Interactive Multimedia for Educational Technology Master Students

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Abstract. This research aims to develop interactive multimedia for boosting the learning outcomes of Master of Educational Technology students at Universitas Negeri Surabaya. Analysis, Design, Development, Implementation, and Evaluation (ADDIE) is a model for creating interactive multimedia. Collecting data on student learning outcomes before and after using interactive multimedia, evaluating the effectiveness of interactive multimedia, and identifying areas for improvement are the objectives of this study. The study's findings indicate that generating interactive multimedia based on the ADDIE model has the potential to significantly improve the learning outcomes of students pursuing a master's in educational technology. Multimedia can deliver engaging and dynamic learning content, increase student involvement, and support achieving predetermined learning objectives. This study contributes significantly to developing interactive multimedia as a practical learning aid, and its implications for enhancing student learning outcomes are positive. Using the ADDIE paradigm, the steps of Analysis, design, development, implementation, and Evaluation may be arranged to ensure the production and execution of interactive multimedia based on learning objectives and requirements.

Keywords: Interactive Multimedia; Educational Technology; Student

1 Introduction

1.1 A Subsection Sample

Education is one of the most essential components in a country's progress. Education has changed due to technical advancements and the use of information and communication technology [1], [2]. Interactive multimedia technology is one of the significant innovations in the world of education [3], [4], Providing users with a more attractive, dynamic, and successful learning experience. The Master in Educational Technology Study Program at Universitas Negeri Surabaya (UNESA) seeks to generate competent graduates in developing and applying educational technology. As a result, this research aims to close this gap and provide relevant and effective interactive multimedia to improve the learning outcomes of UNESA Masters in Educational Technology students. The advancement of education has been relatively quick because it can assist learning at any time and from any location [5], [6]. Several fundamental reasons un-

M. Salimi et al. (eds.), *Proceedings of the 7th International Conference on Learning Innovation and Quality Education (ICLIQE 2023)*, Advances in Social Science, Education and Humanities Research 873,
https://doi.org/10.2991/978-2-38476-301-6_3

derpin the need for interactive multimedia in learning to improve learning outcomes. Education is changing and adapting to technological advancements in an increasingly technologically advanced world. Traditional learning approaches, which are limited to lectures and printed materials, are frequently insufficient to address the different learning demands of students and hold their attention. Formal learning is boring and does not encourage student participation. It highlights the significance of using interactive multimedia in the context of learning.

Interactive multimedia combines technology with learning, resulting in a more engaging, interactive, and effective learning experience for students [3], [7]. The 'Analysis' component of the ADDIE research technique is a critical first step in developing interactive multimedia. During the analysis phase, the researchers will research the students' learning requirements in-depth. Everything begins with Analysis, the first and most crucial process [8], [9]. The researchers will also conduct a literature study, a learning theory search, and a search for successful learning principles. To ensure that the development of interactive multimedia fulfills the learning needs, researchers must understand the content of the learning materials and pay particular attention to the structure and sequence of appropriate teaching. With interactive multimedia, students can learn using the most effective approaches, such as visual, aural, or kinesthetic learning. Interactive multimedia can fulfill varied learning demands [10], [11] and create more meaningful possibilities to attain optimal learning outcomes by varying the delivery of learning materials [12], [13]. After completing an interactive assignment or activity, students can receive immediate feedback. It aids in correcting incorrect understandings and enables a continuous learning process.

Students pursuing a Master of Educational Technology at Universitas Negeri Surabaya find the creation of interactive multimedia extremely beneficial to their education. Students at the Master's level require a more thorough and sophisticated approach to learning. Interactive multimedia can help offer more profound knowledge and solve more complex problems by improving conceptual comprehension and supporting students in acquiring higher levels of critical and analytical thinking. In this project, it is expected that the production of interactive multimedia tailored to the needs of Educational Technology Master's students at Universitas Negeri Surabaya will improve their learning outcomes. By presenting compelling and dynamic instructional content, this multimedia can encourage students to participate in their learning actively [14], [15]. They can investigate, solve problems, and interact directly with learning material. Furthermore, developing interactive multimedia may create a more realistic and contextualized learning environment. Students can participate in environments similar to real-world events using multimedia components like video simulations, interactive case studies, and virtual-based simulations. It aids in the development of better comprehension and the application of knowledge in relevant situations. The presentation of interactive multimedia on smartphone devices allows students to access and carry it wherever they go [16], [17]. Students pursuing an Educational Technology Master's degree at UNESA can significantly improve their learning outcomes by generating interactive multimedia. Interactive multimedia provides an engaging, dynamic, and adaptive learning technique that matches the digital age's technological breakthroughs and learning requirements. Students are expected to improve

