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Development of Interactive Learning Media Based on Educational Websites Using the Rapid Application Development (RAD) Method and Group Pretest-Posttest Design

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A B S T R A C T

This research aims to develop interactive learning media based on educational websites to improve student understanding of the Informatics and Computer Technology course at the Islamic Communication and Broadcasting Study Program, IAIN Kendari. The method used is Rapid Application Development (RAD) for media development and Group Pretest-Posttest experimental design to measure media effectiveness. The results of the study showed a significant increase in student understanding after using this media, which was reflected in the comparison of Pre-test and Post-test scores. The development of Google Sites-based media with multimedia elements is expected to improve the quality of learning. The study also suggests the integration of VR, AR, and AI technologies for further development.

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INTRODUCTION

The rapid development of digital technology has changed almost all aspects of life, including in the world of education. Education is an academic process that aims to build and strengthen social, moral, cultural, and religious values. Basically, education is a form of communication that is structured and designed to encourage lecture activities for students. To achieve this goal, the lecture process must take place effectively and efficiently so that students are able to absorb information and knowledge optimally (Nuraeni, T., Rukmana, K., & Hanifah, N, 2025).

Technological advances have provided many conveniences, in the Islamic Communication and Broadcasting Study Program (KPI) IAIN Kendari, limitations are still found in the use of interactive learning media. The Informatics and Computer Technology course, which is supposed to be a means to develop students' digital skills, still relies on conventional methods that are one-way and do not utilize modern technology. This has the potential to hinder the mastery of digital skills that are urgently needed in today's digital communication era.

The development of interactive learning media based on educational websites based on Google Sites is expected to be able to answer the challenges in the current learning process. This effort aims to make learning in the Islamic Communication and Broadcasting Study Program more interesting, encourage participation, and be in line with technological developments. The presence of interactive media not only helps students understand the material more deeply, but also hone the practical skills they need to face the growing demands of the world of work towards digitalization.

Therefore, the development of educational website-based learning media in the Informatics and Computer Technology course at the Islamic Communication and Broadcasting Study Program IAIN Kendari is expected to make a real contribution to improving the quality of learning, expanding student creativity, and creating a learning environment that is more collaborative and relevant to the needs of the times. (Suryaningrat, R. R., Basrowi, B., & Rahmadani, K, 2023)

THEORETICAL REVIEW

Google Sites

Google Sites is a free platform provided by Google to create websites quickly without the need for programming skills. The service supports the creation of various types of sites, from public pages, corporate intranets, to private portals, and integrates with the Google ecosystem such as Google Docs, Sheets, and Drive. Thanks to its convenience, Google Sites is a relevant choice for students, educators, professionals, and MSME actors in developing blogs, portfolios, and learning media (Aminah, N., Amami, S., Wahyuni, I., & Rosita, C. D., 2021)

Canva Site

Canva Sites is a feature in Canva designed to help users create and publish one-page websites visually without the need for programming skills. Through the drag-and-drop editor and various available templates, this feature makes it

easy to create simple sites for personal needs, portfolios, as well as promotional needs or the creation of interactive learning media (Prihatin, A., Nurdiani, N., & Tresnawati, C, 2024)

Website

A website is a collection of digital pages that are interconnected and can be accessed through the internet. Each page is in a single domain and usually contains a variety of information, from text, images, videos, to interactive elements. In general, websites can be static presenting information that is either unchanging or dynamic, allowing users to interact and their content to be updated in real-time. (Anggara, B., Anshor, A. H., & Hadikristanto, W., 2024)

Rapid Application Development (RAD)

The Rapid Application Development (RAD) methodology is a widely used approach in information systems development because it allows the application development process to take place faster through a series of iterations and continuous feedback. RAD emphasizes short development cycles by utilizing component development as its primary strategy. Conceptually, RAD can be seen as a rapid adaptation of the traditional waterfall model , but with greater flexibility in each stage of its development (Kelvin & Amalia, 2022).

METHODOLOGY

This research aims to develop an interactive learning media based on an educational website using the Rapid Application Development (RAD) approach and the research design of the Pretest-Posttest Group. This methodology was chosen because it provides ease in rapid software development and allows researchers to measure the effectiveness of learning media developed through experimental design. In this section, we will explain in detail the two main methods used in this study, namely RAD and Group Pretest-Posttest design, as well as how they are implemented in this study.

