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Action Script Based On Auxiliary Boiler Application System

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ABSTRACT

Auxiliary boilers play a crucial role in supporting the operations of the shipping industry as auxiliary machinery on board. Auxiliary boilers are used to provide heat and steam sources necessary for various applications on board, such as heating fuel oil and supporting sterilization and sanitation systems. However, understanding and training the operation of this system often takes a long time and manual training is less efficient. To overcome this challenge, a more interactive technology-based solution is needed. Therefore, a solution is required in the form of a simulation application that can combine animation with the auxiliary boiler operational system to create a learning environment that closely resembles real conditions. The research problem addressed in this study focuses on how to design, operate, and assess the benefits of an action script based auxiliary boiler application system. The use of boiler assistant applications can be applied as a learning medium or basic training facility for prospective engine crews in maritime education and training environments. Based on a survey, 74.5% strongly agree and 25.5% agree that this boiler assistant application is very effective as a learning medium.

1. Introduction.

Indonesia is a maritime country with a vast naval territory that plays a crucial role in its economic, social, and cultural life. According to (Ramadhani dan Hanafi 2025), with more than 70% of Indonesia's territory being ocean, maritime transport is the primary solution for connecting regions within Indonesia and is crucial for port modernisation and the development of international maritime networks, enabling Indonesia to compete in global trade and become a key hub in the world's maritime routes. Since colonial times, ships have played a strategic role in connecting major ports and supporting the economy through maritime trade routes.

Auxiliary boilers play a crucial role in supporting the operations of the shipping industry as auxiliary machinery on board ships. According to (Robbi et al. 2024), auxiliary boilers are used to provide the necessary heat and steam for various applications on ships, such as fuel oil heating and supporting sterilisation and sanitation systems on board. However, understanding and operational training for these systems often requires a considerable amount of time and inefficient manual training. To overcome this challenge, a more interactive technology-based solution is needed.

When conducting practical training on KM Sinabung, researchers found it difficult to understand the auxiliary boiler operating system, even though there were many ways to understand it. Based on the questionnaire results, the researcher took the initiative to create an educational application about the auxiliary boiler using animation as a medium. This is one of the most effective methods in helping students at the Semarang Maritime Polytechnic to understand the subject of auxiliary machinery on board a ship. The use of simulation technology not only helps in understanding basic concepts, but also makes the learning process more interactive and engaging.

In addition, learning processes that use conventional methods often take a long time and cannot simulate various operational scenarios well. Therefore, a solution is needed in the form of a simulation application that can combine animation

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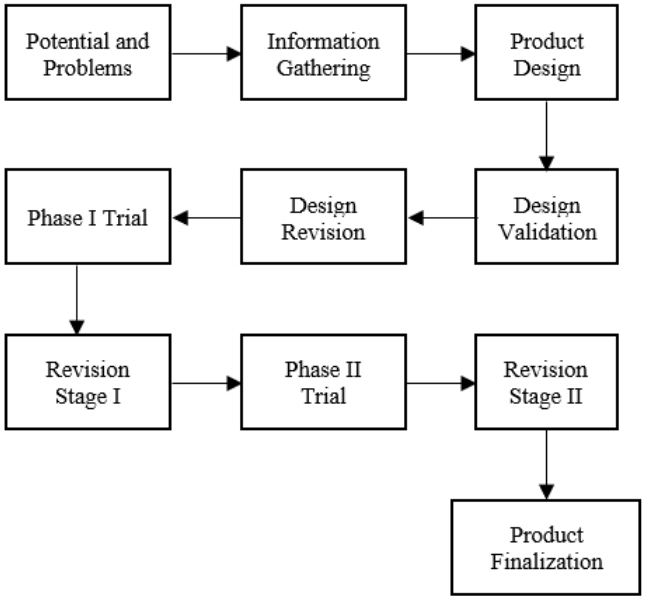
with the auxiliary boiler operational system to create a learning environment that closely resembles real conditions. An application based on action script is expected to address this issue by providing interactive simulations to better understand how to operate auxiliary boilers.

2. Research Methodology.

The research method used by the researcher is research and development (R&D). Data collection in this study was conducted through observation and interviews. In a modified approach, research and development (R&D) includes steps to define the problem, design the product, conduct trials, and revise the product to suit market or user needs (Budaeng, Ayu, dan Pratiwi 2017). The researcher first conducted a survey to collect the necessary data for product development, followed by product development, testing, and evaluation of the created product.