their conceptual comprehension [18], [19], active involvement, and optimal learning outcomes in their study context by utilizing relevant and effective multimedia technologies [20], [21]. Several theories and approaches can be used to plan and build effective interactive multimedia in the context of developing interactive multimedia. Hopefully, the study's development of relevant and effective interactive multimedia will improve the learning outcomes of UNESA students pursuing a master's degree in educational technology. Furthermore, the findings of this study are expected to serve as a reference and guide for the development of interactive multimedia in Indonesian higher education.

2 Method

The research method used in this study adopts the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) [22], [23]. This model comprises five interconnected stages to develop and evaluate the efficiency of interactive multimedia in enhancing the learning outcomes of Educational Technology master's students at Surabaya State University. This investigation will adhere to the ADDIE paradigm, which describes the phases of interactive multimedia development. The ADDIE model's steps of development are exceedingly intricate [24], [25]. Data will be collected through observation, surveys, and learning achievement exams. The data will be examined subjectively and statistically to determine the efficacy of interactive multimedia in enhancing the learning outcomes of UNESA Master of Educational Technology students. This research involved UNESA students pursuing a master's degree in educational technology as respondents. Through interactive multimedia, it is believed that the outcomes of this study would significantly contribute to improving the learning quality of Educational Technology Masters students at UNESA. Through the use of effective and relevant interactive multimedia, it is believed that students would be more actively engaged in the learning process, increase their conceptual knowledge, and achieve better learning outcomes.

The Analysis begins by identifying student learning needs and interactive multimedia-based learning objectives. The study considers the user's characteristics and the learning environment, in addition to determining the contents and concepts that will be incorporated into interactive multimedia. Second, an interactive multimedia structure is constructed during the Design phase based on analyzing the learning objectives and needs. Effective layout, navigation, and user interface are achieved at this level. The type and application of multimedia elements such as graphics, animation, video, and music are also determined. Scripts and storyboards are also developed to demonstrate the working of interactive multimedia visually. Based on the design established in the Concept phase, the Development step creates interactive multimedia. Educational content includes relevant multimedia components. Furthermore, interactive multimedia is assessed regularly and updated based on input. Ensure that interactive multimedia is accessible and available in the classroom [26], [27]. Furthermore, the Implementation phase incorporates interactive multimedia in the teaching process of UNESA's Master of Education in Educational Technology students. Lecturers and

students also use this interactive multimedia. The effectiveness of interactive multimedia in improving student learning outcomes is evaluated in the final step, Evaluation. They gather information on student learning outcomes before and after using interactive multimedia. Evaluation data analysis is used to assess interactive multimedia's success and identify improvement areas.

3 Results and Discussion

This product development results in interactive multimedia intended for students of the Master's program in Educational Technology, Universitas Negeri Surabaya. Interactive multimedia can improve student learning [28], [29]. Tertiary education product requirements drive the development of interactive multimedia goods. Product development in interactive multimedia is critical for education and can dramatically increase students' learning outcomes [30], [31]. The stages of creating interactive multimedia products are outlined below using the ADDIE model

3.1 Analysis

The 'Analysis' component of the ADDIE research technique is a critical first step in developing interactive multimedia. During the analysis phase, the researchers will research the students' learning requirements in-depth. It entails gathering information about the learning themes, the competencies to be attained, and the difficulties students have understanding the learning material. Everything begins with Analysis, the first and most crucial process [8], [32]. The researchers will also perform a literature review, learning theory, and effective learning principles search. The resources and concepts that comprise the interactive multimedia are discovered during the analysis phase. Researchers must comprehend the content of the learning materials and pay close attention to the structure and sequence of suitable teaching to ensure that interactive multimedia development meets the learning needs. Furthermore, while doing the Analysis, it is vital to consider the characteristics of the users, specifically the Master's degree applicants in Educational Technology who attend UNESA.

