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DEVELOPMENT OF WEB-BASED INTERACTIVE LEARNING MEDIA ON BASIC COMPUTER NETWORK ENGINEERING MATERIALS AND MEASURING INSTRUMENTS IN THE DEPARTMENT OF COMPUTER NETWORK ENGINEERING

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Abstract-In the current digital era, it has been greatly influenced by the rapid progress of information technology. For example, the use of interactive web-based learning media is one of the innovations that is currently developing rapidly. This study is to develop interactive web-based learning media using the Google Sites platform on the Basic Computer Network Engineering and Measuring Instruments material in the Computer Network Technology Department. This study uses the research and development (R&D) method using the ADDIE (Analysis, Design, Development, Implementation, Evaluate) research model. The results of the assessment from media experts got a score of 97.3% in the very feasible category while the assessment from material experts got a score of 92% in the very feasible category and the product trial to respondents (students) was divided into two groups, namely the small group got a score of 88.5% in the very feasible category and the large group trial got a score of 93.5% in the very feasible category

Keywords: Learning Media, Web, Google Sites Platform, ADDIE

I. INTRODUCTION

In today's digital era, it has been greatly influenced by the rapid progress of information technology. For example, the use of interactive web-based learning media is one of the innovations that is currently developing rapidly [1]. This media allows students to interact directly with learning materials in the form of simulations, animations, and videos that can be accessed online anytime and anywhere. The use of this media not only improves the quality of learning, but also allows students to study independently at home [2]. In Vocational High Schools (SMK), the subject of Basic Computer and Telecommunication Network Engineering (DDTJKT) is included in the basic material of computer network engineering and measuring instruments, especially in class X. Components such as computer network installation, IP address configuration, and Local Area Network (LAN) require a deep understanding. However, the lack of visual and interactive media that can help students understand abstract concepts about basic computer networks causes many students to have difficulty understanding these concepts. SMK has a strong orientation to the world of work, with the aim that its graduates are ready to work immediately [3]. However. vocational schools located in remote areas, such as in Trenggalek Regency which has geographical challenges, often face limited access to modern learning resources. This further widens the gap in students' understanding of material that requires visual and practical understanding, such as computer networks [4]. The use of web-based learning media has been shown to be beneficial for improving students' understanding of complex material [5], especially when the platform supports the integration of various types of media. Google Sites is one of the free platforms that allows teachers to create simple but functional interactive websites [6]. This website allows teachers to display learning materials in text, image, video, and interactive simulation formats [7]. In addition, this platform supports the distribution of relevant links and files so that students can access the content anytime and anywhere. It is expected that the use of Google Sites for basic computer network engineering and measuring instrument learning materials at SMK Negeri 1 Suruh will help students understand technical concepts that require in- depth visualization, such as network installation, LAN configuration, and the working principles of computer networks [8].

II. RESEARCH AND METHOD

This research is included in research and development (R&D). R&D research is a scientific method for examining, designing, producing, and testing the validation of products that have been produced [9]. This research procedure adapts the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation. This research uses qualitative and quantitative data analysis. Qualitative data was obtained from input from material experts, media experts and student respondes during the validation stage [10]. However, quantitative data shows the results of product development, which is an interactive learning media created using the Google Sites platform. To process quantitative responses from the questionnaire, data was presented in percentages using a Likert scale[11], arranged in the form of statements followed by five responses. The measurement scale for development research was modified by Riduwan. If quantitative analysis is required.

