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DEVELOPMENT OF ELECTRONIC LEARNING MEDIA PACAL RESERVIOR MATERIAL FOR PHASE F CLASS XI SMAN 1 BAURENO

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Abstract: *This study aims to develop effective and interactive learning materials for Pacal Reservoir content within Phase F, Class XI at SMAN 1 Baureno, employing the ADDIE (Analysis, Design, Development, Implementation, Evaluation) approach. Emphasizing the creation of interactive learning resources, the research endeavors to enhance students' comprehension of the technical and environmental aspects associated with the Pacal Reservoir. Methodologically, the research employs learning needs analysis, media design, development based on predetermined designs, implementation within the classroom setting, and evaluation of the efficacy of the developed learning materials. Notably, the active involvement of students and teachers in the development process plays a pivotal role in ensuring that the produced learning materials address identified needs and effectively enhance student engagement and comprehension of the Pacal Reservoir content. It is anticipated that the findings of this study will contribute to the enhancement of the quality of learning materials pertaining to the Pacal Reservoir at SMAN 1 Baureno, while also serving as a valuable reference for the development of similar learning resources across related fields of study.*

Keywords: *Learning Media, Pacal Reservoir, Class XI, ADDIE Method, Interactive*

INTRODUCTION

History serves as more than just a record of the past; it acts as a window through which we can comprehend civilization, culture, and the events that have shaped the human journey (Kuntowijoyo, 2005). However, the delivery of historical content within the context of 11th-grade history learning at SMAN 1 Baureno, a secondary education institution situated in the Baureno sub-district of Bojonegoro Regency, East Java, often encounters challenges in captivating student interest and fostering overall student engagement. One significant topic within local history that warrants attention is the Pacal Reservoir, which plays a pivotal role in the area's history. In the framework of history education at SMA Negeri 1 Baureno, the study of the Pacal Reservoir could constitute an

integral part of the curriculum, as it reflects pertinent aspects of local history. The Pacal Reservoir holds a diverse and rich history, encompassing its construction, its role in local development, and its impact on the surrounding communities. Through an exploration of the Pacal Reservoir's history, students can gain insights into the evolution of the Baureno region over time, the crucial role of infrastructure in development, and the social and economic dynamics associated with the reservoir's construction.

Learning about the Pacal Reservoir within a historical context can significantly broaden students' insights into the relationship between humans and the environment, as well as the role of technology in social change. They can understand how the construction of the reservoir affects the lifestyle of local communities, including the agricultural sector, fisheries, and daily life. By delving into the history of the Pacal Reservoir, students can also develop important historical skills, such as the ability to analyze historical sources, understand historical context, and evaluate the impact of historical events on society. Understanding the Pacal Reservoir not only enriches local history but also offers deep insight into how social, economic, and environmental developments unfolded over time.

The development of learning media using the ADDIE method is a promising alternative in designing more dynamic and up-to-date learning resources. By utilizing technology and various available resources, the creation of interactive learning media, such as history-based animations, visual simulations, or multimedia narratives, can make learning about the history of the Pacal Reservoir livelier and more interesting for 11th grade students.

Research on developing learning media for Pacal Reservoir material within a historical context in class XI at SMAN 1 Baureno is of high urgency. Firstly, the Pacal Reservoir is not only a physical symbol but also a historical heritage rich in stories of the past and the development of the surrounding environment. In the context of local history, a profound understanding of its role and impact on local communities is crucial to study and preserve. Learning about the history of the Pacal Reservoir broadens students' insights into the complexities of their local history. They not only understand important events that occurred in their area but also develop essential historical analysis skills. By analyzing historical sources and understanding the historical context, students can delve deeper into the meaning of the history of the Pacal Reservoir and its implications for the people of Bojonegoro today. According to Utami (2020), the use of appropriate and relevant learning media in delivering this content will provide students with better and more interesting access to their local history, making them more aware of and connected to the historical heritage of their region.

Secondly, technological developments provide significant opportunities to enrich history learning. With innovative learning media, such as animation, 3D visualization, or interactive applications, information about the Pacal Reservoir can be presented in a more engaging and understandable way for students. The use of technology in learning history can also inspire students' creativity, arouse interest, and broaden their insight into local history (Abdullah, 2010).

Additionally, this research responds to the need for learning approaches that adapt to the preferences and learning habits of today's students. Students tend to be more responsive to learning that utilizes technology and interactive media, which not only increases their involvement in the learning process but also deepens their understanding of historical concepts. Research on the development of learning media for Pacal Reservoir material within a historical context in class XI at SMAN 1 Baureno aims to achieve several important goals.

Firstly, the main aim of this research is to produce innovative and effective learning media to convey historical material about the Pacal Reservoir. Well-designed learning media is expected to bridge the gap between complex historical information and student understanding, providing easier, more interesting, and in-depth access to information regarding local history, especially regarding the role and impact of the Pacal Reservoir in regional development.

Secondly, this research aims to increase student involvement in history learning. By using learning media that is interactive and relevant to everyday life, it is hoped that students will be more interested and actively engaged in the teaching and learning process. This increased involvement can produce a more dynamic learning environment, trigger student creativity, and deepen their understanding of the historical aspects presented.

