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DEVELOPMENT OF WEB-BASED INTERACTIVE LEARNING MEDIA (GOOGLE SITES) FOR INFORMATICS SUBJECTS IN CLASS X TJKT STATE VOCATIONAL HIGH SCHOOL 1 REJOTANGAN

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Abstract*— Development of Interactive Web-Based Learning Media (Google Sites) for Informatics Subject in Grade X TJKT at SMK Negeri 1 Rejotangan, Thesis, Information Technology Education Study Program, Faculty of Science and Technology, Universitas Bhinneka PGRI. Supervisor: Yelma Dianastiti, M.Pd. This research was motivated by the low interest and participation of students in the learning process of the Informatics subject in Grade X TJKT at SMKN 1 Rejotangan. One of the main causes is the use of conventional and monotonous learning media, such as static PowerPoint presentations, and the lack of utilization of students' digital devices as learning tools. Even though 85% of students already own gadgets and have sufficient internet access, these resources have not been optimally used for learning purposes. The aim of this research is to develop interactive web-based learning media using the Google Sites platform and to assess its feasibility in enhancing the quality and effectiveness of Informatics learning. The research method used is Research and Development (R&D) with the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. Data were collected through observation, interviews, and questionnaires distributed to media experts, subject matter experts, and students. Validation was carried out by two media experts and one subject matter expert. The product trial was conducted in stages with a small group of 5 students and a large group of 30 students. The instruments used were feasibility assessment questionnaires, evaluating both technical aspects and content quality. The results showed that the interactive learning media based on Google Sites was categorized as "highly feasible" with an average score from media and content experts above 85%. Furthermore, the student trials indicated a high level of satisfaction, with an average response rate of 88.5%, showing that the media was perceived as engaging, accessible, and helpful in understanding Informatics materials in a more enjoyable and independent way. The media was also considered flexible as it can be accessed anytime and anywhere using students' digital devices. In conclusion, the interactive web-based learning media developed using Google Sites proved effective in improving student motivation, engagement, and understanding of Informatics concepts. The use of this media can also serve as an innovative alternative for digital learning aligned with current technological advancements in education. The researcher recommends further development and broader implementation of this media in other subjects, as well as providing training for teachers to optimize the use of digital-based learning.

Keywords: Learning Media, Google Sites, Informatics, Interactive, ADDIE, Development.

I. INTRODUCTION

The main problem in Informatics learning at Vocational High School 1 Rejotangan is the dominant use of conventional learning media that is less interactive, resulting in low student interest and involvement [1]. Although supporting facilities such as computer laboratories, network hardware, and internet access are well available, the use of digital technology in learning has not been carried out optimally, especially in the use of interactive platforms such as Google Sites.

Many teachers are still accustomed to using lecture methods and static presentations, so that learning has not been able to attract students' attention or encourage their active participation in understanding complex Informatics material [2]. The lack of teacher training and understanding of the use of information technology is also an obstacle to the implementation of innovative learning media [3].

Meanwhile, most students already have digital devices that can be used in the learning process, but have not been maximized properly [4]. The absence of learning media that is specifically designed for the needs of TJKT students also makes Informatics learning less relevant to the demands of the industrial world and technology that continue to develop.

II. RESEARCH AND METHODS

A. Types of Research

In this learning media development research, the Research and Development (R&D) method is used, which aims to produce new products through a systematic process [5]. The development model applied is the ADDIE model, which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because of its clear, flexible structure, and can be applied in various educational contexts. Compared to other models such as 4D which emphasizes the development stages more, R2D2 which focuses on technology integration, and Borg & Gall which is more research-oriented, the

ADDIE model is considered more comprehensive and easy to understand for the development of learning media [6].

