

Development Of Interactive Learning Media For Occupational Safety And Health (Osh) Based On Project-Based Learning To Enhance Students Decision Making Skills

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ABSTRACT

This study aims to develop and design interactive learning media based on Project-Based Learning (PjBL) in the field of Occupational Safety and Health (OSH) to enhance students' decision-making skills. The development of this media is specifically intended to train decision-making abilities, as in the context of OSH, students are required not only to possess adequate knowledge but also to make appropriate decisions in high-risk situations. This study employed a Research and Development (R&D) approach using the 4D development model, which consists of the define, design, development, and disseminate stages. The product developed is a web-based interactive learning media using the Genially platform, incorporating simulation scenarios of construction project conditions. The learning media is integrated with the Project-Based Learning model, which is expected to improve student engagement, critical thinking skills, and decision-making abilities.

Keywords: *Interactive media, Project-based learning, decision making, occupational safety and health*

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INTRODUCTION

Occupational Safety and Health (OSH) is a fundamental aspect aimed at protecting workers from various potential hazards and diseases while creating a safe, comfortable, and productive working environment (Waisapi, 2022). The implementation of OSH is not merely a form of worker protection but also serves as a strategy to improve work quality. Across various industrial sectors, OSH has become an essential component that cannot be separated from all work activities, as it is directly related to individual safety and operational sustainability.

One of the sectors with a high level of risk is the construction industry. This sector is characterized by the use of heavy equipment, work at elevated heights, and dynamic environmental conditions. These characteristics contribute to a high level of potential hazards (Bourahla et al., 2024). Data from the Ministry of Manpower of the Republic of Indonesia indicate that workplace accidents remain relatively high and tend to increase each year. In 2024, the construction sector accounted for approximately 0.9% of total national workplace accidents. Out of more than 460,000 reported cases, it is estimated that over 4,000 cases occurred in the construction sector within a single year. In practice, many workplace accidents occur due to inappropriate decision-making. Such decisions are often influenced by factors such as a lack of understanding and low awareness of the importance of OSH.

This condition indicates that decision-making is a crucial competency that must be possessed by prospective workers in the construction field. Therefore, strengthening this competency should be initiated and

cultivated from the early stages of education (Musonda & Okoro, 2021). However, in the educational context, OSH learning still tends to focus on theoretical delivery. Students receive more information without being provided with learning experiences that reflect real-world conditions (Pribadi et al., 2024). As a result, students are not sufficiently trained to analyze risky situations and make appropriate decisions.

To address this issue, innovative learning approaches are needed to provide more contextual and interactive learning experiences. One potential solution is the development of interactive learning media integrated with the Project-Based Learning (PjBL) model. The PjBL approach enables students to learn through solving real-world problems, thereby encouraging active engagement, critical thinking, and decision-making skills (Chang et al., 2024). The integration of interactive media within PjBL also provides opportunities for students to engage in simulation-based scenarios that resemble real-world conditions, making the learning process more meaningful and applicable.

METHOD

This study is a research and development (R&D) study aimed at producing learning media. It was conducted conceptually without empirical implementation; therefore, it focuses on product design and development. The development model adopted in this study is the 4D model proposed by Thiagarajan, which consists of the define, design, and development stages. The disseminate stage was not carried out empirically but was formulated as part of a future development plan. This model was selected due to its

systematic structure and its suitability for developing interactive learning media.

1. Define

The define stage aims to identify learning needs and the challenges faced by students in the implementation of Occupational Safety and Health (OSH). At this stage, an analysis was conducted on learning conditions that are still dominated by theoretical approaches, resulting in students' limited ability to make decisions in risky situations. In addition, an analysis was carried out to determine the competencies required by students, particularly in hazard identification, risk analysis, and making appropriate decisions.

2. Design

The design stage involves the process of developing the learning media, which includes structuring the learning flow, creating storyboards, and developing case-based scenarios that represent real conditions in construction projects. The designed scenarios require students to analyze situations and make decisions within the context of Occupational Safety and Health (OSH) implementation. In addition, this stage includes the development of Student Worksheets (Lembar Kerja Mahasiswa/LKM) based on Project-Based Learning (PjBL), which function as guidance tools in the learning process. The worksheets are designed to guide students in analyzing scenarios, identifying potential hazards, evaluating risks, and making appropriate decisions based on OSH principles. Furthermore, the worksheets incorporate project development activities, such as preparing OSH Standard Operating Procedures (SOP), decision trees, or educational media, as well as individual reflections to strengthen students'

conceptual understanding and learning experiences. The following are several examples of the developed storyboards.



Figure 1. Initial Interface of the Interactive Learning Media

Figure 1 presents the initial page of the interactive learning media. The name SafeBuild Decision was chosen to represent the main objective of the developed media, which is to assist students in building an understanding of safe decision-making within the context of construction work. This naming also reflects the integration of occupational safety aspects with critical thinking processes in determining appropriate actions in high-risk work environments.



