

Google Sites Learning Media with PBL to Enhance Interest in Network Learning

Xaphyra Aura Shava Aulia^{a,1,*}, Shofiyah Al Idrus^{b,2}, Khoirudin Asfani^{c,3}

^a Faculty of Engineering, Universitas Negeri Malang, Malang, Indonesia

^b Faculty of Education, Universiti Malaya, Kuala Lumpur, Malaysia

^c Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taipei, Taiwan

¹ xaphyra.aura.1905336@students.um.ac.id; ² s2176731@siswa.um.edu.my ³ d11111811@mail.ntust.edu.tw

* corresponding author

Article Info

Article history:

Received: Jun 6, 2024

Revised: Jun 20, 2024

Accepted: Jul 5, 2024

Keyword:

Learning media

Google sites

Problem-based learning

Learning interest

Computer and network

ABSTRACT

This research and development aims to develop learning media that can provide new learning resources to students, support the learning process of theory and practicum, overcome material that students find difficult, create an independent atmosphere in learning, and increase student interest in learning. This research and development methodology uses the R&D (Research & Development) method with the 5D development model developed by Pranata in 2009, which has five complex stages, namely: (1) define, (2) data collection, (3) design, (4) develop, and (5) disseminate. This learning media was tested by media experts, material experts, and users who are undergraduate students of Informatics Engineering Education who have taken data communication and computer network courses at the State University of Malang. This research and development produce quantitative and qualitative data using data collection techniques such as observation, interviews, and distributing questionnaires. The results of this research and development can be concluded that: (1) the validity and reliability test of the instrument as many as 30 question items have a value of $r_{count} > r_{table}$, which can be declared valid and obtain a reliability value of 0.948 with a reliable or powerful instrument category, (2) media experts obtained a total score of 86% with very valid assessment criteria, (3) material experts obtained a total score of 96% with very valid assessment criteria, (4) limited trials obtained a total score of 88% with very valid assessment criteria, (5) field trials obtained a total score of 86% with very feasible assessment criteria and (6) learning interest obtained a total score of 85% with a very good assessment category.

I. INTRODUCTION

The era of rapid development of information technology has had an impact on the educational aspect of the development of learning media, which has an important role in improving the quality of learning. [1], [2], [3], [4], [5], [6]. There are several ways to develop a learning media, one of which is by using Google Sites. [7], [8].

Google Sites is a feature from Google that allows users to add text, images, graphics, audio, video, and links to create websites easily. It can also be utilized as a learning medium. Google Sites is one of the web-based learning media that can provide an interesting, effective, and conducive learning atmosphere. The use of Google Sites as learning media is considered more effective and can support learning activities well. [9].

Apart from Google Sites-based learning media, the application of the right learning model is a determining aspect of the success of the learning process. [10]. Problem-based learning is a problem-based learning model or case study that can improve skills in solving problems, being able to think critically, and being independent in learning. [11], [12], [13], [14], [15]. The application of the problem-based learning model in the learning process makes students more active, makes it easier for them to understand the material, and increases interest in learning.

Learning interest is also one of the affective aspects that play a major role in the success of a learning process [16], [17], [18], [19]. A pleasant learning process is one of the parameters or benchmarks for student learning interest.

This research and development aims to develop learning media that can provide new learning resources to students, support the learning process of theory and practicum, overcome

material that students find difficult, create an independent atmosphere in learning, and increase student interest in learning.

II. METHODS

This research and development uses the R&D (Research & Development) method with the 5D development model, which aims to facilitate the process of developing a product. The 5D development model was developed by Pranata in 2009 and has five complex stages, namely: (1) define, (2) data, (3) design, (4) develop, and (5) disseminate.

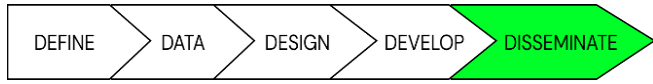


Fig. 1. 5D Pranata Development Model

$$\text{Percentage}(\%) = \frac{\text{Total Score}}{\text{Kriterium Score}} \times 100\% \quad (1)$$

$$\text{Kriterium} = \text{max score} \times \Sigma \text{items} \times \Sigma \text{validator} \quad (2)$$

This research and development uses data collection techniques through observation, interviews, and questionnaires that produce quantitative and qualitative data types. The test subjects in this research and development were media experts, material experts, and users who were undergraduate students of Informatics Engineering Education who had taken data communication and computer network courses at the State University of Malang. In the product trial from the user side, there were limited trials of 5 respondents and field trials of 30 respondents.