Moreover, this research aims to make a positive contribution to the quality of learning at SMAN 1 Baureno. By designing learning media that suit students' needs and integrating them into the curriculum, it is hoped that a more enjoyable, effective, and efficient learning environment in conveying important historical information, such as that related to the Pacal Reservoir, can be created.

By prioritizing the development of learning media that suits students' needs and interests, this research aims to make history learning about the Pacal Reservoir more interesting, relevant, and meaningful for class XI students at SMAN 1 Baureno. This will not only increase their understanding of local history but also form a strong emotional attachment to the cultural and historical heritage of their region.

METHOD

The ADDIE method is a systematic approach to learning development which consists of five main stages: Analysis, Design, Development, Implementation and Evaluation (Branch, 2009). In the context of research into the development of learning media for Pacal Reservoir material for class XI SMAN 1 Baureno, the ADDIE method can be explained as follows:

1. **Analysis:**
   The first stage involves conducting an in-depth analysis of learning needs. This includes gathering information regarding student needs, class characteristics, as well as learning objectives specifically related to understanding Pacal Reservoir material. During this stage, an analysis was carried out using available resources, technology that can be utilized, and relevant information that will be included in the learning media.

2. **Design:**
   Following the analysis, the design stage focuses on planning learning media. Here, teaching strategies, learning objectives, and the structure of the material to be delivered were designed in detail. This design includes selecting media formats (e.g., videos, presentations, interactive applications), determining the content to be included, and organizing the material to maximize student understanding.
3. **Development :**
   After the design phase, the development stage involves the concrete development of learning media based on the plans that have been made. This includes creating a prototype or initial version of the learning media that will be developed. The development team created learning materials using the technologies and resources identified in the previous analysis and design stages**.**
4. **Implementation:**
   Once the learning media has been developed, the implementation stage begins by applying the media in real learning situations in class XI at SMAN 1 Baureno. The teacher or facilitator utilize the learning media in the teaching process, ensuring appropriate and effective use. Media implementation involved 30 students from class XI IPS 5 at SMA Negeri 1 Baureno in two different stages: small group testing and large group testing. In the first stage, 10 students were selected to participate in the small group test. They engaged with the media using an interactive approach that allowed them to actively participate in discussions, analysis, and problem-solving. After that, they were tasked to fill in the Small Group Trial Questionnaire Instrument with score criteria as shown in Table 1. After the completion of the small group testing phase and obtaining appropriate feedback, the next step is to expand the media implementation to the large group testing phase. In this stage, the entire class XI IPS 5, totaling 30 students, will be involved in using the media. The class were divided into larger groups to facilitate discussion, collaboration, and project-based learning. The teacher will play an important role in guiding these activities, ensuring that each student is actively involved and that the learning objectives are achieved.

Table 1. Scores for Each Item in the Small Group Trial Questionnaire Instrument

No	Criteria	Code	Score
1	Strongly agree	SS	5
2	Agree	ST	4
3	Doubtful	RG	3
4	Don't agree	T.S	2
5	Strongly disagree	STS	1

(Source: Sugiyono, 2013)

5. **Evaluation:**
   The final stage involved an evaluation of the effectiveness of the implemented learning media. Evaluation was conducted to assess the extent to which this learning media succeeded in

achieving the set learning objectives. The evaluation results served as a basis for making improvements and adjustments, both in the content of the material, media formats, and the teaching strategies used. Utilizing the ADDIE method, this research followed a systematic and structured approach in developing, implementing, and evaluating learning media to ensure the relevance, effectiveness, and quality of learning Pacal Reservoir material for class XI students at SMAN 1 Baureno.

RESULTS AND DISCUSSION

a. Geographic Conditions

The area of Bojonegoro district, before becoming the residency capital, was part of the Rembang residency area and was still referred to as Jipang or the Rajekwesi district. Bojonegoro Regency is situated southeast of Rembang Regency (Paulus et al., 1917:314). Its western border directly adjoins Blora Regency, while the eastern border meets Lamongan Regency. To the north lie the Kendeng mountains and Tuban Regency, and to the south is Mount Pandan (Penders, 1984). Like other tropical regions, Bojonegoro experiences two seasons: the rainy season and the dry season. This climate is highly conducive to various types of agriculture, such as rice farming during the rainy season and tobacco cultivation during the dry season. Consequently, Bojonegoro possesses immense potential for agricultural development.

In terms of topography, Bojonegoro Regency comprises lowland areas, particularly along the Bengawan Solo stream. However, it also encompasses highland regions to the north known as the Kendeng Mountains, as well as Mount Pandan, Mount Pandang, Mount Kramat, and Mount Gajah to the south (Paulus et al., 1917:314).

The predominant land type in Bojonegoro Regency is agricultural or agrarian land, where the livelihoods of the population are closely tied to agriculture or agricultural activities. Most of the land in Bojonegoro Regency is limestone, rendering it barren for agricultural purposes, particularly as irrigation remains limited. The land types in Bojonegoro Regency are categorized into several areas, including irrigated rice fields, dry rice fields, village lands, and teak forest lands. Rice fields cover the largest area compared to dry land and teak forest land. As a result, Bojonegoro Regency is renowned as a fertile agricultural area suitable for rice, secondary crops, tobacco, sugar cane, and teak cultivation as shown in Figure 1 and 2 (Bojonegoro land use map, 1971).