Figure 1 ADDIE Development Model

B. *Instruments*

The instruments used in this study include questionnaires, interviews, validation sheets, and field trial instruments [7]. The questionnaire was used to collect data on responses from students to the developed learning media, while interviews were conducted to dig up in-depth information from subject teachers regarding learning needs and conditions [8]. The validation sheet was used to assess the feasibility of the media, which involved validation by media experts to evaluate aspects of appearance, navigation, and technical aspects, as well as validation by material experts to assess the suitability of the content and accuracy of the learning materials. In addition, a field trial was conducted on students as end users to determine the effectiveness, attractiveness, and ease of use of the developed learning media [9].

C. *Produce*

The procedure for developing interactive web-based learning media (Google Sites) for Informatics subjects in class X TJKT SMK Negeri 1 Rejotangan follows the five stages of the ADDIE model. The Analysis stage is carried out by identifying learning needs and problems faced by students and teachers. The Design stage includes designing content, navigation, and media displays according to the curriculum. At the Development stage, media is created using Google Sites and tested by media experts and material experts to ensure the quality of content and display [10]. The Implementation stage involves testing students to determine the effectiveness of the media in learning. Finally, the Evaluation stage is carried out to assess the results of the development and provide improvements so that the media is used more optimally.

D. *Analysis Stage*

Based on the results of the analysis of Informatics learning in class X TJKT SMK Negeri 1 Rejotangan, it was found that the use of technology in teaching and learning activities is still not optimal. The learning media used tends to be conventional, such as simple PowerPoint, and has not been able to motivate students optimally. In fact, around 85% of students already have smartphones that have the potential to be used as learning aids. Therefore, innovation of interactive web-based learning media is needed to meet functional needs, such as ease of access and interactivity, as well as non-functional needs, such as attractive appearance and responsiveness to digital devices [11].

E. *Design Stage*

The Design stage is carried out after analyzing the results obtained and used as a basis for designing learning media that suits students' needs [12]. At this stage, the concept and content of interactive learning media based on Google Sites are designed, including navigation flow, interface display, and materials to be presented. Design includes determining the page structure, media types (text, images, videos, and practice questions), and supporting tools to be used in the platform.

This stage produces an initial product plan that will be used as a reference in the next development process. The use cases of the designed learning media include usage scenarios such as students accessing materials independently via smartphones, working on interactive questions, reading multimedia materials, and teachers interacting and providing feedback on student activities through the media.

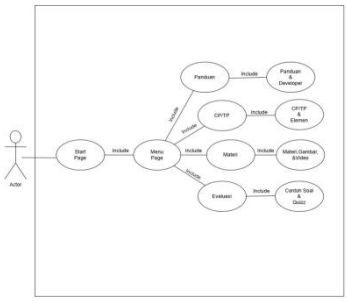

Figure 2 Use Case of Learning Media

F. *Development Stage*

The Development Phase is an important phase in the ADDIE model, where all plans in the design phase are realized into learning media that are ready to use. This process includes creating content such as learning objectives, materials, videos, sample questions, and evaluations, all of which are adjusted to the characteristics of students and learning needs. All elements—text, images, and videos—are integrated harmoniously into the Google Sites platform. After the media has been developed, validation tests are carried out by media experts and material experts. Media experts assess technical and visual aspects, while material experts cover content with curriculum and learning objectives. Input from both experts is used as a basis for revising and refining the media before being used in actual learning implementation [13].

G. *Implementation Stage*

The Implementation stage is the process of using learning media that has been developed in real learning situations in the classroom [14]. The implementation of this stage begins with a small group trial of five students with diverse characteristics to assess the feasibility of the media from the perspective of end users and to collect direct input for improvement. Furthermore, a large group trial was conducted on 35 participants who were taught for the effectiveness, attractiveness, and ease of use of the media on

a wider scale. Researchers conducted direct observations and distributed questionnaires to students to collect data that became the basis for improving the media before being implemented comprehensively.

H. Evaluate Stage

Evaluation is the final stage in the ADDIE development model which aims to assess the suitability of learning media with the specifications and objectives that have been set [15]. This stage provides important feedback for developers to determine the effectiveness of the media, as well as being the basis for making improvements if deficiencies are found. With proper evaluation, learning media can be refined to be more optimal in supporting the teaching and learning process.