The data analysis technique in this research and development is a method for processing data into valid information, including instrument validity and reliability, media feasibility analysis, and learning interest analysis.

A. Instrument Validity and Reliability

The validity test in this research and development uses the Product Moment from Pearson as follows equation (1).

$$r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{\{n \sum X^2 - (\sum X)^2\} \{n \sum Y^2 - (\sum Y)^2\}}} \quad (1)$$

The following are the validity test assessment criteria namely 1) if r count $>$ r table, then the statement is declared valid, and 2) if r count $<$ r table, then the statement is declared invalid.

The reliability test in this research and development uses the Cronbach Alpha as follows: equation (2)

$$r_{11} = \left[\frac{k}{k-1} \right] \left[1 - \frac{\sum \sigma_b^2}{\sigma_t^2} \right] \quad (2)$$

The following is the interpretation of instrument reliability with the correlation coefficient according to Table I.

TABLE I. RELIABILITY COEFFICIENT INTERVAL

Coefficient Interval	Relationship Level
0,00 – 0,199	Very Low
0,20 – 0,399	Low
0,40 – 0,599	Medium
0,60 – 0,799	Strong

B. Media Feasibility Analysis

The expert validation instrument in this research and development uses equation (3).

$$V - ah = \frac{Tse}{Tsh} \times 100\% \quad (3)$$

The following are the criteria for evaluating media feasibility instruments according to Table II.

TABLE II. MEDIA FEASIBILITY INSTRUMENT ASSESSMENT CRITERIA

Score Range	Category
81% – 100%	Very Valid
61% – 80%	Valid
41% – 60%	Fair
21% – 40%	Invalid
0% – 20%	Very Invalid

The user response instrument in this research and development includes limited trials and field trials using equation (4).

$$V - au = \frac{Tse}{Tsh} \times 100\% \quad (4)$$

The following are the criteria for evaluating user response instruments, according to Table III.

TABLE III. USER RESPONSE INSTRUMENT ASSESSMENT CRITERIA

Score Range	Category
81% – 100%	Very Good
61% – 80%	Good
41% – 60%	Fair
21% – 40%	Poor
0% – 20%	Very Poor

C. Learning Interest Analysis

The learning interest instrument in this research and development uses equation (5).

$$K = \frac{F}{N} \times 100\% \quad (5)$$

The following are the criteria for evaluating learning interest instruments according to Table IV.

TABLE IV. CRITERIA FOR ASSESSMENT OF LEARNING INTEREST INSTRUMENT

Score Range	Category
81% – 100%	Very Good
61% – 80%	Good
41% – 60%	Fair
21% – 40%	Poor
0% – 20%	Very Poor

III. RESULT AND DISCUSSION

A. Define

1) Problem Identification

TABLE V. PROBLEM IDENTIFICATION

No	Problem Identification
1	Students have difficulty understanding learning materials such as IP (Internet Protocol), subnetting and supernetting, static routing, dynamic routing, and proxy.
2	Limited interesting and flexible learning media
3	The learning media used does not support practicum learning.

2) Need analysis

TABLE VI. NEEDS ANALYSIS

No	NEEDS ANALYSIS
1	Students need learning media that can support theory and practicum learning.
2	Students need learning media that can overcome learning materials that are considered difficult.
3	Students need interesting and flexible learning media.

B. Data

1) Theoretical Data

TABLE VII. THEORETICAL DATA

No	Theoretical Data	Results
1	Developing PBL-based learning media using Google Sites.	This research uses the R&D method by applying the ADDIE development model. This model consists of five stages: analysis, design, development, implementation, and evaluation. The results of the media feasibility assessment showed that 32% were assessed by media experts, 60% by material experts, and 92% by students, with the overall category showing a very good level of feasibility. Thus, this learning media is suitable for use.
2	The development of website-based interactive learning media using Google Sites to improve student learning achievement.	This research uses the (R&D) method using the ADDIE development model. This model has five stages, namely analysis, design, development, implementation, and evaluation. The results showed that the developed learning media received a media feasibility value of 90% with a very valid category according to media experts and material experts, 93% with a very valid category according to students, and 50% pre-test results were not feasible, and 97% post-test results were very feasible. Therefore, the use of this learning media can be recommended.
3	Increasing student interest in learning and understanding through the application of PBL-based learning models.	This study collected data through observation, questionnaires, interviews, and documentation using the classroom action research paradigm. The research findings then show that there has been a marked improvement in students' learning interest and understanding as a result of using problem-based learning. Students' learning interests and comprehension can be improved in this course by applying problem-based learning methodology.

