

INFORMATIONAL VIDEO ON CLEAN WATER TREATMENT AT THE BATAM WATER MANAGEMENT SYSTEM BUSINESS ENTITY AT THE MUKA KUNING WATER TREATMENT PLANT

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Abstract

Research background: Educational activities at the Muka Kuning Water Treatment Plant remain limited, resulting in low visitor understanding of the clean water treatment process. In addition, systematically developed video-based educational media using instructional design models such as ADDIE are still limited in the clean water treatment sector in Batam. This study aims to develop an informational video by integrating live shoot and motion graphic techniques and to evaluate its effectiveness in improving visitor understanding.

This research employed a research and development approach using the ADDIE model. The model was selected due to its systematic and iterative framework, which enables structured development and continuous evaluation, making it suitable for addressing the lack of systematically developed educational video media in the clean water treatment sector. The developed video was validated by subject matter experts and media experts and tested using a one-group pre-test and post-test design involving 31 sixth-grade elementary school students. Data were analyzed using a paired sample t-test.

The results showed feasibility scores above 85% for educational content, material clarity, and visual quality. Statistical analysis indicated a significant improvement in participants' understanding after watching the video ($t = 9.784$, $p < 0.05$). These findings indicate that the developed video is feasible and effective as an educational medium for clean water treatment learning activities.

A. Introduction

The Batam Business Entity, better known as BP Batam, is one of the authorities responsible for managing drinking water, overseeing the Directorate of the Drinking Water Management System (SPAM). The management of drinking water in Batam City differs from that in other cities. Whereas clean water providers are under the government, the operational management is carried out by the private sector with PT Air Batam Hulu (ABHU) responsible for the operation, maintenance, and development of the clean water supply system and PT Air Batam Hilir (ABHI) responsible for the distribution of clean water to customers (Mujiaman, 2025). One of the main treatment plants under this management is the Muka Kuning Water Treatment Plant (IPA), which treats raw water through physical, chemical, and biological processes to meet the previously established clean water standards (Kementerian Pekerjaan Umum Republik Indonesia, 2007).

Educational activities at Muka Kuning Water Treatment Plant are currently limited to the delivery of information through slide presentations and field trips with restricted access. This has resulted in visitors not gaining an optimal understanding of the stages of the clean water treatment process. These limitations indicate the need for innovation in the form of visual-based educational

media that can explain the clean water treatment process in a more interesting, informative, and effective manner.

One solution that can be developed in this study is an informative video that combines live shoot and motion graphic techniques. Live shoot techniques involve the process of capturing moving images directly to display real activities in the field, thereby increasing the credibility and authenticity of information (Muhazzar & Prasetyaningsih, 2024), while motion graphics involve combining graphic elements into moving visuals that enable the presentation of concepts or processes that are difficult to observe directly (Supardianto & Octaviany, 2023). The combination of these two techniques produces dynamic visual media, making it more effective, creative, and efficient in conveying messages to the audience in explaining the clean water treatment process. Thus, this video is expected to not only serve as educational media for visitors to the Muka Kuning Water Treatment Plant but also function as a means of conveying information for agencies or institutions conducting official visits.

To support effective message delivery, visual communication plays an important role in attracting attention and clarifying information. Visualization in video media allows messages to be conveyed clearly, concisely, and attractively through a combination of elements such as layout, color, and typography (Yusa, Priyono, Anggara, Setiawan, & Yasa, 2023), as well as composition (Prasetyo, Sitompul, & SURAWI, 2023). Shooting techniques such as extreme long shot, long shot, medium long shot, medium shot, close-up, and extreme close-up are used to strengthen the visual appearance (Fersellia, Nugroho, Muflih, & Fachri, 2024). Meanwhile, the use of flat design illustrations was chosen because it offers visual simplicity, visual consistency, and production efficiency (Dewanto & Mulyadi, 2020). This approach emphasizes that educational videos not only present information but also integrate elements of art and visual communication science so that the message is conveyed effectively and the information is better remembered (Studio Antelope, 2020).

Learning media can be used to design informative videos that support educational objectives for visitors to Muka Kuning Science Museum and improve their understanding of the water treatment process. One medium that can be used is the development of educational videos. The use of this medium has been proven to improve the quality of material delivery and the effectiveness of the learning process. Research by (Rejeki, Leksono, & Rohman, 2023) shows that the development of interactive video content in ICT training at the Surabaya Religious Training Center is considered highly valid, interesting, and effective in improving participants' learning outcomes. Research by (Kawete, Gumolung, & Aloanis, 2022) shows that the use of motion graphic-based chemistry learning videos improves students' understanding during the COVID-19 pandemic and is considered excellent by subject matter and media experts. Video development in this study used the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because it is systematic and structured, making it easier for researchers to produce products that meet their needs and objectives (Fitrianingsih, Hardiansyah, Sucianti, Fitriati, & Afriani, 2022). This model also allows for a revision process, where it is possible to return to the previous stage to make improvements before continuing to the next stage to ensure that the resulting product is in line with the learning objectives. In addition, three main aspects, namely educational value, audience comprehension level, and visual appearance, serve to focus and ensure that the information media is not only aesthetically appealing but also capable of conveying educational messages clearly and easily (Yusuf, Prasetyaningsih, & Neta, 2023). Thus, media development becomes more adaptive, effective, and focused in accordance with the visual concept that has been designed.