I. Data Collection Stages

The data collection stages in this study were carried out by distributing questionnaires to media experts, material experts, and students to assess the feasibility of the learning media developed. The questionnaire instrument was compiled based on relevant aspects, such as appearance, ease of use, clarity of material, and media effectiveness. Each statement item in the questionnaire uses a rating scale of 1 to 5, with the following scoring criteria: 1 = strongly disagree, 2 = disagree, 3 = quite agree, 4 = agree, and 5 = strongly agree.

The following is a table of percentage categories of the suitability of learning media based on the results of the questionnaire used in the research:

Tabel I Eligibility Percentage

Score	Suitability
81%-100%	Very worthy
61%-80%	Worthy
41%-60%	Quite worthy
21%-40%	Less worthy
0%-20%	Very unworthy

This table is used to interpret the evaluation results scores from media experts, material experts, and students, after being calculated using the formula: Percentage (%) = (Total score obtained / Maximum score) × 100.

III. RESULTS AND DISCUSSION

This section contains research results and analysis related to the research results. Research results can be explained with images, graphs, tables, or others with the aim that readers can better understand the research results. The Results and Analysis section can consist of several Subsections.

A. Presentation of Data and Results of Problem and Needs Analysis.

The presentation of data and analysis results at this stage contains findings related to problems and needs that are the basis for developing interactive web-based learning media (Google Sites). Based on the results of observations and interviews, several main problems were found in the Informatics learning process in class X TJKT SMKN 1 Rejotangan, including the suboptimal use of technology, lack of innovation in learning media, and low student involvement due to the use of monotonous media such as PowerPoint slides.

In addition, although around 85% of students have smartphones that can support digital learning, their use is not optimal. The results of the identification of needs indicate the need for interactive learning media that is easy to access, and can increase student motivation and understanding of the material. Therefore, it is necessary to develop media that can answer these needs through a technology-based approach that is in accordance with the characteristics of students and the demands of 21st century learning.

B. Presentation of Data and Analysis Results of Product Development

1. Product Design Results

At this stage, the design of interactive web-based learning media is made, which includes an initial description in the form of a storyboard as a basis for further development. This design functions to design the flow of material presentation, interface display, and interactive elements that will be used in the learning media. One important part in this stage is the use case, which is shown in Figure 1. The use case of learning media design describes the scenario or situation of interaction between users, in this case students, with the interactive learning media being developed. This use case is a reference to ensure that the media can be used easily and effectively in accordance with the learning objectives that have been set.

2. Product Development Results

This stage is the stage of making interactive web-based learning media. The final result of this product is a website that can be accessed via mobile or desktop. The following is a display of interactive web-based learning media products on informatics material.

Tabel II Web Based Product Display Results

Picture	Information
	Home Page View There is a start button
	which contains a short profile of the media creator and there are Back and Next button icons.
	Menu Page View On the menu display there are several button icons such as: 1. Guide button 2. Learning Objectives button

	3. Material button 4. Evaluation button
	Material View This display contains an explanation of the material, images and additional learning videos as additional material, and there are Back, Home and Next button icons.
	Evaluation View On this display there are practice questions and evaluations in the form of essay questions, there are Back and Next button icons.

3. Product Trial

After the development stage, it is continued to the product trial stage, here is a summary of the results of the product trial of two media experts and one material expert.