2) Field Data

TABLE VIII. FIELD DATA

No	Field Data	Results
1	Problem Limitation	This learning media only contains some learning materials that are considered difficult, namely IP (Internet Protocol), subnetting and supernetting, static routing, dynamic routing, and MikroTik. This learning media can be accessed if the device is connected to the internet network The subjects of this research and development are undergraduate students of Informatics Engineering Education 2019 who have taken data communication and computer network courses at the State University of Malang.
2	User Characteristics	Students have PC/laptop devices and smartphones. Students have been accustomed to using PC/laptop devices and smartphones.
3	User Needs	Students need learning media that can support theory and practicum learning. Students need learning media that can overcome learning materials that are considered difficult. Students need learning media that are interesting and flexible.
4	Product Advantages	This learning media is developed using Google Sites with a problem-based learning approach. This learning media presents a discussion menu to conduct learning interactions and exchange ideas and opinions. This learning media has been developed with an attractive and interactive design. This learning media is easy to use and flexible. This learning media can help lecturers deliver learning materials efficiently. This learning media can create an independent atmosphere in learning
5	Product Shortcomings	This learning media can only be accessed if connected to the internet network.

C. Design

1) Learning Media Design

This learning media has five learning materials such as (1) IP (Internet Protocol), (2) subnetting and supernetting, (3) static routing, (4) dynamic routing, and (5) MikroTik. This learning media is developed using Google Sites, which can make the learning process more flexible, where students can access learning materials anytime and anywhere. This learning media is designed to facilitate development using Canva media.

2) Expert Validation Instruments

This stage focuses on designing expert validation instruments, which include a media test questionnaire, using aspects of assessment, namely: (a) media content aspects, (b) display aspects, (c) media quality aspects, and (d) usability aspects, and material test questionnaire, using the assessment aspects namely: (a) aspects of material content, (b) aspects of material presentation, (c) aspects of language and communication, and (d) aspects of usability.

3) User Responses Instruments

This stage focuses on designing user response instruments, namely (1) aspects of media quality, (2) aspects of material quality, and (3) aspects of usefulness.

4) Learning Interest Instruments

This stage focuses on designing learning interest instruments, namely: (1) a feeling of pleasure towards learning, (2) a concentration of attention on learning, (3) a tendency

within oneself to look actively at learning, and (4) a need that is fulfilled in learning.

D. Develop

1) Learning Media Development

This learning media was developed using Google Sites, which has eight menus, namely: (1) home menu, (2) material menu, (3) video menu, (4) practicum menu, (5) discussion menu, (6) evaluation menu, (7) about menu, and (8) Manual Book.



Fig. 2. Home Page



Fig. 3. Learning Material Page



Fig. 4. Learning Video Page

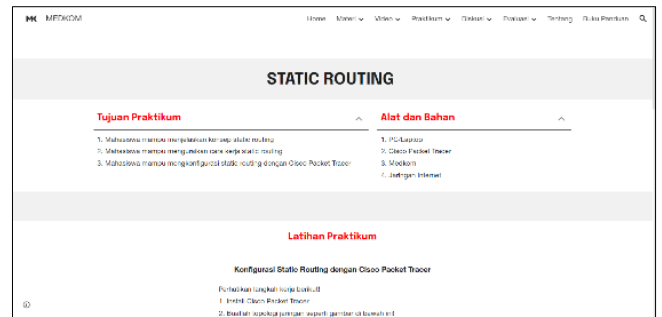


Fig. 5. Learning Practicum Page



Fig. 6. Discussion Page



Fig. 7. Learning Evaluation Page



Fig. 8. Website Developer Page

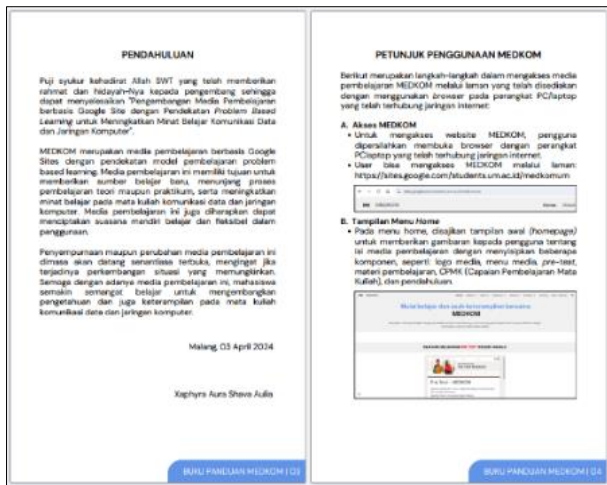


Fig. 9. Manual Book

2) Media Feasibility Analysis

The results of the media validation instrument and, the material expert validation instrument conducted by validators, and the small- and large-scale user trial instrument conducted by respondents are shown in Tables IX, X, XI, and XII. The result of the learning interest instrument to determine the level of student interest in learning after using this learning media is shown in Table XIII.