In developing this research, the researchers used the Borg and Gall model, which means that educational research and development is a process that is created in the form of a product from field testing and then revised, so that it forms a product that meets the researchers' expectations and can be used properly and smoothly as a more modern educational medium (Assyauqi 2020). The following are the 10 stages in developing research using the Borg and Gall model.

Figure 1: 10 steps to borg and gall.



Source: Authors.

According to Borg and Gall, the research and development (R&D) method is a systematic process aimed at developing and validating products used in various fields, especially education. The ultimate goal of this research is to ensure that the products produced can be widely applied and have a positive impact on the learning system.

2.1. Stage I Research Methodology (Research).

Qualitative research methods are research approaches that focus on improving understanding and exploring research topics by collecting and evaluating various sources that have been obtained (Ramadhani et al. 2024). Qualitative research methods are used to study natural (non-experimental) objects, meaning that the researcher is the primary instrument. Data collection involves triangulation, which includes observation, interviews, and documentation. As a result, the data is inductive in nature.

In a study entitled Action Script Based Auxiliary Boiler Application System, the researcher chose a qualitative method with the aim of understanding the machinery on board a ship and assisting users in learning about the detailed workings of the machinery as it occurs in the field. This method can describe situations or phenomena such as actual conditions. This data was not generated directly by the researchers, but was obtained from research results, reports, or documentation conducted by other parties (Adityaningrum et al. 2021). The researchers collected sources from several books, journals, and articles relevant to the research topic.

2.2. Research Methodology Phase II (Development).

The research subjects refer to individuals, groups, and objects involved in testing, evaluating, or providing input during the product development process. Research subjects are usually selected based on their relevance to the research objectives and suitability to the needs of the product being developed. Data collection techniques refer to the strategies researchers employ during the research process. In this case, the researcher collected data by distributing questionnaires to 50 respondents or third-semester students at the Semarang Maritime Polytechnic as one way for respondents to provide suggestions and feedback to the researcher, thereby facilitating a better understanding of a mechanical system through the development of an auxiliary boiler application.

In this study, researchers used mean data analysis techniques, which is the process of identifying data distribution patterns to understand the characteristics of a dataset. Mean data analysis is a method used to understand the characteristics of a study. This analysis is very important because it helps researchers recognise data characteristics by using the average responses from respondents. The following is the formula for the mean analysis technique used:

$$Px = \frac{fx}{\Sigma} \; x \; 100\% \tag{1}$$

Explanation:
Px = Average value of choice x.
Fx = Respondent choice x.
Σf = Total of all respondent answers.

Researchers distributed questionnaires to 50 third semester students at the Semarang Maritime Polytechnic to collect samples using data distribution analysis formulas. The results of the respondents' answers to the questionnaires distributed by

the researchers using Google Forms were used as material for consideration by the researchers in the data collection process. They will be analysed again for more relevant results. Google Forms is an efficient method for quickly and efficiently collecting data (Sufriadi dan Zakaria 2022). The results of the questionnaire in the survey or research will be accumulated with a high level of accuracy and statistics that meet the standards for surveys or research conducted in general.

Table 1: List of Statements.

No	List of Statements	STS	TS	S	SS
1.	The action script-based auxiliary boiler application is easy to use.				
2.	The working system and materials related to auxiliary boilers are easy to understand.				
3.	Offers innovative insights into auxiliary boiler learning.				
4.	Increases interest and motivation to learn about auxiliary boiler operating systems.				
5.	The auxiliary boiler application is very effective for use as a learning medium.				

Source: Research Documents.

Explanation:
STS = Strongly Disagree.
TS = Disagree.
S = Agree.
SS = Strongly Agree.

3. Research Results and Discussion.

3.1. Initial Test Results.

At the beginning of this subchapter, the researcher will explain the initial design of the product/application that the researcher developed based on the manual book available when the researcher conducted sea practice on the KM Sinabung ship. By going through several revisions and simplifications in the process of creating this application, programmers can more easily understand the concept of this action script-based auxiliary boiler application system, so that development can run more efficiently and in line with the researcher's expectations.

3.2. Initial Test Results.

This section discusses the initial stages of evaluation conducted by validators to detect possible deficiencies, both in terms

Figure 2: The Process of Creating Visual Designs for Submenus.