Rapid Application Development

Rapid Application Development (RAD) is a software development methodology that focuses on accelerating the system development process through direct user involvement, both at the design and testing stages. This approach typically includes four main stages: (1) needs planning, (2) design, (3) development as well as testing, and (4) implementation. The main goal of RAD is to speed up prototyping so that changing user needs can be accommodated with lower risk. In this study, RAD is used to develop an interactive educational website efficiently, while opening up space for direct feedback from users as a basis for continuous improvement.

Group Pretest-Postest Design

The Group Pretest–Posttest experimental design is a research approach used to assess the changes that arise after a group receives a certain treatment. In this design, there were two groups: the experimental group that received

treatment in the form of the use of interactive learning media based on educational websites, and the control group that did not receive the treatment. Before the treatment was given, both groups underwent a pretest to measure initial ability. After that, the experimental group received a treatment, then all participants were tested again through a posttest to see the difference in results after the intervention. Through this design, researchers can evaluate the extent to which web-based interactive learning media has an effect on improving students' abilities (Kohan, N., Navabi, N., Motlagh, M. K., & Ahmadinia, F., 2024)

RESEARCH RESULTS

In the process of developing educational website-based learning media using the Rapid Application Development (RAD) method and Group Pretest–Posttest Design is used to measure the success of educational websites in improving student understanding.

Rapid Application Development (RAD)

The development of the system using the Rapid Application Development (RAD) method is carried out through four main stages that are mutually sustainable. Each stage has a strategic role in ensuring that the software engineering process runs faster, adaptive, and responsive to user needs. The four stages include:

Requirements Planning

Needs planning begins with an initial consultation with the Head of KPI Study Program to identify learning problems, media needs, and determine the limits of relevant digital media development. This stage is continued with class observation and RPS analysis of ICT courses to map basic competencies, core materials, and suitability of learning outcomes that need to be strengthened through interactive media. Furthermore, the researcher disseminated a survey of student needs through Google Form to explore their learning style, device limitations, media type preferences, and their level of understanding of ICT materials. The survey data is then analyzed to formulate essential features that must be presented in the media, such as the use of videos, quizzes, interactive slides, or cross-platform integration. Based on these findings, the researcher began to compile functional and non-functional needs as the basis for designing the media to be developed.

Design

The initial design of the media was carried out by compiling the content structure and navigation flow of the website that was adjusted to the RPS as well as the findings of the survey of student needs. Once the navigation framework is prepared, relevant learning materials are prepared and documented in the form of screenshots of the drafting process. The next stage focuses on the development of visual designs, including creating graphic elements, icons, page layouts, and color palette selection through the help of platforms such as Canva and Pinterest to ensure a systematic and easy-to-understand look, as well as wireframes as an

initial design framework that maps the structure of each part of the website before it enters the final production stage.