Table I Assessment Score for Answers

No	Assesment Score	Rating Scale
1	5	Very Good
2	4	Good
3	3	Enough
4	2	Less
5	1	Very less

Source: Riduwan, 2014

The score obtained from the assessed aspects is then calculated using the following formula:

$$Eligibility\ Percentage = \frac{Total\ Analysis\ Score}{Maximum\ Score} x\ 100\%$$

Next, the research scores are averaged across a number of trial sample subjects and converted into assessment statements to determine the quality and level of usefulness of the resulting product. The following table shows the conversion of scores to these assessment requirements:

Table II attractiveness scale

Skor Presentasi	Interpretasi
81%-100%	Very Worthy
61%-80%	Worthy
41%-60%	Fairly Worthy
21%-40%	Less Worthy
0%-20%	Very Less Worthy

Source: Putri, 2021

III. Result and Discussion

The results of the development of a Google Sites web-based learning media product for the Basic Computer Network Engineering and Measurement Instruments topic were obtained through the ADDIE model development steps, which consist of the following five stages:

A. Analysis

Analysis Stage. Analyzing the learning media needed by students to improve the quality of their learning and academic achievement. Consequently, researchers developed interactive website-based learning media that is expected to alleviate student boredom when learning about measuring instruments.

This media will transform the learning process by engaging students. Compared to conventional textbooks or whiteboards, which tend to be boring, interactive website-based learning media can integrate text, images, videos, and interactive quizzes, making the information presented richer and more engaging than conventional textbooks.

B. Design

Design stage. In this second stage, the researcher focused on designing the interactive learning media to be developed. The researcher compiled all the components necessary to create effective, engaging learning media that met students' needs, including developing a visual framework.

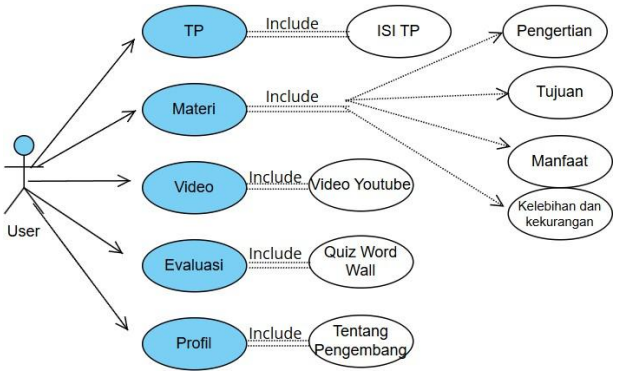

Figure 1 Visual Framework

C. Development

Development Phase. In this third phase, the design will then be processed and uploaded to Google Sites. The resulting Google Sites product is shown in the image below:

Figure 2 Main Page

Figure 3 Material Page

Figure 4 Video Page

Figure 5 Evaluation Page

After the product is finished, validation is carried out by a website-based learning media expert on the basic material of computer network engineering and measuring instruments for class X of SMKN 1 Suruh until the media is ready to be used in learning.

Next, the results of the questionnaire from media experts, and material expert can be seen in the table below.

Table III Media Expert Validation Results Data

No	Rated Aspect	Assessment Score
1	The media has an attractive appearance	5
2	The accuracy of the background and text color selection is appropriate	5
3	The text in the media is neatly arranged	5
4	The quality of animation and simulation of material in the media is interesting	5
5	The language used is communicative	5
6	The language used does not give rise to multiple interpretations	5
7	The Attraction of Animation	4
8	The color combination used is suitable	5
9	The size and type of letters are appropriate and easy to read	5
10	Navigation clarity	4
11	Consistency of button usage	5
12	Ease of use	5
13	The convenience of having a menu	5
14	Ease of opening and closing sites	5
	Total Score Obtained	68
	Total Maximum Score	70

$$Eligibility\ Percentage = \frac{68}{70} X\ 100\% = 97{,}3\%$$

Based on the table above which includes all aspects assessed, the media expert test was conducted on April 21, 2025, using a questionnaire. Researchers obtained data from Mr. Bian Dwi Pamungkas, M.Pd., a lecturer in Information Technology Education, Faculty of Science and Technology, and a Media Expert. The results showed a score of 97.3%, which is considered Very Worthy.