Learners' preferred methods of technology use, levels of comprehension, and learning styles are crucial information for researchers to have. Using this information to construct interactive multimedia depending on the tastes and characteristics of users will be helpful. Additionally, a review of the classroom setting takes place at this point. When developing and implementing interactive multimedia, it is necessary to consider the learning environment, the resources at one's disposal, and any potential constraints and roadblocks. The development of interactive multimedia that may be applied in real-world situations requires first gaining an understanding of the learning environment. Researchers can understand student learning requirements, learning objectives, resources and concepts to be incorporated, user characteristics, and learning scenarios during the study phase. Students enrolled in the Master of Educational Technology program at Universitas Negeri Surabaya will benefit from having this expertise as it will serve as a firm foundation for effective planning and development of interactive multimedia that fits the program's requirements.

3.2 Design

Following the Analysis step in developing interactive multimedia comes the Design stage, which is essential in its own right. During this phase, interactive multimedia structures are built based on a previous assessment of the specified needs and learning goals. These studies are conducted before this phase begins. The development of this layout entails positioning multimedia elements, text, buttons, and navigation in a planned manner to provide a user experience that is both user-friendly and effective. As a result, Understanding and applying interactive multimedia will become more straightforward for students. In addition, after the design process has begun, the significant concentration will shift to the navigational layout. Because of the efficient navigation, students can move between different parts of interactive multimedia in a simple and natural way. The design phase of the product development project is the phase in which planning takes place [33], [34].

A good user interface will have elements like icons, buttons, colors, and contrast, making it easy for people to engage with interactive multimedia [35], [36]. The learning goals should be reflected in the user interface design, and the target audience's characteristics should be considered. Multimedia features like graphics, animation, video, and music are also decided upon and implemented now. Examples of supplementary media include using animation or video to explain complex concepts, images or graphics to illustrate those concepts, and audio to provide further explanations or examples. The design process also includes the creation of any necessary storyboards or scripts. The purpose of this script/storyboard is to describe or show the operation of interactive multimedia. The Build phase aims to create an effective interactive multimedia framework by analyzing learning goals and needs. Master's degree students in Educational Technology at Universitas Negeri Surabaya can benefit from the development of interactive multimedia by adhering to best practices in content organization, navigation design, user interface design, and the selection and integration of appropriate multimedia elements.

3.3 Development

The Development step of the ADDIE process is the actual implementation of the initial design. The created design creates interactive multimedia at this stage. The learning information obtained during the analysis step is initially blended with appropriate multimedia elements. It creates interactive multimedia by combining text, graphics, animation, video, audio, and user input. Each multimedia piece is carefully chosen to support teaching objectives and improve student comprehension [37], [38]. Following the construction of interactive multimedia, testing is carried out to assure quality and functioning. Iterative testing is performed, beginning with internal testing by the developer and moving to test by a representative sample of students or consumers. This test is designed to identify potential vulnerabilities, errors, and other issues with interactive multimedia.

The developer validates the product with media specialists utilizing interactive multimedia. Based on the media professionals' Evaluation, a score of 92.05 percent

was determined. This score can be categorized as valid. Therefore, the interactive media developed is valid. In addition to quantitative data, the developer obtains qualitative data in the form of input from media experts regarding interactive multimedia, such as (1) Buttons should be given a soft color to match the characteristics of master students; (2) Developed interactive multimedia would be enhanced by the inclusion of images that complement the content; and (3) The developer obtains qualitative data in the form of input from media experts regarding interactive multimedia, such as (1) Buttons should be given a soft color to match the characteristics of master students; (2) Developed interactive multimedia would be enhanced by the inclusion The next validation step conducted by the developer is to solicit the opinion of a material expert. The 90.30 percent collected based on the Evaluation of material specialists for interactive multimedia was classified as valid. To produce more effective interactive multimedia, the developer obtained qualitative and quantitative data from subject matter experts. Material specialists have determined that interactive multimedia is compatible with photographic content and can advance to the subsequent level.