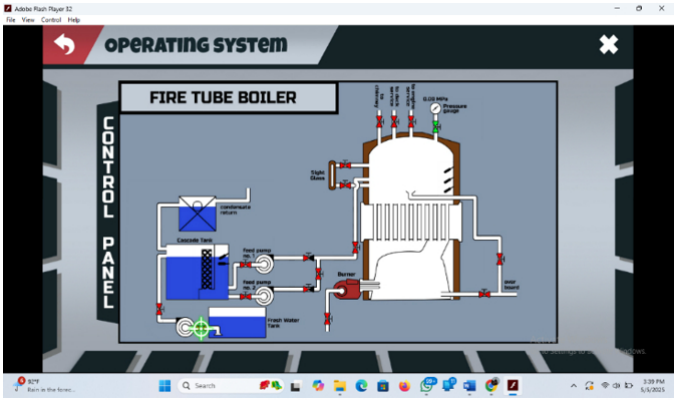
Source: Research Documents.

of content and visual appearance, which are expected to provide useful suggestions and input for researchers. Following these initial findings, improvements were made to enhance the quality of the auxiliary boiler application. This evaluation process will continue until the application is deemed suitable for comprehensive effectiveness testing.

3.3. Product Revision.

From the results of the first test that the researchers submitted to the validators, the researchers received useful suggestions and feedback to improve the application they had created.

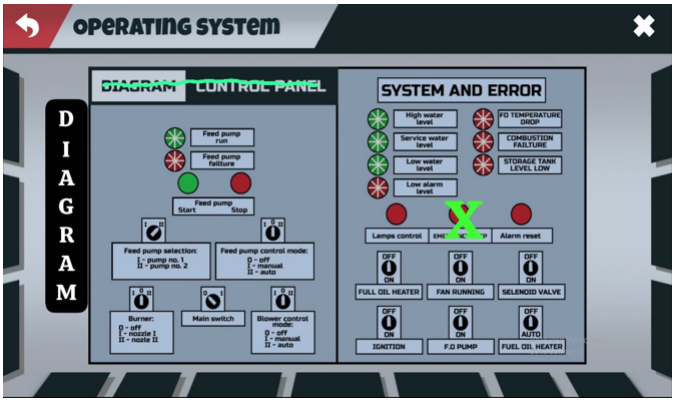
Figure 3: Revision of Operating System Diagram Display.



Source: Research Documents.

In the Figure above, researchers received input from validators to add clear titles to the operating system display to reinforce the context of the application's use. This is important so that users can immediately understand the focus of the simulation presented. This auxiliary boiler application is specifically focused on the operating system of a fire tube boiler, so the addition of a title is expected to clarify the scope of the material being studied and guide users to the appropriate content.

Figure 4: Revision of Operating System Control Panel Display.



Source: Research Documents.

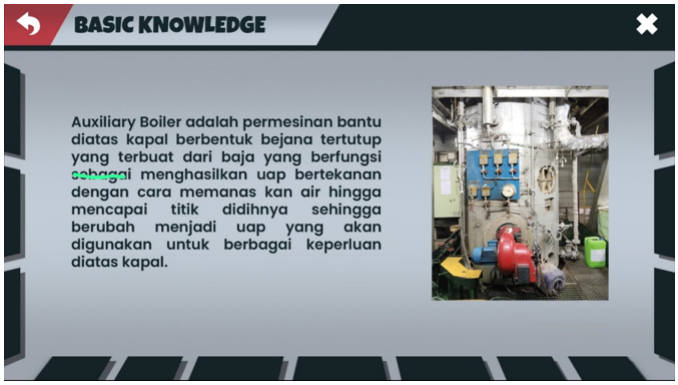
Next, the researchers evaluated the layout of the diagram and control panel, which were previously located in the upper left corner of the application display. Based on discussions with developers and considering aspects of visual comfort and ease of navigation for users, it was decided to move these elements to the left side of the screen, aligning the diagram and control panel.

3.4. Phase II Test Results.

In this second phase of testing, the researchers presented the results of their previous evaluation to different validators, namely lecturers with in-depth understanding of control systems. The involvement of validators was expected to contribute to and provide input for the development of the application under development. From this second phase testing process, the researchers obtained various detailed suggestions and feedback regarding the operational system of the auxiliary boiler, enabling the application they are developing to be completed successfully.

3.5. Product Revision.

Figure 5: Revisions to Basic Knowledge.



Source: Research Documents.

Through the implementation of the second stage of testing submitted to the validator, researchers obtained various suggestions, responses, and constructive and helpful feedback. This feedback not only provided a new perspective on the shortcomings still found in the application but also became an essential reference in the process of refinement and further development.

Based on the image above, researchers obtained input to remove the sentence, as in the definition located in basic knowledge. The validator considered that the word was not included because it still contained the same meaning.

