

DEVELOPMENT OF DIGITAL MULTIMEDIA LEARNING CONTENT MINI SERVER LENTERA

Ganefri¹, Febri Prasetya², Fadhli Ranuharja^{3*}, Bayu Ramadhani Fajri⁴, Agariadne Dwinggo Samala⁵

¹Program Studi Pendidikan Teknik Elektro, Universitas Negeri Padang, Indonesia

²³⁴⁵Program Studi Pendidikan Teknik Informatika, Universitas Negeri Padang, Indonesia

*Corresponding Author: fadhliiranu@ft.unp.ac.id

ABSTRAK

Permasalahan pendidikan di daerah 3T (Tertinggal, Terdepan, dan Terluar), selain dengan tenaga pendidik seperti kekurangan jumlah guru (*shortage*), kualifikasi di bawah standar (*under qualification*), kurang kompeten (*low competencies*) dan ketidaksesuaian antara kualifikasi pendidikan dengan bidang yang diampu (*mismatched*) juga masalah fasilitas jaringan telekomunikasi yang belum memadai khususnya jaringan internet. Lentera (Learning Material Resources for Remote Areas) merupakan sebuah produk inovatif dalam pembelajaran digital yang berbasis *aplikasi mobile learning* yang dapat digunakan tanpa harus terkoneksi dengan internet (*offline*). Konten pembelajaran didesain dalam bentuk multimedia pembelajaran berbasis *Whiteboard Animation* atau animasi papan tulis. Konten pembelajaran diupload ke dalam sebuah mini server. Mini server yang diberi nama Lentera dapat diakses oleh guru dan siswa menggunakan *smartphone* secara *offline* atau tidak membutuhkan jaringan internet. Pengembangan konten pembelajaran multimedia digital dengan mini server yang disebut Lentera ini bertujuan mengembangkan media pembelajaran digital inovatif untuk mendukung guru dan murid yang mengalami kesulitan dalam jaringan internet untuk melakukan pembelajaran digital di daerah 3T. Metode yang digunakan dalam pengembangan mini server ini adalah model ADDIE (*Analyze, Design, Development, Implementation and Evaluation*). Lentera sebagai media pembelajaran *whiteboard animation* yang sangat layak (*valid*) digunakan dalam pembelajaran dengan nilai rata-rata validasi sebesar 94,87%.

Kata kunci: *Mobile Learning, Whiteboard Animation, Mini Server, Lentera, Industry 4.0*

ABSTRACT

Educational problems in the 3T area (Disadvantaged, Frontier, and Outermost) areas, apart from teaching staff, such as shortage of teaching staff, low qualifications, low competence and mismatches between educational qualifications and fields being managed (mismatched) are also problems of inadequate telecommunications network facilities, especially internet networks. Lentera (Source of Learning Materials for Remote Areas) is an innovative product in digital learning based on mobile learning applications that can be used without having to be connected to the internet (offline). The learning content is designed in the form of Whiteboard Animation-based learning multimedia or whiteboard animation. Learning content is uploaded to the mini server. The mini server called Lentera can be accessed by teachers and students using smartphones offline or does not require an internet network. The development of digital multimedia learning content with a mini server called Lentera aims to develop innovative digital learning media to support teachers and students who experience difficulties in internet networks to carry out digital learning in the 3T area. The method used in the construction of this mini server is the ADDIE model (Analyze, Design, Development, Implementation and Evaluation). The lantern as a blackboard animation learning medium is very feasible (valid) to be used in learning with an average validation value of 94.87%.

Keywords: *Mobile Learning, Whiteboard Animation, Mini Server, Lentera, Industry 4.0*



INTRODUCTION

The National Education System is regulated by law. The Law on the National Education System, paragraph 1, states that basic education is the level of education that underlies further education. Based

on national education standards, the implementation of education in all regions of Indonesia is required to have the same quality and quality. The implementation of education in the era of using technology 4.0 is required to be learning that

motivates students and is innovative in solving problems they face in school[1].

In accordance with Ahmad [2] in Nana [3] there is a shift in the learning process, including from classrooms to infinite places and from paper to paperless. Therefore, the compiled learning modules are made digitally. The digital learning module is a unit of teaching program that is systematically arranged and completely outlined in digital form for learning purposes [4].