The Bojonegoro Regency area is situated near the Bengawan Solo River, particularly the area located to the south of the river, which is relatively fertile due to sufficient irrigation. The region along the banks of the Bengawan Solo River is exceptionally fertile, facilitating successful rice and tobacco farming during that period (Bojonegoro Anniversary Commemoration Committee, 1985: 116). With this background, Bojonegoro is renowned as an agricultural area and the prime tobacco-producing region. However, areas farther from the Bengawan Solo River sometimes face water shortages for agriculture, relying solely on rainwater.

Figure 1: Map of land use in Bojonegoro, 1971.

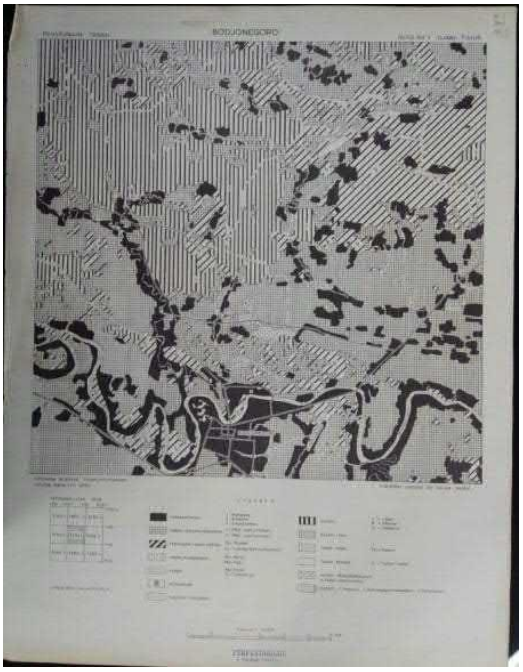
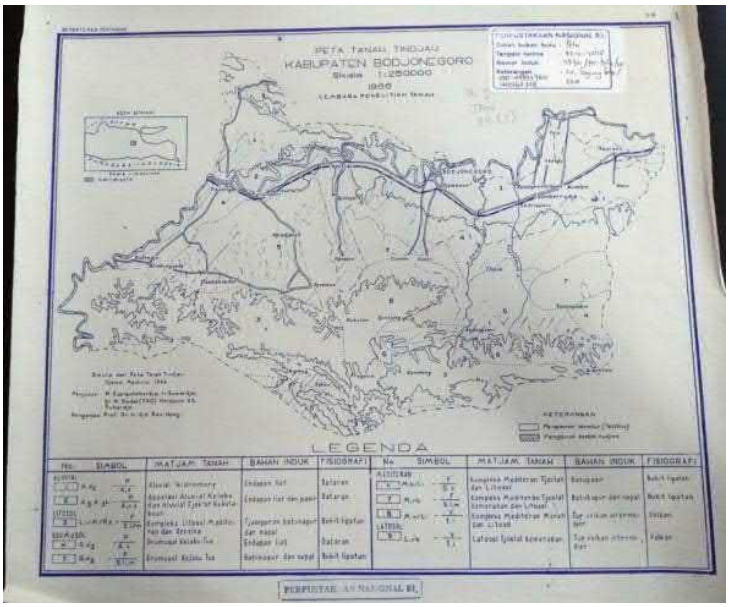


Figure 2: Map of Tanah Tinjau in Bojonegoro, 1966.



There are notable differences between areas close to the Bengawan Solo River in the south and those farther away. The southern areas distant from the river tend to be less fertile due to limited water sources, making agriculture less suitable in these regions. Agriculture is primarily developed on dry or rain-fed lands in these areas. Conversely, the southern areas adjacent to the Bengawan Solo River are more fertile due to adequate irrigation. In these regions, many farmers cultivate tobacco as a continuation of traditional plantations (Bojonegoro Anniversary Commemoration

Committee, 1985: 102). This economic disparity contributes to the wealth gap between the southern areas far from the Bengawan Solo River, which are relatively impoverished, and those adjacent to it.

Therefore, in the development plans for the southern areas distant from the Bengawan Solo River, the Dutch East Indies government implemented a strategy involving the construction of a large reservoir as a rainwater storage facility for agricultural purposes. This reservoir, known as the Pacal Reservoir, was built in 1927 and is located southwest of Bojonegoro Regency.

onsidered strategically significant, Bojonegoro Regency's area partially traversed by the Bengawan Solo River functions as a "sub-coastal" region, serving as a connection between inland areas of Bojonegoro and coastal regions for various governmental and political purposes. As a result, this route remains relatively accessible and easy to navigate due to the river route that facilitates connectivity (Committee for Excavators and Compilers of the History of the Anniversary of the Level II Regional Regency of Bojonegoro, 1988: 90).

b. Content of electronic learning media Pacal Reservoir

The importance of Pacal Reservoir for the people of Bojonegoro Regency

Agricultural land spans an area of 100,235 acres, but technically only 3,678 acres receive irrigation, specifically agricultural land located in the Pirang and Dander irrigation areas in the Bojongoro district. Agricultural land that receives semi-technical irrigation in river areas, where permanent dams are made by the irrigation department and detailed irrigation is carried out by the people, covers 6,952 bau.