Next, the validation of the material was carried out by a material expert, Mr. Dian Dwi Purnakaryanto S.kom as a DDTJKT subject teacher at SMKN 1 Suruh. After obtaining the interview data, the researcher developed the material in the media according to the interview results. After developing it according to the interview data, the researcher conducted a material expert trial on April 24, 2025, using a questionnaire.

The results of the assessment from the material expert questionnaire can be seen in the following table.

Table IV Data From Validation Results By Material Experts

No	Rated Aspect	Assessment Score
1	The content of the media is in accordance with CP/ATP	4
2	The media is appropriate to the learning objectives to be achieved	5
3	The written text can be read clearly	5
4	Use of easy to understand language	5
5	The images and visualizations used are appropriate to the material.	4
6	The use of language used does not give rise to multiple interpretations	4
7	Students can learn independently using this media	4
8	Useful material to increase students' insight and knowledge	5
9	Easy to use	5
10	Suitable as a learning tool	5
11	The provision of examples in the presentation of the material is appropriate.	5
12	It is interactive and helps to understand the material.	4
13	The written text can be read clearly	5
14	Can be applied to learning materials	4
15	The feedback provided is appropriate	5
	Total Score Obtained	69
	Total Maximum Score	75

$$Eligibility\ Percentage = \frac{69}{75} X\ 100\% = 92\%$$

The results of the validation data table above can be concluded that from all aspects assessed, the results of the material expert trial obtained a percentage score of 92%, which is in the Very Worthy category.

With the above assessment by the media expert validator who obtained a percentage score of 97.3% and the material expert validator who obtained a score of 92%, it can be concluded that the website-based learning media using the Google Sites platform developed by the researcher is very feasible and can be used without revision.

D. Implementation

The implementation stage was carried out directly in class X TKJ 2 with a total of 20 students. The results can be seen in the following table.

Table V Student Response Questionnaire Results

No	Rated Aspect	Assessment Score
1	The appearance of the images and colors on this website media are harmonious, so it makes me interested in using it.	96
2	The Google Sites platform is easy to use, so I enjoy using it	94
3	I am interested in the material presented on the website.	96
4	I understand the material/content presented in accordance with the topic being studied.	94
5	The material presented is in accordance with learning objectives	93
6	I can easily understand the presentation of text in this media	92
7	I can easily understand the sentences used in this media	95
8	The material presented in the media stimulated my curiosity about the related material.	93
9	With this website's interactive learning media, I am more active in learning DTJKT	90
10	Using this media helps me understand the material on measuring instruments more easily.	96
11	I am interested in using website media in DTJKT learning	92
12	I use media websites in learning DTJKT, it's not boring	93
13	Through this media I am enthusiastic about studying measuring instrument material.	91
14	I remember and understand lessons more easily	94
	Total Score Obtained	1309
	Total Maximum Score	1400

$$Eligibility\ Percentage = \frac{1309}{1400} X\ 100\% = 93{,}5\%$$

Based on the table above, the student questionnaire results, which scored 93.5%, indicate that the website-based learning media falls within the very appropriate criteria. Therefore, website-based learning media using the Google Sites platform is highly suitable for use in the learning process of measuring instruments at SMKN 1 SURUH.

IV. CONCLUSION

Based on the presentation of the results and discussion above, it can be concluded that the purpose of this study is to provide solutions to students who are bored and tired of learning using conventional methods in the form of books or blackboards, therefore the development of this web-based interactive media was developed using the R&D method of the ADDIE research model which can be seen that the final results of this study obtained an average percentage of media experts and material experts of 95% categorized as very feasible while for the results of respondents (students) got a percentage of 93.5% categorized as very feasible.

Thus, it can be concluded that the web-based interactive learning media developed using the Google Sites platform for the Basics of Computer Network Engineering and Measurement Instruments material has been tested for validity and is considered suitable for use in the learning process. The media can be accessed through the following link: bitly.cx/Yh3it.