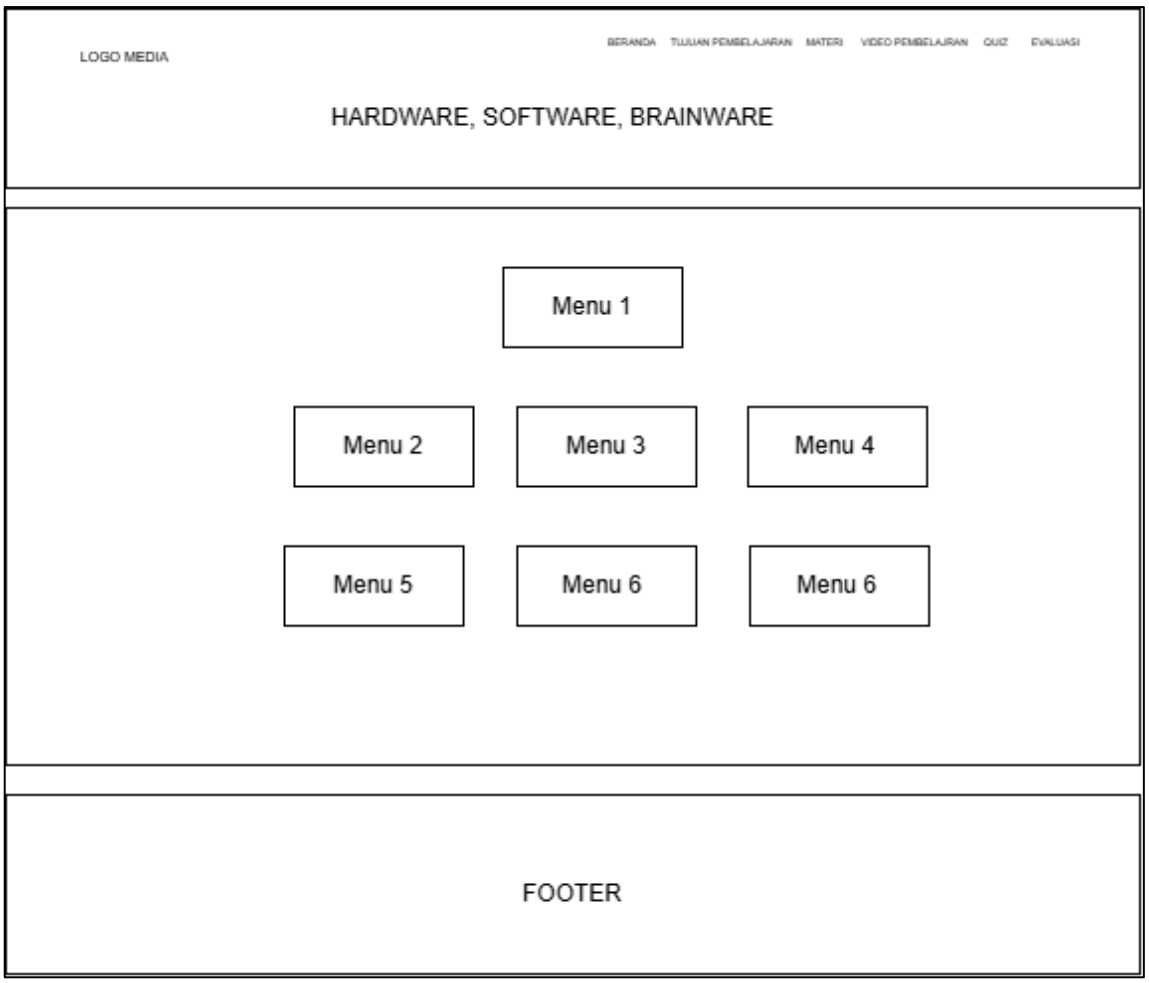

Figure 1. Wireframe Educational Website Design

System Development and Testing

Media development is carried out through the creation of a Google Site-based educational website that contains main menus such as homepages, materials, quizzes, evaluations, and videos. The core content presented includes material about hardware, software, and brainware that is systematically arranged according to learning needs. In addition to the website, learning videos, supporting graphic elements, and interactive quizzes using Kahoot were also developed to increase student engagement. After all components are completed, a functionality test is carried out using the blackbox method Testing is carried out to assess the compatibility between the input provided and the output generated by the software without checking the code structure in it. This process is usually placed in the final stages of development to ensure that the software functions optimally and is able to execute the features it was designed for (Nurfauziah, H., & Jamaliyah, I., 2022).