This study aims to design and develop informational videos about the clean water treatment process by combining live shoot and motion graphic techniques as educational media at the Muka Kuning Water Treatment Plant. In addition, it aims to determine the effectiveness of videos in improving visitor understanding through pre-test and post-test evaluations. The main issue behind this research is the lack of informative video-based educational media that has been systematically developed using the ADDIE model in the clean water treatment sector in Batam.

B. Research Methods

This study employed a research and development method using the ADDIE development model, which consists of five stages: Analyze, Design, Development, Implementation, and Evaluation. The ADDIE model was selected because it applies a systematic and sequential approach,

in which the output of each stage becomes the input for the subsequent stage, enabling structured development and continuous evaluation throughout the process (Fitrianingsih, Hardiansyah, Suciati, Fitriati, & Afriani, 2022).

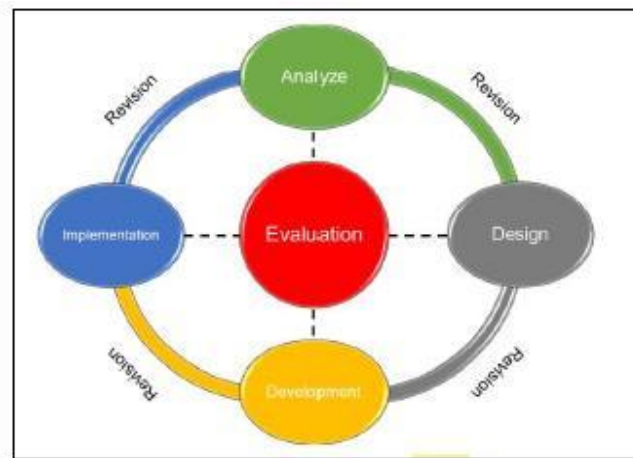


Figure 1. ADDIE Phases

This research aimed to develop an educational informational video on clean water treatment at the Muka Kuning Water Treatment Plant, Batam. The developed media combines live shoot and motion graphic techniques to explain the clean water treatment process and to measure its effectiveness in improving visitors' understanding through pre-test and post-test assessments. The study involved subject matter experts and media experts as validators in the alpha testing stage, as well as media users in the beta testing stage. The media users consisted of 31 sixth-grade students of Kartini Elementary School, Batam, who participated as respondents during the implementation phase.

Evaluation was conducted in two stages: alpha testing and beta testing. Alpha testing aimed to assess the suitability of the material content and visual appearance of the video prior to implementation. This stage was carried out using questionnaires completed by subject matter experts and media experts to evaluate educational aspects, material accuracy, and visual quality. The educational aspect was emphasized as it reflects the quality of information and learning messages delivered through the media (Yusuf, Prasetyaningsih, & Neta, 2023).

Beta testing was conducted to measure the effectiveness of the developed video. At this stage, respondents were first given a pre-test to measure their initial understanding, followed by treatment in the form of watching the educational video, and then a post-test to assess changes in understanding. The same set of questions was used for both tests to ensure measurement consistency.

The research instruments for subject matter experts were developed based on educational aspects, material comprehension, and visual appearance (Yusuf et al., 2023). Meanwhile, the instruments for media experts covered technical and visual aspects, including shooting techniques, frame composition, background selection, layout, typography, audio, color, graphics, animation, background music, language use, navigation, and screen design. All instruments used a Likert scale to obtain assessment scores, as this scale is effective for measuring respondents' opinions and attitudes toward a particular object (Yusuf, Prasetyaningsih, & Neta, 2023).

Furthermore, the Likert scale was used to obtain scores from each respondent because it is capable of measuring the opinions, positions, and views of individuals or certain groups regarding phenomena or events in society (Yusuf, Prasetyaningsih, & Neta, 2023). The following are the scores from the questionnaire in the form of a Likert scale that has been adjusted for Alpha testing.