REFERENCES

[1] N. K. Uderbayeva, A. Kadirbek, and J. Kultan, "Review of the effectiveness of new information technologies in the era of global digital technologies," vol. 003, pp. 1–5, 2023, doi: 10.56199/dpcsebm.jglm1102.

[2] Y. Yahya and A. M. Nur, "Pengaruh Penerapan Media Interaktif Berbasis Multimedia Untuk Pembelajaran Bahasa Inggris Di MTs. NW Ketangga Menggunakan Algoritma Naïve Bayes," *Infotek J. Inform. dan Teknol.*, vol. 5, no. 1, pp. 209–218, 2022, doi: 10.29408/jit.v5i1.4841.

[3] J. R. Coyanda, D. I. Ricoida, and D. A. Verano, "Pelaksanan Ujian Kompetensi IT dalam meningkatkan kualitas lulusan di SMKN Suak Tapeh Banyuasin," *AKM Aksi Kpd. Masy.*, vol. 4, no. 1, pp. 191–198, 2023, doi: 10.36908/akm.v4i1.858.

[4] P. E. D. Tedjokoesoemo, "Bridging the Gap to Communicate Abstract Concept of Physics for Visual Learners," *Kata*, vol. 25, no. 00, pp. 101–106, 2023, doi: 10.9744/kata.25.00.101-106.

[5] M. L. Sari and M. A. Ghofur, "Web-based mind mapping learning media to increase understanding of economic policy materials," *Harmon. Sos. J. Pendidik. IPS*, vol. 7, no. 2, pp. 104–118, 2020, doi: 10.21831/hsjpi.v7i2.32078.

[6] N. Nurlatifah and J. Suprihatiningrum*, "Pengembangan Google Sites Berbasis Inkuiri Terbimbing pada Materi Asam Basa sebagai Media Belajar Mandiri Siswa SMA/MA Kelas XI," *J. Pendidik. Sains Indones.*, vol. 11, no. 1, pp. 67–83, 2023, doi: 10.24815/jpsi.v11i1.27391.

[7] С. В. Тращеев and Н. Г. Кочетова, "Педагогика . Вопросы теории и практики Pedagogy . Theory & Practice Веб - сайт « Педагогическая коммуникация » как средство развития коммуникативных умений педагога в условиях цифровизации образовательных процессов The Website " Pedagogical Communication ," vol. 7, no. 2, pp. 234–239, 2022.

[8] H. Saputra, D. Octaria, and A. Isroqmi, "Pengembangan Media

Pembelajaran Berbasis Web Google Sites Pada Materi Turunan Fungsi," *J. Deriv. J. Mat. dan Pendidik. Mat.*, vol. 9, no. 2, pp. 123–135, 2022, doi: 10.31316/jderivat.v9i2.4072.

[9] J. Susanto, R. Khoirudin, S. Kudrati Ningsih, and F. Ramadhona Amalia Lubis, "The Role of Research and Development (R&D) on Gross Domestic Products (GDP) (Case Study USA, China, Japan, Germany and the UK)," *J. Int. Conf. Proc.*, vol. 6, no. 1, pp. 1–13, 2023, doi: 10.32535/jicp.v6i1.2223.

[10] R. Acedillo, J. Lagahit, A. J. Macusang, and J. Bacatan, "Students and Teacher's Perception on the Effectiveness of Using Strategic Intervention Material in Science," *Int. J. Res. Innov. Soc. Sci.*, vol. 06, no. 03, pp. 60–68, 2022, doi: 10.47772/ijriss.2022.6304.

[11] J. Moreno-Garcia, B. Yáñez-Araque, F. Hernández-Perlines , and L. Rodriguez-Benitez, "An Aggregation Metric Based on Partitioning and Consensus for Asymmetric Distributions in Likert Scale Responses," *Mathematics*, vol. 10, no. 21, pp. 1–17, 2022, doi: 10.3390/math10214115.