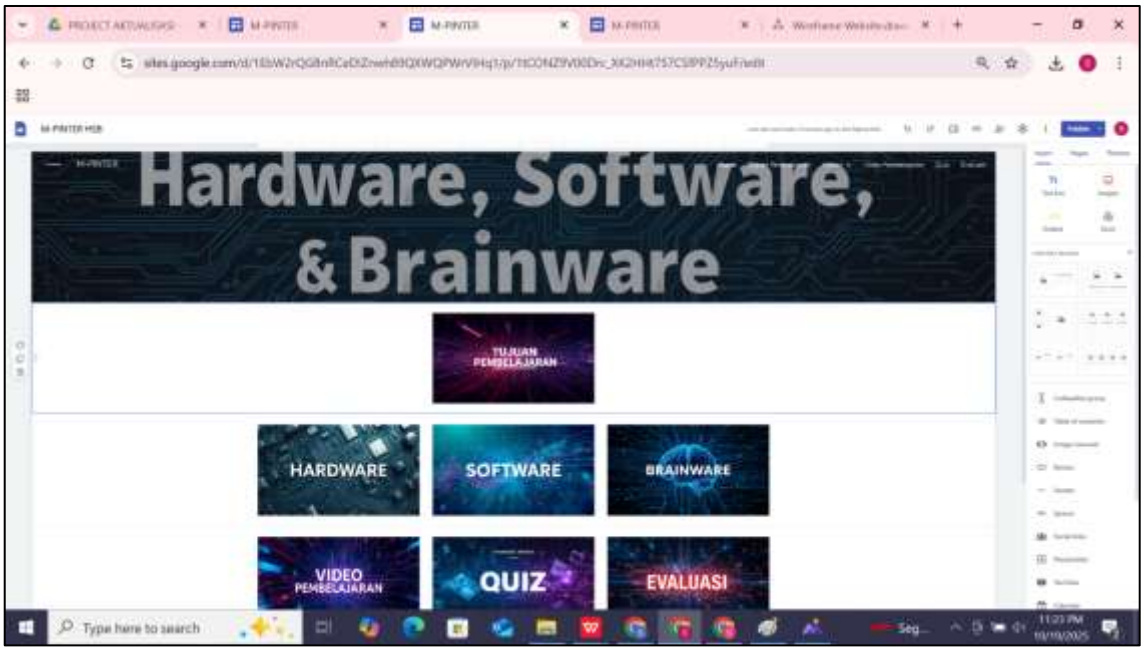

Figure 2. Educational Website Design

Table 1. Test the Functionality of Educational Websites

No.	Indicator	Conclusion of Observation Results
Functionality in general		
1	Is the website accessible properly using multiple browsers (Chrome, Firefox, Safari, Edge)?	Yes, it is well accessible in various browsers √
2	Is the website accessible on multiple devices (desktop, tablet, smartphone)?	Yes, it is well accessible on various devices √
3	Is the website accessible well at various screen resolutions?	Yes, the website is well accessible at various screen resolutions √
4	Is the website looking consistent across browsers and devices?	Yes, the website looks consistent across different browsers and devices √
5	Is the website accessible using a different internet connection (Wi-Fi, mobile data, etc)?	Yes, the website can be accessed using a different internet connection (Wi-Fi, mobile data, etc) √
Navigation and User Interface (UI)		
1	Is every link on the website clickable and leads to the appropriate page?	Yes, every link on the website can be clicked and leads to the same page as √
2	Are the buttons on the website working correctly (e.g., send	Yes, it works well √

	button, login button, navigation button)?	
3	Does the navigation menu work well and lead to the right page?	Yes, the navigation works well √
4	Are all UI elements clearly visible and usable without any visual distractions?	Yes, all are clearly visible and used without visual distractions √
5	Are all images and icons loaded correctly and not distorted?	Yes, all work fine √
6	Can the text be read clearly without having to zoom in?	Yes, everything can be read clearly √

Implementation

The implementation of the research begins with a Pre-Test to map the initial ability of students before using the developed media. After that, interactive learning media is implemented in the learning process so that students can interact directly with the material that has been designed. The next stage is the evaluation of learning through digital questions that have been provided on the website, to see the extent to which students understand the material after using interactive learning media. At the end of the series, a Post-Test is carried out and the results are compared with the Pre-Test to assess the effectiveness of the learning media used.

Group Pretest-Postest Design

To be able to see the success of interactive learning media based on educational websites, it is necessary to have a Pretest-Postets Design Group so that the successful implementation of educational websites can be seen. Based on the Group Pretest–Posttest experimental design, the comparison of Pre Test and Post Test scores of KPI Study Program students in ICT courses showed significant differences after using interactive learning media based on educational websites. After conducting the initial test (Pre test) and conducting the post test, there was a significant increase in Post Test results compared to the Pre Test, especially in the group of students whose Post Test scores were more in the higher score range (70-100). This illustrates that treatment with educational website-based learning media has a positive effect on improving student understanding in ICT courses, in accordance with the findings in the research of Kohan et al. (2024).

DISCUSSION

The results of the study showed that there was a significant change in learning outcomes between students' Pre Test and Post Test scores after the use of interactive learning media based on educational websites in ICT courses. The pattern of grade distribution illustrates that before the intervention, students were in a diverse range of initial abilities and tended to be concentrated in the middle to lower grade category. This shows that students' initial understanding

of ICT materials is still limited, both in terms of basic concepts and technical skills.