The agricultural production of the natives is generally very poor, and the economic situation is very worrying. Farmers rely on the land for their livelihoods, despite much of it being barren. The number of industries and crafts is very small. Labor work is mainly available in government-run businesses such as the Forestry Service, Irrigation Service, and the BPM oil drilling fields in the Kasiman and Malo districts.

Apart from the reasons mentioned above, the construction of the Pacal Reservoir is based on the potential of the Bojonegoro Regency area, relying on agriculture as the primary sector of people's livelihoods. The construction of the Pacal Reservoir commenced during the Dutch East Indies government era, starting in 1927 and completing in 1933.

The idea for creating the Pacal Reservoir emerged from the critical need for water in agriculture, supported by the insufficiency of small reservoirs in the Bojonegoro area to meet the required water volume. This necessity was underscored by a consistent rise in income from the agricultural sector annually. Additionally, the prolonged dry season in 1905-1906 resulted in significant losses of agricultural products (Penders, 1984: 35), further emphasizing the urgency of developing water storage solutions like the Pacal Reservoir.

The Dutch East Indies government chose to construct the Pacal Reservoir in Kedung Sumber Village, Temayang District due to the district's elevated geographical position compared to others.

The presence of teak forests in Temayang District also provided an opportunity to utilize the area as a natural water storage medium for the Pacal Reservoir. The Pacal River, naturally formed among the hills in Temayang District, served as the primary water source for the reservoir (Hartono, 2012).

The construction of the reservoir in Kedung Sumber Village was anticipated to be cost-effective and less labor-intensive. It primarily involved damming at specific points according to the design plan for the Pacal Reservoir. Additionally, the Pacal River tributary served as the outlet for the reservoir. Moreover, compared to the Bengawan Solo River Valley project, the construction of the Pacal Reservoir was deemed more effective. The Bengawan Solo River Valley project, involving dam construction on the Bengawan Solo River, was considered less efficient due to the substantial costs associated with dam construction and the requirement of expensive water pumps for agricultural water extraction, which many farmers couldn't afford (Prasetio: 202).

The construction of the Pacal Reservoir was prompted by the prolonged dry season. Between 1893 and 1903, the Bojonegoro area faced significant agricultural irrigation challenges, leading to dire living conditions for farmers due to crop failures caused by unfavorable weather conditions and rice plant diseases, notably planthopper pests.

In 1904, technical irrigation systems and flood control measures were inadequate in the Bojonegoro area. Only around 112 bau rice fields situated at the base of Mount Pandan in Bojonegoro's southern region and its vicinity received water consistently throughout the year from local springs. The rice fields near the city of Bojonegoro were supplied water from three primary sources: the Karan spring in Gunung Sari Village, Baureno district, which irrigated 42 paddy fields; the Kerdjo dam in Brangkal Village, Kepohbaru District, which provided water for 2,376 paddy fields; and the Tjawal river irrigation in Baureno district, supporting 1,726 bau rice fields. Additionally, the Mekuris river in Mlinjeng Village, Sumberejo District, served three other areas, irrigating 2,311 bau, 2,313 bau, and 631 bau of rice fields, respectively. Based on this information, only about 12% of the total 79 thousand paddy fields in Bojonegoro received irrigation from these sources (Penders, 1984: 29).

The colonial government attempted to address this issue temporarily by providing land aid as emergency relief to prevent starvation-related deaths. However, a more effective and lasting solution to this problem could be achieved through the implementation of a comprehensive programmatic and structural approach. This situation worsened during 1904-1906, with nearly continuous floods during the rainy season and droughts during the dry season. Consequently, the local economy deteriorated, leading to the imminent threat of starvation in many districts of Bojonegoro (Penders, 1984: 23).

In 1906, the entire Bojonegoro area and the nearby district of Blora were affected by a drought in July and August, resulting in significant damage to the rice harvest. On April 18, 1906, Resident Fraenkel provided assistance of 30,000 guilders to purchase and distribute corn seeds. In mid-October, Resident Fraenkel was also authorized by the Batavian government to purchase rice from

other areas using government funds and then sell it to people suffering from drought and hunger in order to stabilize rice prices. Conditions in Bojonegoro remained concerning, especially during the prolonged dry conditions in June, as the corn harvest had also been severely affected (Penders, 1984: 25).

The main source of a consistent and adequate water supply to irrigate the entire Bojonegoro residency is the Bengawan Solo River. Rivers and other streams in the Bojonegoro residency area dry up during the east wind. The Bengawan Solo River enters the Bojonegoro residency about 4 km north of Ngawi and flows for approximately 38 km through a deep ravine in a limestone area generally near Ngluwak village.

The primary reason why the construction of the large Bengawan Solo water reservoir in 1906 was not realized was that in most of the Bojonegoro residency, the banks of the Bengawan Solo River were too steep to allow water to be taken directly through the canal. Irrigation would require the installation and operation of expensive mechanical pumps, a cost considered too high given the expected increase in agricultural output.