3.4 Implementation

Students at Universitas Negeri Surabaya who are pursuing Master's degrees in Educational Technology make use of interactive multimedia during the learning process as part of the Implementation phase of the ADDIE technique. The responsible lecturer also incorporates interactive multimedia into the learning process. The instructor is responsible for introducing students to interactive forms of multimedia and explaining how these forms of multimedia might support educational goals. Students have easy access to interactive multimedia resources, and those resources are readily available in the classrooms that they are currently in [39], [40]. In addition, lecturers can provide students with detailed instructions on accessing and using interactive multimedia while in a learning environment.

Individual student trials are the next phase for the developer. As interactive multimedia user targets, three pupils were evaluated individually. A valid category score of 88.5% was obtained and included in the results of the individual tests. The following recommendations and feedback were gleaned from the developer's trials: 1) Interactive multimedia can assist students in completing projects assigned by instructors; 2) the interactive multimedia that has been developed is excellent, but more examples of models for the development of media that can be used are needed; and 3) interactive multimedia can assist all students in learning the development of media and learning resources and can be used with a variety of instructional methods. The designers conducted small group studies. The developer selects six students as targets for small-group experiments. The small group trials yielded 85 percent correct data. These numbers are classifiable into legitimate groups. In addition to numerical data, the developer received feedback from small groups, including 1) interesting applications and increased student enthusiasm for learning, 2) some students wanted all learning materials to include interactive multimedia, and 3) developed interactive multimedia that could aid them in learning materials.

Field testing is the fifth step in the developer's process. During the field trial phase, 25 students supplied the developer with comments. The developed interactive multimedia is rated as valid with an 81.6 percent score. Based on the developer's evaluations, the generated interactive multimedia may be characterized as interactive multimedia suited for evaluating the development of media and learning materials. The developer collects information from material specialists, media experts, individual trials, small group tests, and field trials to determine the practicability and effectiveness of this interactive multimedia. Material specialists, media experts, and test subjects ensure the generated items' validity and usability. Students edit the generated interactive multimedia based on the feedback of media specialists, subject matter experts, and other students. The improvements made by the developer are advantageous so that the developed interactive multimedia can be significantly enhanced and suitable for instructional use. In addition to the developer's validity and feasibility tests, the effectiveness of the interactive multimedia must also be assessed. The relevance of interactive multimedia is established by comparing the pre-test and post-test learning outcomes of students and the validity, practicability, and efficacy of interactive multimedia.

3.5 Evaluation

The ADDIE paradigm was used to assess the efficiency of interactive multimedia in improving the learning outcomes of Universitas Negeri Surabaya master's students in Educational Technology. The learning outcomes data was thoroughly evaluated. Learning outcomes were compared before and after using interactive multimedia, and a significant improvement was found. This evaluation process tries to confirm that interactive multimedia offers the promised learning outcomes and benefits. [41], [42]. The developer uses SPSS-based testing and analyses to determine the product's effectiveness under development. It demonstrates significant differences in students' learning results before and after using interactive multimedia.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest - Posttest	-23.95833	5.31183	1.08427	-26.20132	-21.71534	-22.096	23	.000

Fig. 1. Paired Samples Test

4 Conclusion

According to a study conducted at Universitas Negeri Surabaya on the development of interactive multimedia to improve the learning outcomes of Master of Educational Technology students, interactive multimedia has significant potential to improve learning outcomes. This study follows the Analysis, Design, Development, Implementation, and Evaluation processes. The Analysis Phase supports defining student

learning requirements and objectives through interactive multimedia. The layout, navigation, user interface, and exploitation of relevant multimedia elements are considered when designing interactive multimedia. The Construction Phase comprises interactive multimedia based on the designs generated, including incorporating learning content and testing and improving it iteratively. The Implementation Phase includes incorporating interactive multimedia into the learning process of Master of Educational Technology students. Interactive multimedia is easily accessible and available in the classroom, and both instructors and students use it. The effectiveness of interactive multimedia in improving learning outcomes is assessed during the Evaluation Phase. They are gathering and evaluating assessment data to gauge the success of interactive multimedia and areas for development. The development of interactive multimedia has the potential to dramatically improve the learning outcomes of Master of Educational Technology students at Universitas Negeri Surabaya, according to this study. Multimedia can deliver engaging and interactive learning materials, increase student engagement, and aid in achieving predetermined learning objectives

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