Table 1. Likert Scale Score Alpha Testing

Score	Description
5	Very Suitable
4	Suitable
3	Fairly Suitable

2	Not Suitable
1	Very Unsuitable

The maximum score was determined by multiplying the number of respondents by the highest Likert score. The resulting percentages were then interpreted based on predetermined suitability intervals. This calculation was performed to obtain the average presentation score for each video recording based on the scores obtained using the formula below.

$$index \% = \frac{total\ skor}{skor\ maksimum} \times 100$$

$$index \% = (total\ score)/(maximum\ score) \times 100$$

Maximum score = number of respondents x highest likert score

Maximum score for Clean Water Management System Experts Batam = 2 respondents x 5 = 10

Minimum score for Clean Water Management System Experts Batam = 2 respondents x 1 = 2

Maximum score for Media Expert = 2 respondents x 5 = 10

Minimum score for Media Expert = 2 respondents x 1 = 2

In order to determine the level of suitability in informational videos, the results obtained from these calculations are adjusted to the percentage intervals that have been set on the Likert scale.

Table 2. Alpha testing percentage interval

Percentage	Description
0 - 20%	Very Unsuitable
>21 - 40%	Not Suitable
>40 - 60%	Fairly Suitable
>60 - 80%	Suitable
>80 - 100%	Very Suitable

To measure learning improvement, pre-test and post-test scores were analyzed using a paired sample t-test. Each correct answer was scored 1 and each incorrect answer 0, with a maximum score of 10. Data analysis was performed using Microsoft Excel to calculate the mean, standard deviation, and t-test values through the *Data Analysis* feature by selecting *t-Test: Paired Two Sample for Means*. The decision criteria were based on the significance value, where a p-value less than 0.05 indicated a significant difference between pre-test and post-test results.

Table 3. Sampling criteria for T-Test Beta testing

Paired Sample T-Test Measurement Criteria	
P – Value < 0,05	Significant difference
P – Value > 0,05	No significant difference

C. Results and Discussion

1. Results

The result of the development of the Informational Video on Clean Water Treatment at The Batam Water Management System Business Entity at the Muka Kuning Water Treatment Plant was designed by combining live shoot and motion graphic techniques, developed using the ADDIE Model development method. The following are the stages of media development:

1. Analysis

The analysis stage is the first stage in the ADDIE Model development method. The analysis part of this study is to identify the needs and issues underlying media development through

interviews with the Batam Drinking Water Management System Business Entity, with reference to previous research on information media development (Kawete, Gumolung, & Aloanis, 2022). At this stage, interviews were conducted to determine the needs, problems in educational activities, and specific data that the company wanted to convey. Based on the results of an interview with Mr. Mujiaman, Director of PT Air Batam Hulu, it was found that visitor education activities at the Muka Kuning Water Treatment Plant were still limited to presentation slides and field visits with limited access. This condition meant that visitors did not yet fully understand the clean water treatment process. Therefore, visual media in the form of informative videos combining live shoot and motion graphic techniques were needed so that visitors could understand the clean water treatment process more effectively and interestingly. Based on previous research by (Muhazzar & Prasetyaningsih, 2024), live shoot techniques are often used to provide a realistic picture and increase the credibility of information, while the implementation of motion graphics has the advantage of enabling the visualization of elements that cannot be seen directly but also provides additional interesting information (Supardianto & Octaviany, 2023). To ensure that the developed video is on target and effective, this study conducted a review of relevant information and visual references, such as company profile videos and the kurgesagt flat design visual style.

The analysis stage also covers several aspects, namely the analysis of material or content requirements by material experts from SPAM Batam experts/practitioners, visual presentation analysis by media experts, and analysis of visitors' understanding of the video content on clean water treatment at the SPAM Batam Business Entity at IPA Muka Kuning, so that the material presented can optimally fulfill its educational objectives. The table of requirements analysis can be seen in the following table:

Table 4 Needs Analyst

Concept	Detailed information
Aims/objectives	<ol style="list-style-type: none"> To design an informational video on clean water treatment that integrates <i>live shoot</i> and <i>motion graphic</i> techniques to explain the water treatment process at the Muka Kuning Water Treatment Plant. To examine the effectiveness of the informational video in improving visitors' understanding of the clean water treatment process based on pre-test and post-test results.
Format	<ol style="list-style-type: none"> Video Asset in mp4 format <i>Dubbing</i> dan <i>backsound</i> in mp3 format Final video combining live shoot and motion graphic techniques in MP4 format
Duration	5 minutes 13 seconds
Video Concept	The informational video on the Clean Water Treatment Process at the Muka Kuning Water Treatment Plant was created with the concept of an informational video about the clean water treatment process at the Muka Kuning Water Treatment Plant, designed to describe the role of the SPAM Business Entity and its partners, the capacity of the water treatment plant in Batam City, and the function of the water catchment area and reservoir. This video also explains the stages of water treatment, starting from water collection in the dam to final storage in the clearwell, accompanied by a brief review of each process. In addition, it also shows the service area of the Muka Kuning water treatment plant, the benefits of clean water for the community, and a message to use water wisely. The filming locations focused on the Muka Kuning Reservoir, the Water Catchment Area of Muka Kuning, and the Muka Kuning Water Treatment Plant. The narration uses a clear and relaxed voice-over to ensure easy understanding by the audience, while the background music used is non-copyright background music.
Contents	<ol style="list-style-type: none"> Brief introduction to the Company and its partners Data on water treatment plant capacity in Batam City Functions of the DTA and Reservoir Water treatment process from water intake to the final stage of water storage in the clearwell