In the Kanor sub-district of the Palem district, rice fields are irrigated every 200 years. The Regent of Bojonegoro reported that the level of agricultural land experiencing regular flooding is 2650 bau, covering an area of 325 "smells" in the Bojonegoro district itself. As a result of very high-water levels from the Bengawan Solo in 1905, an additional 6449 rice fields were flooded between February 19-23, especially in the four eastern districts. During the rainy season, this land is left unplanted, resulting in food shortages (Penders, 1984: 31)

In 1906, the agricultural area in Bojonegoro received only 2.7 million guilders from the colonial government, which was spent on irrigation. During the period 1900-1940, the total area of rice fields increased from 2.7 million hectares to 3.4 million hectares. Colonial policy, as stated in a report in 1905, indicated that the construction of the Solo Valley scheme project had been halted. The Solo Valley scheme project entailed the construction of irrigation and dams along the Bengawan Solo River. This project was discontinued because a much more effective method emerged, namely expanding the existing reservoir system by creating water storage through damming rivers or springs. Consequently, the number of reservoirs is expected to increase in the Bojonegoro residency in the future (Panders, 1984: 33). Small reservoirs from the Bojonegoro residency from 1882-1905 along with the area of rice fields that were irrigated can be found in Table 2.

Several technical improvements were made to the above reservoirs in 1882-1905. For example, in 1882, a total of 5,928 guilders was spent to build a new sluice gate for the Pandjang Reservoir. The government's plan to repair the Tlogo Mudji Reservoir was stopped due to insufficient finances. This situation led local residents to carry out repairs to the reservoir with assistance from mosque funds (Memory of Handover of Position 1921-1930, 1976). On October 8, 1902, the government issued order number 36, providing a total of 12 thousand guilders for repairs to all the reservoirs mentioned in the table above. Efforts made by the Dutch East Indies government and the community to repair existing

small reservoirs were deemed insufficient to meet the water needs for agriculture in the Bojonegoro area. This condition caused prolonged crop failure from 1902-1923. In 1923, people continuously experienced crop failure. This condition occurred when the rainy season was prolonged, resulting in floods, followed by a dry season that led to drought. As a result, crop failure occurred on 41,694 acres of agricultural land in Bojonegoro (Panders, 1984: 33).

Table 2. Small reservoirs in the Bojonegoro Residency in 1882-1905 and the area of irrigated rice fields.

Reservoir Name	The area of rice fields that are irrigated (smell)
Long	95
Hadji logo	1,950
Koedoer	475
Pasinan	150
Blongsong	154
Karangdinojo	256
Mataoenan	147

Source: Memories of the Resident of Bojonegoro (CE Croes), 7 May 1930.

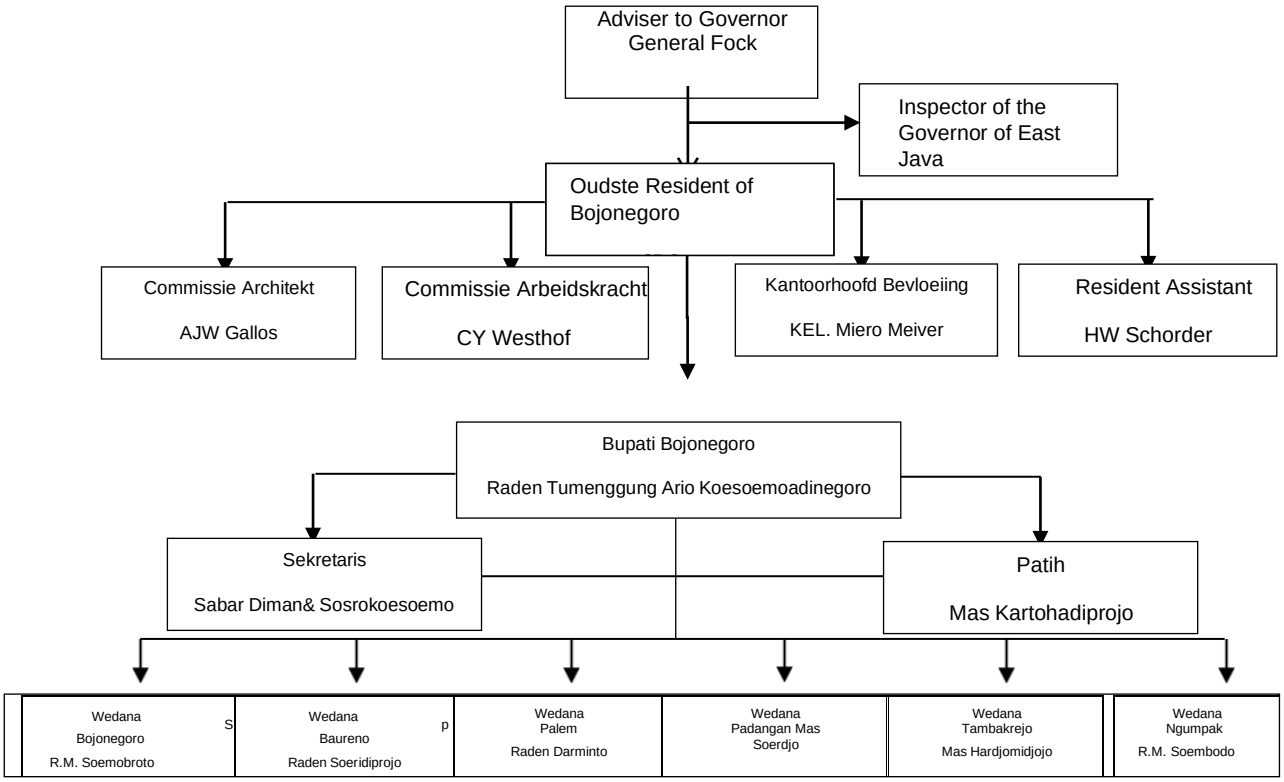
Resident of Rembang, Hildering, in 1923, proposed that if the Solo Valley scheme was completed or if it was financially impossible, then a number of additional reservoirs should be built on the Patjal, Kerdjo, Tjawak, Tidoe, Korgan, and Kedongtawang Rivers (Penders, 1984: 34). The complaints of the Rembang Resident Government regarding the continuing poor conditions in Bojonegoro seem to have received more attention from ministers of colonial countries. One of the ministers of the Dutch East Indies colony, in an express message to Governor General Fock on November 17, 1925, stated that rice planting was entirely dependent on the weather. A poor harvest results in economic decline and affects income. General Fock expressed his hope that the draft budget for 1924 would include a general plan for the economic development of the Bojonegoro region.