Figure 2. Instruction for Using the Media

Figure 2 presents the user instruction page of the interactive learning media, which serves as an initial guide for users. This page is presented in a series of systematic steps to help students understand the flow of using the SafeBuild Decision media. The instructions begin with guidance to click the navigation icon as the first step to proceed to the next stage.



Figure 3. Scenario Selection

Figure 3 presents the scenario selection page, which serves as a core component of the learning media. This page functions as the starting point for students to determine the context of the problem to be analyzed. It provides several scenario options representing real conditions in construction projects, including scaffolding installation, concrete casting under adverse weather conditions, and material lifting using a tower crane. Each scenario is designed based on situations with high potential hazards, enabling students to develop their ability to identify risks and make appropriate decisions. The variety of scenarios presented aims to broaden students' understanding of different types of risks that may occur in construction work. Thus, students are not limited to understanding a single type of problem but are encouraged to develop critical thinking skills across various work situations.

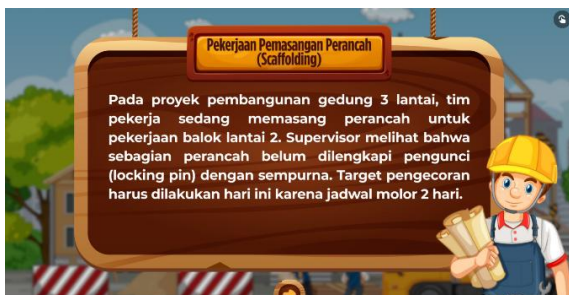


Figure 4. Example of Scenario Based Questions



Figure 5. Answer Options in the Scenario

Figure 4 presents an example of a scenario-based problem page. After students select a scenario, the subsequent page, as shown in Figure 5, displays a set of answer options that must be chosen based on the selected scenario. The questions are designed to focus on identifying the most significant risk within the given situation. Students are provided with several alternative answers, such as project delays, cost overruns, scaffolding collapse, and material damage. The learning media is equipped with an immediate feedback system for each selected answer. When students choose the correct answer, an indicator appears to confirm the correctness of the choice. Conversely, if an incorrect answer is selected, the system provides an error indication without interrupting the learning process. Students are still able to proceed to the next question without any penalties that could hinder the learning flow.



Figure 6. Barcode Scanning Feature for Accessing Students Worksheet

Figure 6 illustrates the barcode scanning feature, which serves as a link between the interactive learning media and the Student Worksheets (Lembar Kerja)

Mahasiswa/LKM). This feature enables students to directly access the worksheets after completing all activities within the SafeBuild Decision media. The provided barcode directs users to Project-Based Learning (PjBL)-based worksheets that have been previously designed. The worksheets contain follow-up activities, including scenario analysis, decision-making tasks, the development of simple OSH-related products, and individual reflection. Thus, the learning process does not stop at interaction within the media but continues into more in-depth and applicable activities.

Overall, the design stage results in a structured interactive learning media called SafeBuild Decision, which is integrated with Project-Based Learning (PjBL)-based student worksheets. This design encompasses not only visual and navigational aspects but also contextual scenarios, decision-making processes, and follow-up activities that support active student engagement in the learning process. The integration of interactive media and student worksheets is intended to create a learning experience that is not only informative but also applicative and reflective. Therefore, the design produced at this stage is expected to provide a strong foundation for the development of learning media oriented toward enhancing students' decision-making skills in the context of Occupational Safety and Health (OSH), particularly in the construction field.

3. Development

The development stage represents the realization of the learning media design that was prepared in the previous stage. At this stage, the SafeBuild Decision media is developed as a web-based interactive learning platform using the Genially

platform. The selection of this platform is based on its ability to integrate various multimedia elements, such as text, images, animations, and interactive features that support a more dynamic learning experience. The development process focuses on implementing the designed framework, particularly by incorporating animation elements, navigation systems, and interactivity that enable the media to function similarly to a game (game-based learning). Each page is structured with a clear flow, allowing users to navigate seamlessly from one section to another through responsive and user-friendly navigation buttons.

The use of engaging animations and visual design is also emphasized at this stage to enhance student engagement during the learning process. The interface is adapted to reflect the construction work environment, providing a realistic impression that helps students better understand the simulated situations

4. Disseminate

The disseminate stage in this study has not yet been implemented empirically; however, it has been formulated as part of a future development plan. This stage aims to distribute the SafeBuild Decision learning media so that it can be more widely utilized in the learning process. The dissemination plan includes several strategies: (1) limited trials involving students to obtain initial feedback on the use of the media; (2) publication of the development results in the form of scientific articles in educational journals; and (3) utilization of digital platforms, such as web-based learning media, to improve user accessibility.