	<ol style="list-style-type: none"> 5. Brief overview of the water treatment process from intake to the clearwell process. 6. Map of clean water distribution areas from the Muka Kuning Water Treatment Plant 7. Customers can enjoy clean water and are encouraged to use water wisely
Visual Concept	Informational video was created by combining live shoot techniques in the style of a company profile with motion graphic elements that use simple visual concepts in a flat design style. The colors used are predominantly blue, white, and green with slight gradations and one-pixel outlines to clarify the visual elements. For typography, two fonts were used: Helvetica Neue for the title and Poppins for the text content. The selection of these two fonts is based on their bold, modern, and easy-to-read forms..
Photo and video shooting techniques	Using extreme close-up, close-up, medium long shot, medium shot, long shot, and extreme long shot techniques, as well as drones and cameras.
Distribution Media	Company Indoor Meeting Room
Research Subjects	<ol style="list-style-type: none"> 1. 2 Clean Water Management System Experts Batam, namely : General Manager Hulu Water Management System dan Director of PT Air Batam Hulu 2. 2 Media Experts, namely Adhitya Mardha as professional videographer, and Ikhfan Afrido as Motion Graphic Designer 3. Visitors of Muka Kuning Water Treatment Plant

Researchers will develop Clean Water Treatment Information Videos at the Batam Drinking Water Management System Business Entity at the Muka Kuning Water Treatment Plant with the aim of providing an informative video-based educational medium that is systematically developed using the ADDIE model in the clean water treatment sector in Batam. This will form the basis of the needs, issues in educational activities, and specific data that the company wishes to convey. In the context of education, visualization through video can strengthen memory and accelerate understanding because the human brain tends to process visuals faster than text (Yusa, Priyono, Anggara, Setiawan, & Yasa, 2023).

2. Design

In the design stage, the video media was designed to combine the concept of a company profile and flat design style. The elements used included images, text, animation, video, and audio, all of which were selected and arranged to support the narrative visually and auditorily. Adapting previous research (Fitrianiingsih, Hardiansyah, Suciati, Fitriati, & Afriani, 2022), at the design stage, the researchers created a storyline, script, and storyboard using Freepik references in the creation of visual assets and interesting effects. The design process involved the design of visual and audio assets that were designed according to the storyline, script, and storyboard that had been compiled.

- Creation of Storyline

The video begins with an introduction to the Batam Business Entity logo, recognizing the role of the Batam SPAM Business Entity and its partners in providing clean water in the city of Batam. The information is conveyed with the help of a water mascot named Aira, followed by a map of water treatment facilities in the city of Batam. The main part explains the function of water catchment areas and reservoirs as sources of raw water. Then, the process of clean water treatment at the Muka Kuning Water Treatment Plant is shown, starting from the raw water intake stage, aeration, pre-disinfection, coagulation, flocculation, sedimentation, filtration, disinfection, to water storage in the clearwell. There is a brief review of the water process from intake, processing units, to clean water storage in the clearwell. The end of the video shows a map of Batam City and the clean water service area under the Muka Kuning Water Treatment Plant, as well as the benefits of clean water for daily life and a message encouraging the community to use water wisely. The narration uses a clear and relaxed voice-over intonation to make it easy for viewers to understand, while the background music uses non-copyright background music.

At this stage, the script is systematically and coherently structured to explain the clean water treatment process in language that is easy to understand, clear, and informative. The script also includes instructions for voice intonation, pauses, and emphasis on important points so that the message can be conveyed effectively. Adapted from previous research by (Fitrianiingsih, Hardiansyah, Sucianti, Fitriati, & Afriani, 2022), revisions can be made at each stage of the ADDIE Model development if there are deficiencies. Therefore, in this study, the script underwent several changes, such as replacing location footage due to time constraints, production costs, and the availability of equipment such as drones and cameras. The initial concept of combining live shoot and motion graphics in one scene was changed to separate displays—live shoot to show the actual conditions of the water treatment unit and motion graphics to explain the internal processes that are not directly visible.

- Storyboard

The Information Video Storyboard on the Clean Water Treatment Process at the Muka Kuning Water Treatment Plant was developed by combining live shoot and motion graphic techniques. Each storyboard image is accompanied by a description explaining the scene, text, duration, layout, and other necessary details. Adapted from previous research by (Fitrianiingsih, Hardiansyah, Sucianti, Fitriati, & Afriani, 2022), revisions can be made at each stage of the ADDIE Model development if there are any shortcomings. In this study, changes also occurred in the storyboard due to creative improvisation in the productive stage and adjustments made to the visual aspects, duration, and audio narration, so that the final storyboard differed from the initial design. A total of 16 scenes were created in the storyboard, which became the main guide in the production process to clearly visualize how each scene conveyed information.