On August 30, 1925, the colonial government approved the construction of the Pacal Reservoir with an estimated total cost of 1.2 million guilders, of which 37,000 guilders were provided by the government in the form of building materials, such as wood, stone, and iron, and 1,163,000 guilders were obtained from increased taxes on the native population. The development of not only the Pacal Reservoir but also other reservoirs on the island of Java was followed by the opinion of the Dutch East Indies ministry. Criticism and suggestions from this ministry ultimately yielded wise results. The labor for building the reservoir was carried out by native forced laborers, called forced labor. Most of the workers were Bojonegoro residents as well as workers from around the Bojonegoro area such

as Blora, Tuban, and Babat. The structure of the Pacal Reservoir construction committee was formed according to changes in the existing residency government structure. Previously, Bojonegoro was under the Rembang Residency government; then, it was established independently as a residency. With this new status, Bojonegoro Regency acquired several new position structures that did not previously exist. The government structure and the names of its officials are mostly included in the Pacal Reservoir construction committee.

The formation of the committee structure began in 1925 when Bojonegoro Resident CE Caroes took office. Through the "Verslag Over de Burgerlijke Openbare Werken Over Het Jaar 1925," a report by the Governor of East Java W.Ch. Handerman appointed the Bojonegoro Resident to supervise the construction of the Pacal Reservoir. The appointment of Resident CE Croes granted full authority to form the development committee structure according to expectations. The structure of the Pacal Reservoir construction committee is depicted in Figure 3.

Firuge 3. Composition of the Pacal Reservoir Development Committee in Bojonegoro



Source: East Java Provincial Archives Service

Judging from this arrangement, Governor General Fock directly ordered Bojonegoro Resident CE Croes to carry out the construction of the reservoir. The construction of the Pacal Reservoir was supervised directly by the Governor of East Java, W.Ch. Handerman. Under the Resident of Bojonegoro, CE Croes, there was the Regent of Bojonegoro, Raden Tumenggung Ario

Koesoemoadinegoro, who was assisted by the secretary, governor, and wedana-wedana in Bojonegoro, to collect funds and find manual workers for the construction of the reservoir. The construction of the Pacal Reservoir was completed in 1933 (see Figures 4-7 for pictures of the construction process).

Once the construction of the Pacal Reservoir was completed, it was immediately used to collect rainwater for agricultural activities. This reservoir covers an area of 3,878 Ha, with a water depth of 25 M. Judging from its area and depth, the Pacal Reservoir can hold an average of around ±35 million M^3 of water. The water flow reach of the Pacal Reservoir basically covers less than the entire Bojonegoro Regency. The drainage area of the Pacal Reservoir covers the sub-districts of Temayang, Dander, Bojonegoro, Sugihwaras, Kapas, Balen, Sumberrejo, Kedungadem, Kepohbaru, Kanor, and Baureno (Committee for Excavating and Preparing the Anniversary of Regional Regency Level II, 1988: 243). Why aren't the other Bojonegoro sub-districts also irrigated by the Pacal Reservoir? It's because of their geographic location, which is higher than the Pacal Reservoir located in Kedung Sumber. The construction of the Pacal Reservoir has contributed 35% to the sustainability of agriculture in Bojonegoro. This can be seen from the condition of the Pacal Reservoir's water flow, which can irrigate agriculture in Bojonegoro Regency.