The existence of learning media in the form of digital learning videos for students can reduce the burden of carrying more than 1 (one) textbook [5]. Students can study independently easily because the modules are arranged systematically and completely. Students can study in accounting laboratories and in unlimited places with their laptops. The existence of this digital learning module can reduce paper usage so that it will have a good impact on the environment.

The use of the lantern mini server was welcomed by teachers, especially teachers who had difficulty teaching without using media. Lentera is a mini server that functions like a mini PC. The lantern can also function as a web storage medium or as a web server. This lantern is designed using Raspberry pi +. Here are the raspberry pi specifications used:

- SoC: Broadcom BCM2837
- CPU: 4x ARM Cortex-A53, 1.2GHz
- GPU: Broadcom Video Core IV
- RAM: 1GB LPDDR2 (900 MHz)
- Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless
- Bluetooth: Bluetooth 4.1 Classic
- Storage: microSD
- GPIO: 40-pin header, populated
- Ports: HDMI, 3.5mm analogue audio-video jack, 4x USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI)



Fig. 1 Raspberry Pi

By using a local network with the lantern mini server as the access point. ICT integrated classroom simulation can be carried out well. Students and teachers are connected via their respective smartphone devices. The teacher designs the learning media which is then inserted into the lantern mini server as digital learning content.

The learning system in SMKN 2 Tarusan Pesisir Selatan, majoring in Audio Video Engineering (TAV)

uses the teacher as a learning resource center. From the results of interviews with teachers of the assessment system and the provision of material using textbooks and other written-based teaching resources. Teachers are helped after training on the use of mini server lanterns as a learning medium for digital classes both in the teaching and learning process, assignments and assessments. To fill in interesting digital learning content, whiteboard animation was chosen as a medium for delivering theory in the form of videos for independent student learning [6].

Whiteboard animation learning media can help the knowledge of Vocational School 2 Tarusan teachers. 2) the use of learning media increases student interest, attitudes and understanding as well as motivation. Based on the various statements mentioned above, the development of learning media in the form of whiteboard animation needs to be designed to fill the digital learning content of the lentera mini server.

METHOD

Based on the problems previously described, this study will produce a learning media product. According to Sugiyono [7] research and development methods are research methods used to produce a particular product and test the effectiveness of the product. This research procedure adapts the ADDIE development model which consists of five stages which include analysis, design, and evaluation[8].

The ADDIE model consists of 5 components that are interrelated and structured systematically, which means that from the first stage to the fifth stage in its application, it must be systematic and cannot be ordered randomly. These five stages or steps are very simple when compared to other design models. Because it is simple and systematically structured, this design model is easy to understand and apply [9].

The ADDIE development research steps in this study are presented in the form of the chart below:

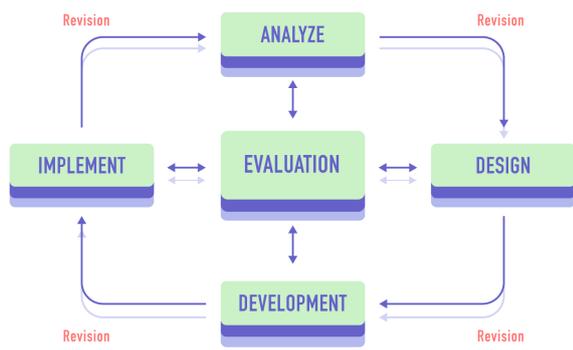


Fig. 1 ADDIE Model

The following are the steps for the ADDIE model development model:

- a. Analysis

The first stage is to analyze the characteristics of students majoring in audio video engineering, the needs of the material to be made into a whiteboard animation video and analyze the needs of the tools or devices used. Primary data is obtained through interviews and secondary data from existing research references.
- b. Design

Create pages in the application. Starting from the front page of the main menu that can be accessed. The page / layout starts the game. Final score page. The entire page is sorted one by one.
- c. Development

Consisting of interactive animation media creation, media validation and media revision. Development starts from media validation and application content.
- d. Implementation

The implementation of this whiteboard animation video was carried out at SMKN 1 Tarusan Pesisir Selatan. One class consists of 25 students and 1 teacher. The teacher uses the computer to guide the students using a whiteboard animation video.
- e. Evaluation

Evaluation is carried out after the program has been implemented, it will look for deficiencies and improve them so that the resulting product is more optimal and suitable for use.