In addition, outreach activities targeting lecturers and educational practitioners are also planned as an effort to introduce the

developed learning media. Through this dissemination stage, it is expected that the SafeBuild Decision learning media can be implemented more broadly and contribute to improving the quality of Occupational Safety and Health (OSH) learning, particularly in enhancing students' decision-making skills

RESULT AND DISCUSSION

Interactive Learning Media Design

The design of the SafeBuild Decision interactive learning media demonstrates a systematic structure oriented toward user experience. The media begins with an introductory page that functions as an initial orientation, followed by usage instructions that clearly guide students through the learning process. This structured flow supports ease of navigation and helps users understand the learning process from the outset. The scenario selection page presents several high-risk working conditions in construction projects.

This presentation not only provides contextual variation but also encourages users to actively engage in determining the problems to be analyzed. Each scenario is designed to guide students through the processes of hazard identification and decision-making, making the media not only informative but also exploratory. The use of interactive elements such as navigation buttons, animations, and page transitions creates a more dynamic learning experience. This indicates that the media design considers not only visual aspects but also functional aspects that support user engagement in learning.

Integration of Project-Based Learning in the Media

The integration of the Project-Based Learning (PjBL) model in the SafeBuild

Decision media is reflected in the learning flow, which positions students as the center of the learning process. The presented scenarios act as contextual problem triggers that must be analyzed by students, followed by decision-making stages based on Occupational Safety and Health (OSH) principles. The feedback provided for each decision reinforces the reflective process, as students are able to understand the consequences of their choices. Thus, the media not only presents problems but also provides space for evaluation and experiential learning.

Furthermore, the integration with Student Worksheets (Lembar Kerja Mahasiswa/LKM) through a barcode scanning feature extends the learning process into a more applicative stage. Students not only interact with the media but also engage in analysis, product development, and reflection. This indicates that the media accommodates the key characteristics of PjBL, namely contextual problems, investigative processes, and tangible outputs.

Potential for Developing Decision-Making Skill

The SafeBuild Decision learning media has strong potential to enhance students' decision-making skills, particularly in the context of Occupational Safety and Health (OSH) in the construction sector. Scenario-based learning encourages students to analyze situations, identify risks, and determine the most appropriate actions. The combination of interactive media and the PjBL approach enables students to engage in active, independent, and reflective learning. Therefore, this media functions not only as a learning tool but also as a means to develop competencies that are relevant to workplace demands. In the future, this media has the potential to be empirically tested to evaluate

its effectiveness in improving students' decision-making skills.

CONCLUSION

This study produced a design of interactive learning media called SafeBuild Decision, based on Project-Based Learning (PjBL) in the context of Occupational Safety and Health (OSH). The developed media has a systematic structure and integrates contextual scenarios, decision-making processes, feedback mechanisms, and Student Worksheets (Lembar Kerja Mahasiswa/LKM) as follow-up learning activities. Conceptually, this media has the potential to support more active, contextual, and decision-making-oriented learning. Therefore, the developed media can serve as an innovative alternative for OSH learning, particularly in the construction field. Future research is recommended to conduct implementation and empirical testing to evaluate the effectiveness of the media in improving students' decision-making skills.

REFERENCE

- Bourahla, A., Fernandes, G., Ferreira, L. M. D. F., Bourahla, A., Fernandes, G., & Ferreira, L. M. D. F. (2024). Managing Occupational Health and Safety Risks in Construction Projects to Achieve Social Sustainability – A Review of Literature Projects to Achieve Social Sustainability. *Procedia Computer Science*, 239(2023), 1053–1061. <https://doi.org/10.1016/j.procs.2024.06.269>
- Chang, Y., Choi, J., & Sen-akbulut, M. (2024). education sciences Undergraduate Students' Engagement in Project-Based Learning with an Authentic Context. *Journal of Education Sciences*, 14, 186.
- Kementerian Ketenagakerjaan Republik Indonesia. (2024). Data kecelakaan kerja di Indonesia tahun 2024. <https://kemnaker.go.id>
- Musonda, I., & Okoro, C. (2021). Assessment of current and future critical skills in the South African construction industry. *The Journal of University Vocational Award Council*, 11(5), 1055–1067. <https://doi.org/10.1108/HESWBL-08-2020-0177>
- Pribadi, A. P., Mukasyafah, Y., & Rahman, R. (2024). Heliyon Analysis of the effectiveness and user experience of employing virtual reality to enhance the efficacy of occupational safety and health learning for electrical workers and graduate students. *Heliyon*, 10(15), e34918. <https://doi.org/10.1016/j.heliyon.2024.e34918>
- Thiagarajan, S. (1974). *Instructional Development for Training Teachers of Exceptional Children: A Sourcebook*.
- Waisapi, J. Y. (2022). Occupational Safety and Health and the Environment Keselamatan dan Kesehatan Kerja dan Lingkungan. *Formosa Journal of Social Sciences (FJSS)*, 1(3), 285–298.