TABLE V. MEDIA EXPERT INSTRUMENT RESULTS

No	Assessment Aspect	Tse	Tsh	V – ah	Criteria
1	Media Content Aspects	20	25	80%	Valid
2	Display Aspects	59	65	91%	Very Valid
3	Media Quality Aspects	33	40	83%	Very Valid
4	Usability Aspects	17	20	85%	Very Valid
Total		129	150	86%	Very Valid
Average		0.86			

TABLE VI. MATERIAL EXPERT INSTRUMENT RESULTS

No	Assessment Aspect	Tse	Tsh	V-ah	Criteria
1	Material Content Aspects	47	50	94%	Very Valid
2	Material Presentation Aspects	52	55	95%	Very Valid
3	Language and Communication Aspects	20	20	100%	Very Valid
4	Usability Aspects	25	25	100%	Very Valid
Total		144	150	96%	Very Valid
Average		0.96			

TABLE VII. TABLE XI. SMALL-SCALE TRIAL RESULTS

No	Assessment Aspect	Tse	Tsh	V-au	Criteria
1	Media Quality	53	60	89%	Very Good
2	Material Quality	52	60	87%	Very Good
3	Usability	27	30	89%	Very Good
Total		132	150	88%	Very Good
Average		0.88			

TABLE VIII. TABLE XII. LARGE-SCALE TRIAL RESULTS

No	Assessment Aspect	Tse	Tsh	V-au	Criteria
1	Media Quality	52	60	87%	Very Good

No	Assessment Aspect	Tse	Tsh	V-au	Criteria
2	Material Quality	51	60	85%	Very Good
3	Usability	26	30	87%	Very Good
Total		129	150	86%	Very Good
Average		0.86			

E. Disseminate

The dissemination stage focuses on article publication and the implementation of learning media into class activities.

IV. CONCLUSIONS

The research and development results indicate that a learning media was developed using Google Sites with a problem-based learning approach, designed specifically as a website utilizing the 5D development model to enhance interest in data communication and computer network courses. The feasibility of this media was rigorously tested by validators, including media experts, material experts, and users. The results of the feasibility test suggest that this learning media is functional and suitable for use by students, offering new learning resources that support both theoretical and practical learning processes. Furthermore, the researchers analyzed the learning interests of 30 undergraduate students from the 2019 cohort of Informatics Engineering Education at the State University of Malang, who had completed data communication and computer network courses after using this learning media. The analysis revealed a significant increase in student interest in learning, with the media being rated in the "very good" category.

REFERENCES

- [1] M. D. Abdulrahman *et al.*, "Multimedia tools in the teaching and learning processes: A systematic review," *Heliyon*, vol. 6, no. 11, Elsevier, p. e05312, Nov. 01, 2020. doi: 10.1016/j.heliyon.2020.e05312.
- [2] E. Perez, S. Manca, R. Fernández-Pascual, and C. Mc Guckin, "A systematic review of social media as a teaching and learning tool in higher education: A theoretical grounding perspective," *Educ. Inf. Technol.*, vol. 28, no. 9, pp. 11921–11950, Sep. 2023, doi: 10.1007/s10639-023-11647-2.
- [3] C. A. Bonfield, M. Salter, A. Longmuir, M. Benson, and C. Adachi, "Transformation or evolution?: Education 4.0, teaching and learning in the digital age," *High. Educ. Pedagog.*, vol. 5, no. 1, pp. 223–246, Jan. 2020, doi: 10.1080/23752696.2020.1816847.
- [4] K. Morris and F. Yeoman, "Teaching Future Journalists the News: The Role of Journalism Educators in the News Literacy Movement," *Journal. Pract.*, vol. 17, no. 7, pp. 1573–1590, Aug. 2023, doi: 10.1080/17512786.2021.1992599.
- [5] Q. H. Tran-Duong, "The effect of media literacy on effective learning outcomes in online learning," *Educ. Inf. Technol.*, vol. 28, no. 3, pp. 3605–3624, 2023, doi: 10.1007/s10639-022-11313-z.
- [6] K. Asfani, H. Elmunsyah, S. Patmanthara, W. Nur Hidayat, H. Suswanto, and H. B. Awang, "Distance Learning Scheme with Remote Desktop Application for Mikrotik Configuration Practice in the Covid-19 Pandemic Era," in *2022 5th International Conference on Vocational Education and Electrical Engineering: The Future of Electrical Engineering, Informatics, and Educational Technology Through the Freedom of Study in the Post-Pandemic Era, ICVEE 2022 - Proceeding*, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 216–220. doi: 10.1109/ICVEE57061.2022.9930444.
- [7] Y. L. Lai and C. I. Jen, "Using Google Sites to promote 7th graders' information literacy, reading comprehension, and information Technology through inquiry-based learning in Taiwan," in *Communications in Computer and Information Science*, Springer Verlag, 2015, pp. 317–327. doi: 10.1007/978-3-319-28197-1_33.