RESULTS AND DISCUSSION

The results obtained are based on the implementation of the development method using the ADDIE model. The following is a complete review of the steps for conducting the research.

1. Analysis (Analysis)

Analysis software

This interactive whiteboard animation of science learning is intended for young children who are just entering the learning period while playing. Primary data obtained from interviews at Tarusan Pesisir Selatan District Vocational School explained the needs of users of the whiteboard animation application, namely students and teachers of SMKN 2 Tarusan Pesisir Selatan. The material used is to recognize various substances that are harmful and not harmful to the human body. In designing interactive animation, supporting equipment is also needed for the process of making and testing conducive interactive animation learning. The following are the aspects needed in making interactive animation learning [10].

Table 1. software requirements

needs	information
Windows 10	operating system
Adobe Photoshop CS6	Image Editing app
Videoscribe	Video Editing app

Table 2. K hardware requirements

needs	information
Pentium i3 2.0 GHz	Processor
4 Gigabytes RAM	Memory RAM
Seagate 500 Gb	Harddisk capacity

1. Design (Design)

Interface design is done by paying attention to users who use the application so that application users can easily use the buttons and features on the whiteboard animation. Interface design provides information to the user so that it is in line with the objectives to be achieved. Interface design of whiteboard animation starts from:

The main menu interface design for a whiteboard animation for a healthy lifestyle

- a) Design the audio and video engineering material storyline

Table 3. Storyline design

Cut (Slide)	Storyline (Alur Cerita)	Aset Visual (Gambar)	Naration(Voice Over) and music Illustration	Estimated Duration
1.	Opening Title	<p>Teks : psychoacoustic anatomy of the human ear</p> <p>Planning Installation and video audio system Harmis Yasril, S.Pd</p> <p>Figure: Student is studying</p>	instrumental music	5 sec
2.	Definition of Psikoakustik human ear anatomy	<p>Teks: The ear is an organ of the human body that functions as the sense of hearing and an organ that maintains balance. The ear has a limit on the frequency of sounds that can be heard, which is the frequency of 20 Hz - 20,000 Hz.</p> <p>Figure : -</p>	instrumental music	10 sec

The storyline design to be designed is the psychoacoustic anatomy of the human ear, which is a material that discusses the human ear which is very functional with children audio video techniques.

a) Interface Design



Fig. 3 Mobile Learning Interface

The display design of the mobile learning application on the lantern can be filled with whiteboard animation learning video content.

1. Development



Fig. 4 Cover of whiteboard animation for TAV programs



Fig. 5 Inner part of ear

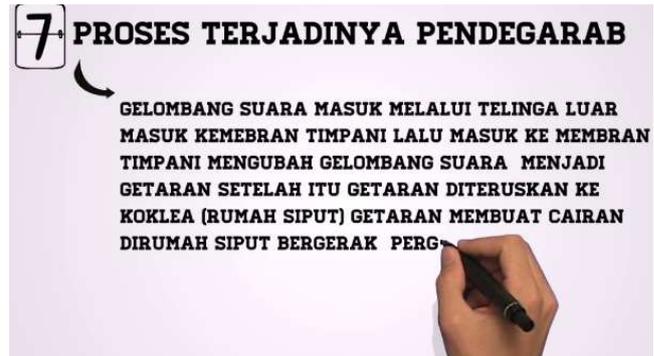


Fig. 6 The proses of hearing

At the development stage, the implementation of the storyline is applied to videoscribe to become one complete learning video. Entering text and audio makes the media whiteboard animation more interesting. The narrative will also guide students to better understand the material presented.

2. Implementation

At the implementation stage, a trial was conducted in a class consisting of 25 students majoring in audio video engineering at SMKN 2 Tarusan. The lantern mini server as the center of a mobile learning application is connected to the students and teachers in the classroom. Students are asked to open the video material page and listen to what is being said. The teacher evaluates how many students understand the material presented through the whiteboard animation by doing daily tests.

3. Evaluation

The instruments and evaluation methods used for software testing (technical test) are in the form of a black box testing component and a white box testing component. The evaluation instruments and methods used for media expert and content expert reviews were in the form of a questionnaire. The instruments and evaluation methods used for small group tests and field tests to obtain student responses were in the form of a questionnaire.