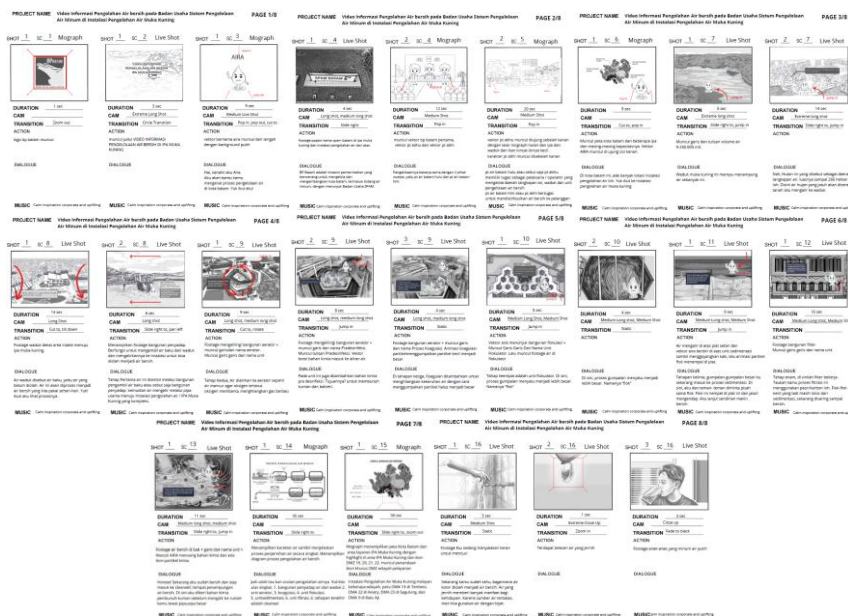


Figure 2. Storyboard

- Typography

The fonts used in the product are Helvetica Neue and Poppins. These fonts were chosen for their bold, modern, and easy-to-read characteristics. Helvetica Neue is used for the title, while Poppins is used for the body text.

- Color Selection

The colors used for the product were selected based on the branding of the water company and the meaning of the colors itself. The selected colors are blue, green, white, black/gray, and brown.

3. Development

During the development stage, the production of this informational video refers to the storyboard or script that was prepared in the previous stage. Adapting from previous research

(Fitrianiingsih, Hardiansyah, Sucianti, Fitriati, & Afriani, 2022), in the development stage, researchers used motion graphic development software and video development hardware, including several software programs, namely Adobe Illustrator for creating vector assets, Adobe After Effects for creating motion graphic animations, and Adobe Premiere Pro for editing and finalizing the video. The hardware used included cameras, drones, and smartphones to obtain live shoot footage with varying angles and according to visual needs.

The animation stage is implemented in Adobe After Effects, after all graphic assets are made. Assets are animated using the puppet pin technique, with initial and final keyframes utilizing the rotation, position, and scale features. Next, the video editing stage is carried out in Adobe Premiere Pro to select, cut, and combine clips from the live shoot to form a storyline according to the script. At this stage, we also added supporting elements such as text overlays, transitions, and visual effects to reinforce the message. The next stage was audio editing, which included selecting background music and dubbing to clarify the narration and enhance the video's appeal. Voice recording using the Voice Memos app on an iPhone, while the background music is obtained from the pixabay website, titled calm inspiration corporate and uplifting by Alexzavesa, played from 00:01 to 05:13. The combination of audio and visual elements is designed to make the video more communicative, informative, and appealing to the audience. The final step is rendering, which is the final process of combining all the edited elements into a single complete video file using Adobe Premiere Pro.

The media output of this design process is a 5-minute 13-second video that combines the style of a company profile video with a simple flat design visual style. This style was chosen so that information can be conveyed clearly by providing a realistic picture, enhancing the credibility of the information, and enabling the visualization of elements that cannot be observed directly. This video combines video, text, icons, illustrations, animations, and voice narration to support the delivery of educational messages in figure 3. Overall, the video provides a clear picture of the clean water treatment process and its benefits. Next, the video is ready to be tested for validity and effectiveness at the implementation and evaluation stages.