Figure 4: Construction of the Pacal Reservoir 1928

(Source: KITLV 91028/Leiden University Library Digital Collections)

Figure 5: Construction of the Pacal Reservoir 1930

(Source: KITLV 91030/Leiden University Library Digital Collections)

Figure 6: Construction of the Pacal Reservoir 1931

(Source: KITLV 91033/ Leiden University Library Digital Collections)

Figure 7: Construction of the Pacal Reservoir 1933

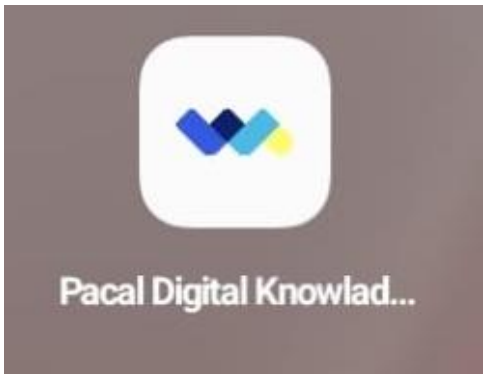
(Source: KITLV 91035/Leiden University Library Digital Collections)

c. Media Effectiveness Test

Pacal Digital Learning Media (see Figure 8-9) is a digital learning platform developed to enhance the effectiveness of learning at SMA Negeri 1 Baureno. This platform is designed to provide broader accessibility to learning materials, facilitate interaction between students and teachers, and enable more interactive and project-based learning. With various features such as interactive learning modules, discussion forums, online assignments, and evaluations, Pacal Digital Learning Media takes learning to a new level in line with developments in information and communication technology. The media testing stage consists of two different phases: large groups and small groups, designed to ensure that the implementation of learning media runs effectively and efficiently. The media can be downloaded via the shared link and accessed using electronic devices such as smartphones or laptops. It can be accessed anytime and anywhere without the need for a network connection. Additionally, there is a brief overview of the learning media that contains local historical content on the Pacal Reservoir.

Firstly, the media testing phase commences with a small group. In this stage, a select group of 10 students is chosen to participate in the initial trial of the learning media. These participants are either randomly selected or chosen based on specific criteria established by the school or teacher. The individuals in this small group will engage with the learning media in a controlled and monitored environment. The objective of this phase is to identify potential advantages and disadvantages of the learning media, as well as to gather direct feedback from participants to enhance and refine media development. The small group trials took place on Monday, November 28, 2023, in Class [insert class name]. The scores for each question in the questionnaire range from 1 to 5. A score of 5 indicates the respondent strongly agrees, while a score of 4 indicates agreement, and so forth, until the score is assessed. Data on the results of the small group trials can be found in Table 3.

Figure 8: image of the Pacal Reservior learning application



Source : Dini Nisa Atus Sholikah, 2023

Figure 9: image of contents the Pacal Reservior learning application

Source : Dini Nisa Atus Sholikah, 2023

Table 3. Quantitative Data from Small Group Trial Results (N=10)

Indicator	Assessment Items	X	Xi	Hur (%)
Material in learning media (Sudatha, 2019)	1. The sentences presented are easy to understand	48	50	96 %
	2. Presentation of images on application media in accordance with the material presented.	46	50	92 %
Visual aspects in learning media (Ariani & Haryanto, 2010)	3. Clarity of narrative	45	50	90 %
	4. 360° image clarity	46	50	92%
	5. Attractive layout design	40	50	80%
	6.Color accuracy	48	50	96 %
Benefits and functions of learning media	7. Cultivate interest in learning	40	50	80 %
	8.Providing Stimulation independence	43	50	90.1 %
	9. Clarify the message conveyed	44	50	88 %

	10. Overcoming space and time limitations	42	50	84 %
Total number		442	500	884
Average		44.2	50	88.4 %

(Source: Small Group Trial Results Questionnaire, 2023)

Notes:

N = Number of trial subjects

x = Number of Values given by test subjects

xi = Maximum Number of Values

Hur = Student response test results

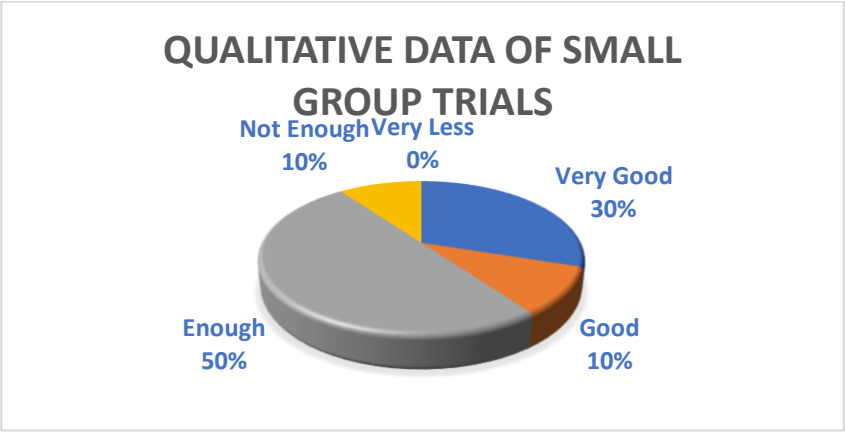
$$Huv/Hur = \frac{\sum x}{\sum xi} \; x\; 100\%$$

$$\frac{Huv}{Hur} = \frac{442}{500} \; x\; 100\%$$

$$= 88.4\ \%$$

Based on Table 3, the results of the small group trial above can be seen that the average percentage value is 88.4%. These results indicate that the product, Pacal Electronic Media on Pacal Reservoir Material, is very effective for use or application in schools, especially for class X IPS students at SMAN 1 Baureno.

Figure 9. Qualitative Data on Small Group Trial Results



(Source: Small Group Trial Results Questionnaire, 2023)

Figure 9 presents qualitative data provided by respondents. A total of 10 respondents offered criticisms and suggestions in the student response questionnaire during the small group trial. Nearly all of the criticisms and suggestions provided were positive; only one respondent proposed an improvement, suggesting the addition of music to the product being developed. Overall, Pacal Electronic Media proves to be highly effective for learning Indonesian history.