- [8] B. Gan, T. Menkhoff, and R. Smith, "Enhancing students' learning process through interactive digital media: New opportunities for collaborative learning," *Comput. Human Behav.*, vol. 51, pp. 652–663, Oct. 2015, doi: 10.1016/j.chb.2014.12.048.
- [9] H. Halimatusyadiah and D. Disman, "The Benefits of Interactive Media Websites Through Google Sites on Learning Outcomes of Elementary School Students," *J. Ling. Idea*, vol. 14, no. 1, p. 92, Jun. 2023, doi: 10.20884/1.jli.2023.14.1.8305.
- [10] I. G. Smarandache, L. P. Maricutoiu, M. D. Ilie, D. E. Iancu, and V. Mladenovici, "Students' approach to learning: evidence regarding the importance of the interest-to-effort ratio," *High. Educ. Res. Dev.*, vol. 41, no. 2, pp. 546–561, Feb. 2022, doi: 10.1080/07294360.2020.1865283.
- [11] A. S. A. Ghani, A. F. A. Rahim, M. S. B. Yusoff, and S. N. H. Hadie, "Effective Learning Behavior in Problem-Based Learning: a Scoping Review," *Medical Science Educator*, vol. 31, no. 3, Springer, pp. 1199–1211, Jun. 01, 2021, doi: 10.1007/s40670-021-01292-0.
- [12] L. Wijnia, G. Noordzij, L. R. Arends, R. M. J. P. Rikers, and S. M. M. Loyens, "The Effects of Problem-Based, Project-Based, and Case-Based Learning on Students' Motivation: a Meta-Analysis," *Educ. Psychol. Rev.*, vol. 36, no. 1, pp. 1–38, Mar. 2024, doi: 10.1007/S10648-024-09864-3/TABLES/4.
- [13] C. C. Wang, "The process of implementing problem-based learning in a teacher education program: an exploratory case study," *Cogent Educ.*, vol. 8, no. 1, Jan. 2021, doi: 10.1080/2331186X.2021.1996870.
- [14] K. Smith *et al.*, "Principles of Problem-Based Learning (PBL) in STEM Education: Using Expert Wisdom and Research to Frame Educational Practice," *Educ. Sci.*, vol. 12, no. 10, p. 728, Oct. 2022, doi: 10.3390/educsci12100728.
- [15] J. M. Harackiewicz, J. L. Smith, and S. J. Priniski, "Interest Matters: The Importance of Promoting Interest in Education," *Policy Insights from Behav. Brain Sci.*, vol. 3, no. 2, pp. 220–227, Jun. 2016, doi: 10.1177/2372732216655542.
- [16] X. Wu, H. Liu, L. Xiao, and M. Yao, "Reciprocal Relationship Between Learning Interest and Learning Persistence: Roles of Strategies for Self-Regulated Learning Behaviors and Academic Performance," *J. Youth Adolesc.*, vol. 53, no. 9, pp. 2080–2096, Sep. 2024, doi: 10.1007/s10964-024-01994-9.
- [17] E. Acosta-Gonzaga and A. Ramirez-Arellano, "The Influence of Motivation, Emotions, Cognition, and Metacognition on Students' Learning Performance: A Comparative Study in Higher Education in Blended and Traditional Contexts," *SAGE Open*, vol. 11, no. 2, Apr. 2021, doi: 10.1177/21582440211027561.
- [18] Y. K. Kuo, S. Batool, S. Devi, T. Tahir, and J. Yu, "Exploring the impact of emotionalized learning experiences on the affective domain: A comprehensive analysis," *Heliyon*, vol. 10, no. 1, p. e23263, Jan. 2024, doi: 10.1016/j.heliyon.2023.e23263.
- [19] K. Asfani, H. Suswanto, and A. P. Wibawa, "Influential factors of students' competence," *World Trans. Eng. Technol. Educ.*, vol. 14, no. 3, pp. 416–420, 2016.