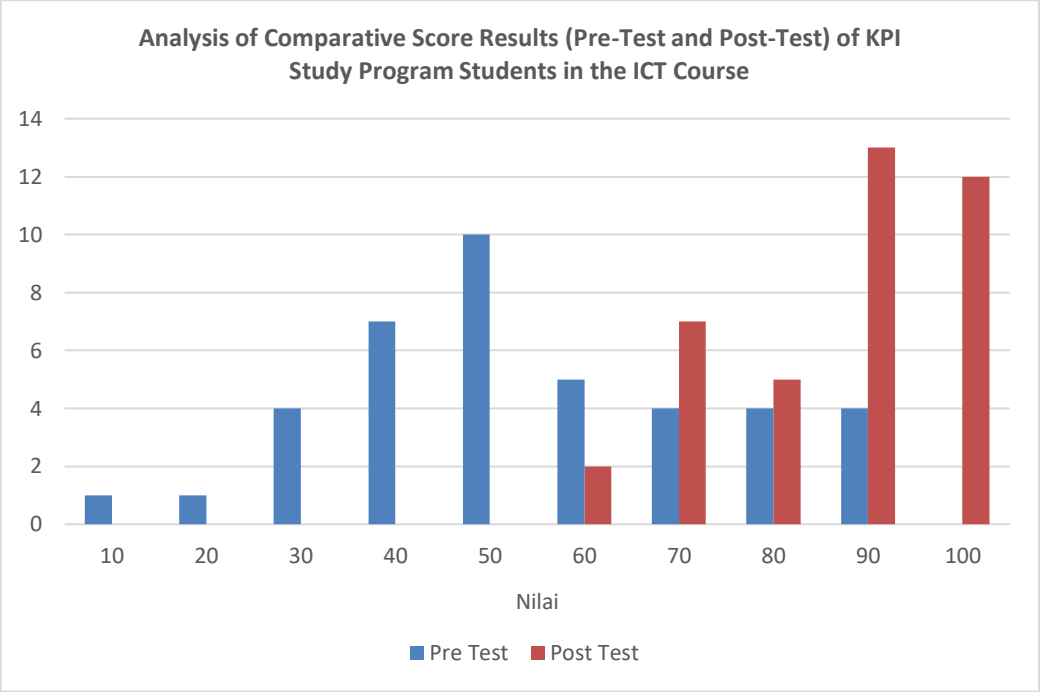

Figure 3. Results of Score Comparison (Pretest and Posttest)

Overall, the results of the study show that the use of interactive learning media based on educational websites has a real positive impact on students' academic achievements, especially in understanding the basic concepts of ICT. The shift in values towards a higher category not only marks the success of the media developed, but also shows the importance of integrating digital technology in the learning process in the modern era. This finding also confirms that learning media innovation is a relevant and effective pedagogical strategy to improve student competence in technology-oriented courses.

CONCLUSIONS AND RECOMMENDATIONS

This study shows that the use of interactive learning media based on educational websites has a real influence on improving student learning outcomes in ICT courses. A comparison of Pre Test and Post Test achievements shows a shift in ability from diverse initial understanding to higher and consistent final mastery. This increasing trend indicates that interactive media is able to provide a more effective learning process through visual, structured, and easily accessible materials.

Other research results confirm that website-based media not only encourages motivation and independence to learn, but also increases students' active participation in understanding the material. The combination of digital materials, learning videos, interactive quizzes, and online evaluations provides a more adaptive learning experience that meets the needs of the digital age. Thus, the use of this media not only strengthens students' ICT literacy, but also shows

that technology-based learning approaches have strong relevance in improving the quality of learning in higher education.

The recommendations for the development of research and interactive learning media are as follows:

1. Development of Learning Media based on Virtual Reality (VR), Augmented Reality (AR) and Artificial Intelligence (AI)
2. Creating periodic training for teachers or lecturers in order to develop digital-based interactive learning media optimally
3. Adequate infrastructure support

FURTHER STUDY

This study shows that interactive learning media based on educational websites has a positive influence on improving student learning outcomes in ICT courses. This can be seen from the comparison of Pre Test and Post Test achievements which showed a significant improvement in material understanding. This media not only increases students' understanding, but also increases their motivation, learning independence, and active participation in the learning process. However, there are obstacles in terms of unstable network access, which can interfere with the smooth use of the media. Therefore, further research is recommended to integrate learning media based on Virtual Reality (VR), Augmented Reality (AR), or artificial intelligence (AI) technology to improve the quality of student learning experience, as well as overcome problems related to the limitations of existing network infrastructure.

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