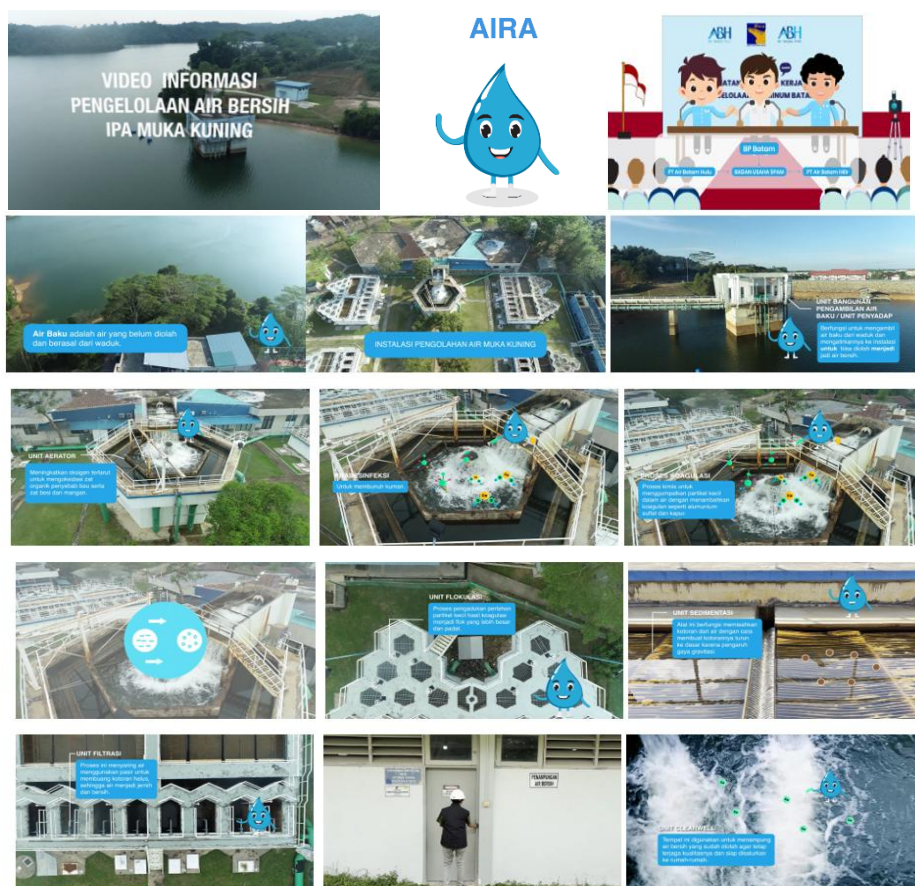


Figure 3. Final video

4. Implementation

The implementation stage was carried out by showing an informational video on clean water treatment in the indoor meeting room of Muka Kuning Water Treatment Plant as a learning medium for visitors. A trial was conducted with students from Kartini Elementary School in Batam through pre-tests and post-tests to measure the effectiveness of the video in improving understanding. The activity began with a brief briefing on the profile of the Water Management System of the Batam Business Entity, then the respondents took the pre-test, watched the video, and took the post-test after the screening. The questions given to visitors were the same. The results of this test formed the basis for assessing the effectiveness of the video media in improving visitors' understanding of the clean water treatment process.

Beta Test Results (Pre-test and Post-test) – Visitors from Kartini Elementary School Grade 6, visitors were given pre-test and post-test treatments to measure the level of understanding of 31 Kartini Elementary School Grade 6 students aged 11-12 years. The comprehension test was conducted using a One Group Pre-test and Post-test with Paired Sample t-Test analysis. This method was used to determine whether there was a significant difference between the pre-test and post-test results after the respondents watched the educational video.

Table 5. Pre-Test and Post-Test (Beta) Test Results

Respondents Name	Total <i>Pre-Test</i>	Total <i>Post-Test</i>
Respondents 1	4	7
Respondents 2	8	9
Respondents 3	7	8
Respondents 4	9	10
Respondents 5	9	10
Respondents 6	9	10
Respondents 7	6	8
Respondents 8	8	10
Respondents 9	7	8
Respondents 10	6	8
Respondents 11	8	8
Respondents 12	8	10
Respondents 13	7	10
Respondents 14	6	10
Respondents 15	8	9
Respondents 16	7	10
Respondents 17	7	9
Respondents 18	6	9
Respondents 19	5	10
Respondents 20	5	8
Respondents 21	5	10
Respondents 22	7	8
Respondents 23	7	8
Respondents 24	7	8
Respondents 25	7	9
Respondents 26	7	9
Respondents 27	6	8
Respondents 28	6	8
Respondents 29	6	8
Respondents 30	5	8
Respondents 31	5	8

Following the pre-test and post-test scores, statistical analysis was conducted using Microsoft Excel. The data was summarized and processed to calculate the mean, standard deviation (variance), and perform a paired sample t-test. The analysis was performed using the Data Analysis feature in

the Data menu by selecting the t- Test: Paired Two Sample for Means option to determine the difference in results before and after treatment as follows:

Table 6. Pre-Test and Post-Test (Beta) Results

Statistik	Nilai
Mean Total Pre - Test	6,710
Mean Total Post -Test	8,806
Observations (Respondent)	31
t-value (t Stat)	-9,784
t-table (t Critical two-tail, $\alpha = 0,05$)	2,042
Sig. (P-value two-tail)	0,000

Based on the results of paired sample t-test, the following values were obtained:

1. The calculated t-value was = 9,784, which is greater than the critical t-table = 2,042
2. P-value = 0,000 < 0,05
3. Therefore, H₀ is rejected and H₁ is accepted, which means that there is a significant difference between the pre-test and post-test values.
5. Evaluation

Based on previous research by (Kawete, Gumolung, & Aloanis, 2022), an evaluation stage was conducted to assess the feasibility and effectiveness of the developed media, to ensure that the video met the specified needs and objectives. The evaluation included an Alpha Test and a Beta Test. The Alpha Test was conducted by subject matter experts and media experts to assess the suitability of the content, educational aspects, and visual appearance of the video (Supardianto & Octaviany, 2023). Meanwhile, the Beta Test was used to measure the effectiveness of the video in improving visitor understanding through the One Group Pre-test and Post-test methods, which were analyzed using the Paired Sample t-Test statistical test.

1. Alpha Test Results –Water Clean Management System Experts in Batam, by Mrs. Tumirah, General Manager of SPAM Hulu, and Mr. Mujiaman, Director of PT Air Batam Hulu

Following the collection of questionnaires by Clean Water Management System Experts, the next step was to analyze the data to calculate scores, percentage indices, and average ratings to determine the final eligibility category, whether it was suitable or very suitable. This data analysis process was carried out using Microsoft Excel software, with the results shown below.

Table 7. Total Score of Material Suitability Test Questionnaire

Parameter	Questions	Total Score	Indeks Calculation (%)	Indeks %	Assessment Interval	Mean Index (%)	Final Assessment Period
			(Total Score / Maximum Score) x 100			(question index 1 + question index 2) / number of questions)	
Education	Does the process shown represent the facts?	10	(10/10) x 100	100%	very suitable	100%	very suitable
	Does the data shown accurately	10	(10/10) x 100	100%	very suitable		

	reflect the facts?						
Understanding / material	Does the developed video meet the informational needs for communicating the clean water treatment process at the Muka Kuning Water Treatment Plant?	9	$(9/10) \times 100$	90%	very suitable	90%	very suitable
	In your opinion, how clear are the visual and narrative elements of the video in supporting the presentation of the clean water treatment stages at the Muka Kuning Water Treatment Plant?	9	$(9/10) \times 100$	90%	very suitable		
Tampilan Visual	Is the use of the <i>live shoot</i> technique in the video aligned with the intended informational needs?	9	$(9/10) \times 100$	90%	very suitable	85%	very suitable
	Is the use of the <i>motion graphic</i> technique in the video aligned with the intended informational needs?	8	$(8/10) \times 100$	80%	suitable		

According to the data collected through questionnaires administered by Expert of Water Clean Management System, it was concluded that in the Education Parameter, a percentage index of 100% was obtained. Subject Matter Experts stated that the video was highly relevant to the process shown and that the data was accurate in relation to the facts in the field. For the Understanding/Material

Parameter, a percentage index of 90% was obtained, where Material Experts assessed that the video was highly suitable in meeting the need for information about the clean water treatment process and presenting the material clearly. Meanwhile, the Visual Display Parameter obtained a percentage index of 85%, indicating that the use of live shoot and motion graphics was considered highly suitable for the company's needs and supported the visual understanding of the material. The validation results show that the informational video on the clean water treatment process received high ratings in terms of educational value, material, and visual display. The excellent alignment between content and visuals contributes positively to learning effectiveness, as it facilitates the audience's understanding of the clean water treatment stages in an engaging and clear manner. Therefore, it can be concluded that there is a significant correlation between the expert evaluation results and the effectiveness of the video as an educational media.

2. Alpha Test Results –Media Experts as assessed by Mr. Adhitya Mardha as Professional Videographer and Mr. Ikhfan Afrido as Motion Graphic Designer

When the media expert respondents collected the questionnaires, the next step was to analyze the data to calculate the scores, percentage indices, and mean ratings to determine the final eligibility category, whether it was suitable or highly suitable. This data analysis process was carried out using Microsoft Excel software, with the results shown below.

Table 8. Total Media Validity Test Questionnaire Score (Alpha)

No.	Questions	Total Score	Indeks Calculation (%)	Indeks	Assessment Interval	Mean Final Score	Final Assessment Interval
			$(\text{Total Score} / \text{Maximum Score}) \times 100$			Total Index /number of questions	
1	Shooting techniques	10	$(10/10) \times 100$	100%	very suitable	94,29%	very suitable
2	Frame composition	10	$(10/10) \times 100$	100%	very suitable		
3	Accurate background selection	10	$(10/10) \times 100$	100%	very suitable		
4	Layout	8	$(8/10) \times 100$	80%	suitable		
5	Colors	9	$(9/10) \times 100$	90%	very suitable		
6	Font selection	10	$(10/10) \times 100$	100%	very suitable		
7	Font size selection	10	$(10/10) \times 100$	100%	very suitable		
8	Graphics	9	$(9/10) \times 100$	90%	very suitable		
9	Animation	9	$(9/10) \times 100$	90%	very suitable		
10	Backsound	9	$(9/10) \times 100$	90%	very suitable		
11	Sound	9	$(9/10) \times 100$	90%	very suitable		
12	Screen design	9	$(9/10) \times 100$	90%	very suitable		