3.6. Phase III Testing.

In this third stage of testing, researchers conducted trials of the application, demonstrating the auxiliary boiler application system interactively and practically. In this third phase of testing, researchers involved fourth-semester students from the engineering programme, as shown in the figure above. The purpose of this testing was to ensure that the application could effectively and thoroughly enhance students' understanding of the auxiliary boiler operating system before they embark on their sea training aboard a vessel.

3.7. Product Improvement.

In refining the developed product, researchers refer to the implementation of the second stage of testing as the final stage of the entire application evaluation process. At this stage, the validation process is carried out by expert validators, who are tasked with evaluating the feasibility, functionality, frame display, effectiveness, efficiency, and visual consistency of the auxiliary boiler application, so that this application can become an effective learning medium and in line with educational objectives. The results of this evaluation indicate that the application meets the eligibility criteria based on predetermined standards, in terms of content, appearance, and functionality. Additionally, feedback from cadets indicates a high level of satisfaction and increased motivation to learn through the use of this application.

3.8. Product Discussion.

Based on the overall process of designing, developing, and implementing an action script-based auxiliary boiler application system, researchers can conclude several essential points.

3.8.1. How to Create an ActionScript-Based Auxiliary-Boiler Application System.

In the process of making an action script-based auxiliary boiler application system, it requires laptop or computer hardware running the Windows operating system. It has installed Adobe Animate software that supports the use of action scripts as a programming language to assist in the process of making this application optimally, starting from designing between frames to the final compilation of the application with interactive features and more attractive graphic visualisation.

3.8.2. Working Principle of the ActionScript-Based Auxiliary-Boiler Application System.

In its working principle, the action script-based auxiliary boiler application system is designed to simulate the boiler work process systematically, making it easier for users to understand

the workflow and operational mechanism of the system. There are several stages in operating this auxiliary boiler application, enabling it to function optimally and effectively during the learning process.

3.8.3. Benefits of the ActionScript-Based Auxiliary-Boiler Application System.

The action script based auxiliary boiler application system is designed to provide benefits in the world of education, especially in the field of learning auxiliary machinery systems on ships, especially auxiliary boilers. This application was developed as an interactive learning that not only conveys theory, but also simulates the auxiliary boiler work process visually and dynamically. This aims to help cadets of Politeknik Ilmu Pelayaran Semarang understand the operation of auxiliary boilers in depth before they enter the workforce through practical sea activities on board.

Based on the results of the questionnaire survey conducted among 55 respondents, it can be concluded that the auxiliary boiler application developed by the researchers can make a positive contribution to supporting the learning process of cadets at the Semarang Polytechnic of Shipping Science. Respondents stated that the application can be easily used, the work system and material displayed is easy to understand, can provide an exciting innovation in learning auxiliary boilers, can increase interest and motivation to learn very effective to be applied as a learning medium.

Conclusions.

Based on the results of research and development of action script-based auxiliary boiler application systems that have been carried out, it can be concluded the following:

How to Make an ActionScript-Based Auxiliary - Boiler Application System.

During the development of the auxiliary boiler application system, software utilizing the ActionScript programming language is employed, which can only be accessed via a laptop or computer. This application enables the development of interactive and dynamic inter-frame displays, featuring numerous animation options that enhance the visualization of the boiler work process. In addition, the stability between frames offered by ActionScript provides smooth and responsive visual transitions, which are essential in conveying system information well. With the ability of ActionScript to combine animation with sound, the resulting application can display simulations that look real and are easy to understand.

Working Principle of the ActionScript-Based Auxiliary - Boiler Application System.

The auxiliary boiler serves as a source of steam for additional purposes on board. With its working principle involves heating water in the boiler to produce steam through the process of burning fuel in the combustion chamber. This application focuses solely on the fire-tube boiler operating system. In this application, the process is visualised dynamically using inter-frame animations that explain the flow from filling water into the boiler drum, fuel supply, combustion process, water evaporation, to steam distribution to the user system.

Benefits of the ActionScript-Based Auxiliary-Boiler Application System.

The utilisation of auxiliary boiler applications can be applied as a learning medium and a means of basic training for prospective engine crews in a maritime education and training environment. With the simulation displayed, it makes it easier for users to understand the flow of the auxiliary boiler operating system in an attractive visualisation. And based on a survey as much as 74.5% strongly agree and 25.5% agree that this auxiliary boiler application is very effective to be applied as a learning medium. Thus, this application is very useful in the process of learning an auxiliary machinery system, namely the auxiliary boiler system.

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