design. Here are the steps to create an intro page :

1. Inserting a background image for learning media that was previously created in Macromedia Fireworks.
2. Then insert the previously edited intro video and insert the accompanying music called backsound.mp3 in the cast member, then drag everything to the score.window so that the timeline can be set.
3. After that, create a start button to connect the link between the intro page and the main page.

Figure 4. Making Intro Page

Page Menu Main

The main menu page consists of the main page background that was previously created in Macromedia Fireworks, then the menu button, competency button, image1 button, image2 button, test button and shortcut buttons that were previously created in Flash 8 (Sugiyanto et al., 2022). The following is how to design it. and creating the main page in Macromedia Director (Umbara et al., 2021):

1. Enter or import the main page background, back sound music "backsound.mp3", necessary buttons, animations and sound effects into the cast member.
2. Once everything is entered into the cast member, move them one by one into the score window, adjust the frames and timeline. The stage window will then display the scene.
3. We give these buttons script code, which is shown as a link to the next page (frame) or movie. On each of them knob button contains script code as follows:

a. Button Menu:
on mouse Up me puppet sound 3,"click" go frame "menu"end
b. Button Competence:
on mouse Up me puppet sound 3,"click" go frame "Competence" end
c. Button Image 1, Image2 and Formative Tests:
on mouse Up me puppet sound 3,"click" go movie "image1/image2/test" end
d. Button Exit:
on mouse Up me puppet sound 3,"click" stop end

In the button script image1, image2 and test formative That meaning to move movies.

4. On all the shortcut keys that There is each We provide the script code as follows:

```
//Introduction on mouse Up me
puppet sound 3,"click"
go frame "pend1" of movie "citra1"
end
//Definition Processing Citra on mouse Up me
puppet sound 3,"click" go frame "def" of movie
"citra1" end
//Operation Processing Citra on mouse Up me
puppet sound 3,"click" go frame "open" of movie
"citra1" end
//Application Processing Citra on mouse Up me
puppet sound 3,"click"

go frame "app" of movie "citra1"
end
//Digitalization Citra on mouse Up me
puppet sound 3,"click" go frame "dig" of movie
"citra2" end
//Model Image on mouse Up me
puppet sound 3,"click" go frame "mod" of movie
"citra2" end
//Color
on mouse Up me puppet sound 3,"click" go frame "war" of movie
"citra2" end
//Sampling And Quantization on mouse Up me
puppet sound 3,"click" go frame "samp" of movie
"citra2" end
//Choice double And Practice on mouse Up me
puppet sound 3,"click" go frame "test" of movie
"test formative" end
```

5. To create a volume slider, or volume control, first draw a long line and a small circle. This circle will act as the slider button. Then, adjust the frame and timeline. Then, select the Library icon from the toolbar and select Media > Sound. Select “Channel Volume Slider” by clicking and dragging on the small circle (slider button) that was created earlier, then set the parameter properties (Azriati et al., 2020).

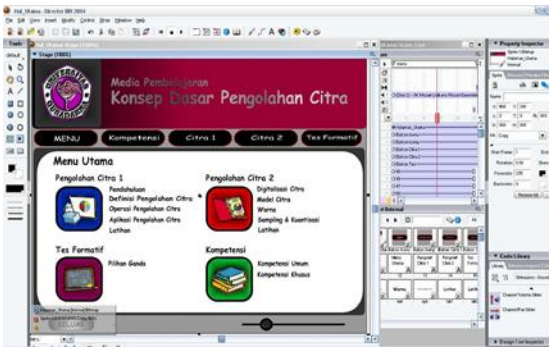

Figure 5. Making Page Main course

Trial Research on the Results of Developing Interactive Multimedia-Based Learning Media for Image Processing Courses After several stages of making this learning media, the next step is done study test results for the basic concepts of Image Processing course (Melati, 2023). The purpose of this study was to determine whether the interactive multimedia-based material on basic concepts of Image Processing met students' learning needs (Dwiana et al., 2021).

However, before the application of interactive multimedia-based learning media This is used for research, so a formative evaluation must first be conducted. Formative evaluation is a procedure used to test the benefits of a product. In product development research, it is necessary to carry out formative and summative evaluations in a learning media application. Each evaluation needs to be conducted during the design and development stages. Formative evaluations are conducted to determine the extent to which where students can use the application. Summative evaluation is carried out to measure effectiveness Study using the application. Evaluations can also be conducted to measure the extent of student knowledge retention after learning this application.

In the development of interactive multimedia-based learning media This previously been formative evaluation was carried out by the author, which included:

1.Study expert material

Study of learning media application material for basic concepts of image processing done Dr. Karmilasari, SKom.MM. as an expert on Image Processing. The results of the expert's study indicate that the application of learning media on basic Image Processing concepts is good and suitable for use.

2.Study expert media

The study of media application for learning basic concepts of Image Processing was conducted by Dr. Widyo Nugroho, MM as a media expert (media development). The results of the media expert's study explain that the application The learning media for basic concepts of Image Processing is good and suitable for use. Then, a trial of the multimedia-based learning media development for the Image Processing course was conducted on 30 Gunadarma University students, specifically undergraduate Information Systems students. This test was conducted with the aim of determining quality of multimedia applications, determining the effectiveness of basic concepts of Image Processing, display feasibility, user interaction strategies, and program interaction strategies.

CONCLUSION

Based on the previous results and discussion, it can be concluded that: This interactive multimedia-based learning media can be a supplement for students even though it is only an option. but it can also be used to increase knowledge, insight, especially regarding the Image Processing course on the material Basic Concepts of Image Processing, facilitate the learning process teaching and improving quality of learning and learning achievement. The results of filling out a questionnaire from 30 respondents regarding the quality of the material display, material presentation, user interaction, program interaction and design aspects stated that the average presentation of more than 50% of all aspects of the application display was good.

Suggestion

The creation of this interactive multimedia-based learning media is still in the development stage, so it is not yet perfect, both in terms of design and the interactivity of the material. Application instructions and exercises should be provided for users. added so that use and understanding to material get better.

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Author Contributions

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Conflicts of Interest

This research is conducted to provide information to the public regarding the research that has been conducted so that it can be used for educational purposes. in addition, this research is used by researchers for lecturer performance loads and accreditation needs of study program and institutions

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