- Media Expert Result 1

Tabel III Media Expert Trial Results 1

Total Score Obtained	Maximum Score
68	75
Result	90,6 %

Eligibility percentage (%) = $\frac{68}{75}$x 100

Eligibility percentage (%) = 90,6 %

The media expert test was conducted on February 10, 2025 using a questionnaire form. The researcher obtained data from two media experts, namely from Mr. Bian Dwi Pamungkas, M.Pd as a Lecturer in Information Technology Education, Faculty of Science and Technology as the First Media Expert. obtained a score of 90.6%

- Media Expert Result 2

Tabel IV Media Expert Trial Results 2

Total Score Obtained	Maximum Score
66	75
Result	88 %

Eligibility percentage (%) = $\frac{66}{75}$x 100

Eligibility percentage (%) = 88 %

the results of the validation test from the two media experts conducted on February 10, 2025 by Mrs. Yelma Dianastiti, M.Pd as the Supervising Lecturer as the Second Media Expert. obtained a result of 88%

- Material Expert

Tabel V Material Expert Trial Results

Total Score Obtained	Maximum Score
64	70
Result	91,4 %

Eligibility percentage (%) = $\frac{64}{70}$x 100

Eligibility percentage (%) = 91,4 %

The media expert test was conducted on February 25, 2025 using a questionnaire form. The researcher obtained data from the teacher concerned in the Informatics subject, namely Mrs. Siti Romelah, S.T as the Head of the Computer Network and Telecommunication Engineering Department as well as a teacher who teaches the Informatics subject. Obtained a result of 91.4%.

Based on the validation results, the learning media obtained a validity percentage of 90.6% from the first media expert, 88% from the second media expert, and 91.4% from the material expert. The average validity percentage of this learning media is 90.2%. Thus, it can be concluded that this interactive learning media based on Google sites is classified as very valid and worthy of being used as a supporting media in the learning process in class X TJKT SMK Negeri 1 Rejotangan.

C. Product Trial Data Presentation and Analysis

Website-based learning media developed using the Google Sites platform was implemented in Informatics subjects in class X of Computer Network Engineering and Telecommunications (TJKT). The trial of this media was carried out on February 26, 2025 using a questionnaire method to assess the level of media feasibility. The target of this trial was class X TJKT students, which was divided into two stages, namely small group trials and large group trials.

- Small Group Trial

Tabel VI Small Group Trial Results

Total Score Obtained	Maximum Score
630	725
Result	86,8 %

Eligibility percentage (%) = $\frac{630}{725}$x 100

Eligibility percentage (%) = 86,8 %

In this trial, it was conducted on 5 students before being tested on a large group. The results obtained were 86.8%.

- Large Group Trial

Tabel VII Large Group Trial Results

Total Score Obtained	Maximum Score
4059	4350
Result	93,3 %

Eligibility percentage (%) = $\frac{4059}{4350}$x 100

Eligibility percentage (%) = 93,3 %

This trial was conducted on 30 students. The results obtained were 93.3%.

In a small group trial involving 5 students, the percentage of eligibility was 86.8%. Meanwhile, in a large group trial involving 30 students, the percentage was 93.3%. The average level of eligibility of this learning media reached 90%, so it is included in the category of feasible and very feasible to be used for students in the learning process in class X TJKT SMK Negeri 1 Rejotangan.

IV. CONCLUSION

The results of the study showed that interactive learning media based on websites (google sites) in informatics subjects at SMKN 1 Rejotangan obtained the following trials: Media expert 1 (90.8% - very feasible) Media expert 2 (88% - very feasible) Material expert (91.4% - very feasible) Student trial (90% - very feasible) This proves that the developed learning media is valid and feasible to use in the learning process.

REFERENCES

[1] S. S. Manik, "Pengembangan E-Modul Literasi Numerasi Materi Aljabar Untuk Siswa SMP ," pp. 1–143, 2023.

[2] G. A. Sembiring *et al.*, "PENGARUH MODEL PROBLEM BASED LEARNING TERHADAP PENINGKATAN AKTIVITAS DAN MINAT BELAJAR SISWA PADA MATERI KOMPONEN EKOSISTEM DAN INTERAKSINYA DI KELAS X SMA NEGERI 7 MEDAN PENGARUH MODEL PROBLEM BASED LEARNING TERHADAP PADA MATERI KOMPONEN EKOSISTEM DAN IN," vol. 3, no. 4, 2025.