13	Language usage	10	(10/10) x 100	100%	very suitable		
14	Navigation	10	(10/10) x 100	100%	very suitable		

Media expert testing results show that the video on clean water treatment at the Muka Kuning Water Treatment Plant received an average rating of 94.29%, with most aspects rated as “highly appropriate.” The visual quality, design, and presentation of the video meet the standards for good information media. This high rating is positively correlated with learning effectiveness, as the clear and attractive display helps the audience understand the information more easily and informatively. Expert testing results show that the clean water treatment process information video received high ratings in terms of education, content, and visual presentation. The suitability of the content and visuals assessed by the experts had a positive effect on learning effectiveness, as it helped the audience understand the clean water treatment process more easily and attractively. Thus, there is a strong relationship between the expert testing results and the effectiveness of the video as an educational media.

2. Discussion

The result of this study demonstrate that the informational video on the clean water treatment process developed using the ADDIE model significantly improved visitors’ understanding, as indicated by the increase in post-test scores compared to pre-test results. Previous studies have emphasized the effectiveness of video-based learning media in improving audience understanding (Rejeki, Leksono, & Rohman, 2023) stated that audiovisual learning media enhance comprehension by combining visual and auditory elements, allowing information to be delivered more clearly and systematically. When this approach was adapted to the present study, similar results were obtained, as evidenced by the significant increase in post-test scores compared to pre-test scores. This finding indicates that video-based informational media are also effective when applied in non-formal educational settings, such as clean water treatment sector.

Furthermore, (Yusuf, Prasetyaningsih, & Neta, 2023) demonstrated that motion graphic-based videos are effective in explaining abstract and complex processes that are difficult to observe directly. This concept is highly relevant to the present study, as several stages of clean water treatment—such as coagulation, flocculation, filtration, and disinfection—cannot be fully observed during site visits. The application of motion graphic visualization in this study enabled the visualization of otherwise unobservable elements while also providing engaging additional information, thereby confirming that the theoretical advantages identified in previous research are consistent when implemented in the clean water management sector.

In addition, (Muhazzar & Prasetyaningsih, 2024) highlighted that live shoot techniques increase the credibility of information by presenting real conditions in the field. The integration of live shoot footage in this study supported this theory, as visitors were able to relate conceptual explanations to actual operational activities at the Muka Kuning Water Treatment Plant. The combination of live shoot and motion graphic techniques therefore produced complementary effects, strengthening both clarity and authenticity of the delivered information.

Regarding media development, (Fitrianingsih, Hardiansyah, Suciati, Fitriati, & Afriani, 2022) explained that the ADDIE model provides a systematic and iterative framework that ensures alignment between learning objectives, content, and evaluation. When this model was applied in the present study, high feasibility scores were obtained from expert validation, indicating that the structured stages of analysis, design, development, implementation, and evaluation contributed positively to media quality. While previous studies mainly applied the ADDIE model in classroom-based learning environments, this research extends its application to the clean water treatment sector in Batam. This constitutes the novelty of the study, demonstrating that ADDIE-based media development is not only suitable for formal education but also effective for public infrastructure-based learning.

Overall, the findings confirm that theories and results from previous studies remain consistent when adapted to the context of clean water treatment education. At the same time, this study contributes new empirical evidence by applying a systematic ADDIE-based video development

approach in a non-formal public education environment, which has rarely been explored in prior research.

D. Conclusion

The informational video on clean water management at the Muka Kuning Water Treatment Plant was successfully developed using the ADDIE model, which consists of the stages of analysis, design, development, implementation, and evaluation. The final product is a 5-minute 13-second educational video combining live shoot and motion graphic techniques to explain the clean water treatment process from raw water intake to clearwell storage. Validation results from water clean management system experts and media experts showed feasibility scores above 85% across educational content, material clarity, and visual presentation, indicating that the video meets the standards for educational media.

The effectiveness test involving 31 respondents showed a significant improvement in understanding, with a t-value of 9.784 and a p-value of 0.000 (<0.05). These results confirm that the developed video is effective in improving visitors' understanding and is suitable for use as an educational tool during visits to the Muka Kuning Water Treatment Plant.

This study also addresses the limited availability of informative video media that are systematically developed using instructional design models such as ADDIE in the clean water treatment sector in Batam. In this context, the ADDIE model is considered more suitable than other media development approaches due to its systematic and iterative framework, which allows continuous evaluation and refinement at each development stage. This characteristic supports the development of accurate, structured, and visually effective educational media for technical learning contexts.

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