Following the reception of necessary feedback and making required adjustments, the media testing phase progresses to the large group stage. In this phase, the entire class, comprising approximately 30 students, participates in utilizing the learning media. These large group trials enable the testing of media in a broader, more realistic context, considering factors such as student diversity, class dynamics, and potential technical challenges that may arise when implementing the media on a larger scale. The result of large group trials is presented in Table 4.

The Large Group Trials took place on Wednesday, November 30, 2023. The scores for each question in the questionnaire range from 1 to 5. A score of 5 indicates the respondent strongly agrees, while a score of 4 indicates agreement, and so forth, until a score of 1 is given (refer to Table 1).

Table 4 Quantitative Data Results Trials Large Group (N=30)

Indicator	Assessment Items	X	Xi	Hur (%)
Material in learning media Sudatha (2019)	1. The sentences presented are easy to understand	128	150	85%
	2. Presentation of images on application media in accordance with the material presented.	128	150	85 %
Visual aspects in learning media N. Ariani & Haryanto (2010)	3. Clarity of narrative	133	150	88 %
	4. 360° image clarity	143	150	95%
	5. Attractive layout design	137	150	91%
	6.Color accuracy	134	150	89 %
Benefits and functions of learning media Wahono (2006)	7. Cultivate interest in learning	136	150	90.6 %
	8.Providing Stimulation independence	136	150	90.6 %
	9. Clarify the message conveyed	139	150	92.6%
	10. Overcoming space and time limitations	138	150	92 %

Total number	13.52	1500	716
Average	135.2	150	90.1%

Notes:

N = Number of trial subjects

x = Total value given by test subject xi = Maximum Number of Values

Hur = Student response test results

$$Huv/Hur = \frac{\sum x}{\sum xi} \; x\; 100\%$$

$$\frac{Huv}{Hur} = \frac{1352}{1500} \; x\; 100\%$$

$$= 90{,}1\ \%$$

Based on table 4, the results of the large group trial above can be seen that the average percentage value is 90.1%. These results indicate that the product, Pacal Electronic Media on Pacal Reservoir Material, is very effective for use or application in schools, especially for class XI students.

Figure 10. Qualitative Data on Large Group Trial Results

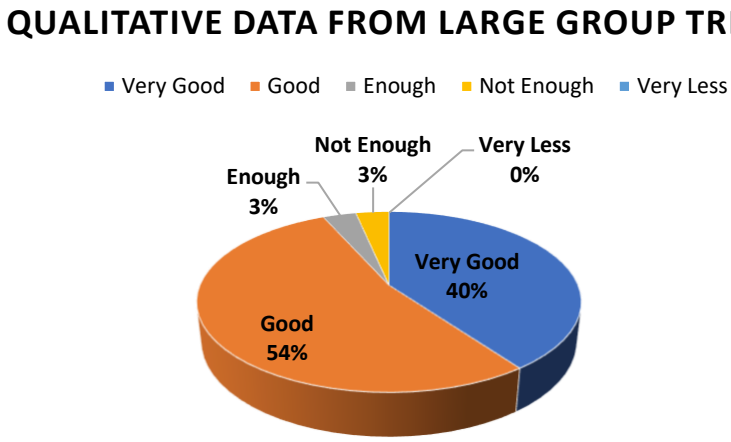


Figure 10 represents qualitative data provided by respondents. A total of 30 respondents provided criticism and suggestions in the student response questionnaire in the large group trial. Almost all of the criticism and suggestions given were positive, only one respondent made suggestions for improvement, namely regarding music that was too loud. Overall, Pacal Electronic Media was very effectively used in learning Indonesian history.

CONCLUSION

In research on developing learning media for Pacal Reservoir material using the ADDIE method, the following conclusions can be drawn: This research underscores the importance of a systematic approach in developing learning media for historical material, especially pertaining to the Pacal Reservoir, within the learning context of class XI at SMAN 1 Baureno. Through the ADDIE (Analysis, Design, Development, Implementation, Evaluation) approach, this research successfully designed and implemented learning media aimed at enhancing students' understanding of local history.

An in-depth learning needs analysis serves as the main basis for developing this media. The focus during the design stage is on utilizing appropriate technology and organizing materials according to student characteristics. The result is learning media that is interactive, relevant, and tailored to students' needs, thereby making information about the Pacal Reservoir more engaging and comprehensible.

The implementation of this learning media in history classes for class XI students leads to increased student involvement. The incorporation of technology and innovative approaches in learning transforms students' learning experiences, making them more dynamic and offering opportunities for deeper exploration of local historical material.

Evaluation of the learning media demonstrates its effectiveness in enhancing students' understanding of the Pacal Reservoir material. Continuous evaluation serves as a crucial foundation for enhancing and further developing this learning media, with the goal of consistently improving its quality and relevance to students' learning needs in the future.

Thus, developing learning media for Pacal Reservoir material using the ADDIE method not only offers a solution for enhancing students' understanding of local history but also creates room for a more adaptive, engaging, and effective learning approach within the historical context at SMAN 1 Baureno.

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