[3] A. Rofi'i, E. Nurhidayat, and H. Firharmawan, "Teachers' Professional Competence in Integrating Technology: A Case Study at English Teacher Forum in Majalengka," *Ijlecr - Int. J. Lang. Educ. Cult. Rev.*, vol. 9, no. 1, pp. 64–73, 2023, doi: 10.21009/ijlecr.v9i1.37683.

[4] D. Researches and D. Indonesia, "Peran Teknologi dalam Manajemen Pendidikan Islam di Madrasah : Studi Kasus Literasi Digital Bahan Ajar," vol. 5, no. 2, pp. 166–174, 2025.

[5] K. W. A. Siahaan, Hisar Marulitua Manurung, and Mungkap Mangapul Siahaan, "Android-Based Learning Media Development Strategies During Pandemic Times To Improve Student Science Literature," *Int. J. Educ. Humanit.*, vol. 1, no. 1, pp. 34–42, 2021, doi: 10.58557/ijeh.v1i1.4.

[6] P. Studi *et al.*, *PENGEMBANGAN MEDIA PEMBELAJARAN BERPIKIR KREATIF PADA MATA PELAJARAN PENDIDIKAN PANCASILA KELAS V MI AL* -. 2025.

[7] A. I. Oben, "Research Instruments: a Questionnaire and an Interview Guide Used To Investigate the Implementation of Higher Education Objectives and the Attainment of Cameroon'S Vision 2035," *Eur. J. Educ. Stud.*, vol. 8, no. 7, pp. 113–130, 2021, doi: 10.46827/ejes.v8i7.3808.

[8] "Kelayakan Media Pembelajaran Flipbook Digital Nepenthes spp . Kalimantan Barat Untuk Pembelajaran Materi Keanekaragaman Hayati Kelas X," vol. 11, pp. 137–145, 2025.

[9] C. Lesmana and D. Santoso, "Pengembangan media pembelajaran berbasis video interaktif pada SMP Negeri 03 Sungai Kakap," *J. Pendidik. Inform. dan Sains*, vol. 12, no. 1, pp. 211–224, 2023, doi: 10.31571/saintek.v12i1.5111.

[10] A. Pendahuluan, ", Ani Nur Aeni 4 1," vol. 10, pp. 211–226, 2025.

[11] P. Sarjana, T. Politeknik, M. Negeri, and B. Belitung, "PENERAPAN AUGMENTED REALITY PADA GAME EDUKASI TUMBUHAN LUMUT UNTUK SISWA SMP NEGERI 2 BANGKA BELITUNG," 2024.

[12] D. Prodi, P. Guru, S. Dasar, and U. P. Palembang, "PENGEMBANGAN MEDIA KARTU KATA BERGAMBAR UNTUK KETERAMPILAN MEMBACA Mahasiswa Prodi Pendidikan Guru Sekolah Dasar , Universitas PGRI Palembang 1," vol. 9, no. 1, pp. 1–8, 2023.

[13] D. Choirum and M. Alfi, "PENGEMBANGAN MEDIA PEMBELAJARAN INTERAKTIF BERBASIS GAME VISUAL NOVEL PADA MATA PELAJARAN PENDIDIKAN PANCASILA DI SMA NEGERI 20 SURABAYA Listyaningsih Abstrak," vol. 11, pp. 788–798, 2023.

[14] P. S. Mertasari and N. N. Ganing, "Pengembangan Media Pembelajaran Powtoon Berbasis Problem Based Learning pada Materi Ekosistem Muatan IPA Kelas V Sekolah Dasar," vol. 4, pp. 288–298, 2021.

[15] S. Siregar, H. Sitompul, K. Wijaya, S. Perangin-angin, and N. Sebayang, "Development of ' Concrete Work Practice ' Learning Media by Using the Addie Model," vol. 591, no. Aisteel, pp. 881–886, 2021.