Student responses were explored using a questionnaire with a Likert scale of 5 (values ranging from 1 to 5) which were analyzed descriptively [11].

Table 4. Value Range Scale

Value Range	Response Category
$M_i + 1,5 S_i \leq x$	Very interested
$M_i + 0,5 S_i \leq x < M_i + 1,5 S_i$	interested
$M_i - 0,5 S_i \leq x < M_i + 0,5 S_i$	Hesitant
$M_i - 1,5 S_i \leq x < M_i - 0,5 S_i$	Not interested
$X < M_i - 1,5 S_i$	Very disinterested

The average student response was 38, which in general showed that the student's response was positive for the use of whiteboard animation video media on the psychoacoustic material of human ear anatomy..

CONCLUSION

After conducting research on learning media based on whiteboard animation at SMKN 2 Tarusan, majoring in Audio Video Engineering, it can be concluded:

1. Based on the testing of the mini server, the lantern can be filled with digital learning content in the form of whiteboard animation in the psychoacoustic material of human ear anatomy for students majoring in audio video engineering at SMKN 2 Tarusan.
2. Positive responses in the form of responses from students that the whiteboard animation media is interesting and helps students understand the material so that independent learning can be done in the classroom

SUGGESTION

Media development research that is filled with digital learning content into the lantern mini server can be in the form of various media, one of which is video. It is possible for the learning media in the form of a simulation application to be embedded in the lantern mini server.

REFERENCES

- [1] A. D. Samala, B. R. Fajri, and F. Ranuharja, "DESAIN DAN IMPLEMENTASI MEDIA PEMBELAJARAN BERBASIS MOBILE LEARNING MENGGUNAKAN MOODLE MOBILE APP," *J. Teknol. Inf. dan Pendidik.*, 2019.
- [2] I. Ahmad, "Proses pembelajaran digital dalam era revolusi industri 4.0," *Direktur Jenderal Pembelajaran dan Kemahasiswaan. Kemenristek Dikti*, 2018.
- [3] N. Nana and E. Surahman, "Pengembangan Inovasi Pembelajaran Digital Menggunakan Model Blended POE2WE di Era Revolusi Industri 4.0," in *Prosiding SNFA (Seminar Nasional Fisika dan Aplikasinya)*, 2019, vol. 4, pp. 82–90.
- [4] G. Ganefri, B. R. Fajri, F. Ranuharja, F. Prasetya, R. Fadillah, and F. Firdaus, "MINI SERVER LENTERA SEBAGAI ALTERNATIF PEMBELAJARAN DIGITAL DI DAERAH 3T," *J. Teknol. Inf. dan Pendidik.*, 2019.
- [5] S. Naqvi and R. Al Mahrooqi, "ICT and Language Learning," *J. Cases Inf. Technol.*, 2016.
- [6] R. Wijayanti and B. Hasan, "EFEKTIFITAS PENGGUNAAN MEDIA PEMBELAJARAN MATEMATIKA BERBASIS WHITEBOARD ANIMATION," *APOTEMA J. Progr. Stud. Pendidik. Mat.*, 2018.
- [7] Sugiyono, *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D* Sugiyono. 2013. "Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D." *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D.* <https://doi.org/10.1>. 2013.
- [8] Sugiyono, *Metodologi Penelitian Kuantitatif, Kualitatif, dan R&D*. 2016.
- [9] A. D. Samala, B. R. Fajri, F. Ranuharja, and R. Darni, "PEMBELAJARAN BLENDED LEARNING BAGI GENERASI Z DI PERGURUAN TINGGI (STUDI KASUS: PENDIDIKAN TEKNIK INFORMATIKA UNIVERSITAS NEGERI PADANG)," *JTIP J. Teknol. Inf. dan Pendidik.*, 2020.
- [10] F. Ranuharja, B. R. Fajri, and A. D. Samala, "SISTEM PELAYANAN BANTUAN MENTOR BIMBINGAN BELAJAR (BAMBIMBEL) BERBASIS WEB," *J. Teknol. Inf. dan Pendidik.*, 2020.
- [11] F. Ranuharja, "Pengembangan Modul Berbasis Web Java pada Mata Kuliah Analisis Perancangan Sistem Informasi Program Studi S1 Sistem Informasi UPI YPTK Padang," Tesis. Padang: Universitas Negeri padang, 2016.