

# Development of Augmented Reality Application Media Based on Project Based Learning Building Construction Lessons in Class XI DPIB SMK Negeri 2 Binjai

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**Abstract.** This research aims to: 1) To determine how well Augmented Reality Media, which was designed for use in building construction instruction, is used in this study. 2) To determine the viability of augmented reality media designed for use in building construction instruction. Borg and Gall's product development model and Dick and Carey's learning design model are combined in development research of this kind. Understudies in class XI at the State Professional Secondary School 2 Binjai were the subjects of this review. A method that is somewhat experimental is used in this study. 65 students participated in the study, 33 of whom were in the experimental class that used AR media for project-based augmented reality tutorials and 32 in the control class. The hypothesis test demonstrates that building construction students taught using visual media have significantly different learning outcomes than students taught using Augmented Reality Project-based learning media. The data acquisition demonstrates this, with  $t_{count} = 5.63$  and  $t_{table} = 1.63$ . Interpolation of  $t_{table} 1.63$  produced a significance level of 0.05. The efficiency of building construction materials utilizing Project-Based Augmented Reality Learning Media was contrasted with that of visual media. As a result, the conclusion was that. Conclusion the use of augmented reality learning media based on Project Based Learning is more effective than using visual learning media for improving the learning outcomes of Building Construction students. This conclusion can be drawn from the study's findings and discussion of the development of augmented reality learning media in the subjects of Soft Building Construction and Building Interiors, which were tested on class XI students at SMK N 2 Binjai. The results of this study indicate that Augmented Reality Media is effective for improving student learning outcomes in class XI SMK Negeri 2 Binjai.

**Keywords:** Augmented Reality, Project Based Learning, learning of building construction

## 1. Introduction

Using technology as a learning tool is one way it can be used in education. In general, learning media are tools for teaching and learning. Anything that can be used to get people's attention, thoughts, feelings, and abilities or learning skills going in order to help them learn. According to Sukiman (2012:29), the media are everything in a student's environment that can encourage learning.

Building construction is one of the subjects that requires learning materials. For instance, students may not always be able to identify. Static learning media can evolve into more dynamic learning media with the ability to display concrete visualizations of geometric objects as

technology advances. Android's augmented reality technology is one method that can be used. Although its use in Indonesia is still very limited, augmented reality is a technology that is expanding rapidly in almost all parts of the world. A visual technology known as augmented reality (Azuma, R. T. et al.) incorporates objects from the virtual world into a real-world display in real time. (2011).

Objects can be visualized concretely through three-dimensional virtual modeling that is similar to the real object right on top of the material from the printed book by utilizing augmented reality technology and android smartphones. For this reason, applications as learning media for Android-based building construction by utilizing augmented reality technology can be an alternative to assist students in understanding various building objects concretely. This media is expected to increase the attractiveness of students to learn with a combination of varied human and computer interactions, namely the combination of 3D geometry modeling on android applications with material in printed books. One factor in the level of user satisfaction of the application is the quality of the application itself. Then the learning media to be developed requires good quality standards. This is supported by theory. Pressman (2010: 400) which states that user satisfaction is defined as a combination of product suitability with user needs, software quality, and distribution at an affordable price.

## **2. Research Method**

This study, as described by Borg and Gall, employs a research and development (R&D) methodology. Educational products are developed and tested as part of the process. Educational research and development (R&D) is the process of developing and validating educational products, according to Borg and Gall (1983). Nine of the ten steps in this study were completed: 1) Introduction; 2) Creating instructional designs; 3) Getting things together; 4) Developing and implementing learning models; and 5) Formative evaluation in addition to a review or field test of the product revision. 6) Main Field Testing; 7) Operational Product Revision; 8) Operational Field Testing; and 9) Final Product Revision. Formative evaluation continues all the way through the development process. It begins with the stages of analysis, design, production, and implementation before evaluating the product's effectiveness.

The next step is to provide each validator, who is an expert in learning, media, and material, with two instruments. After that, they give three more individual or instrument tests, nine more small group tests, and all of the class's students a limited field test. After that, the results were tested once more on 65 students in two classes—the experimental class and the control class—to see how they compared to the original set of data. 33 students used project-based learning-based augmented reality media in the experimental class, while 32 students used visual media in the control class to succeed.

## **3. Result and Discussion**

The average score in each category is used to determine the findings of studies conducted by experts in media, design, and materials in relation to each aspect of the overall assessment. After that, the study's findings were looked at to see if the learning media had been created. The following is an explanation of the typical percentage of results from experts in learning design, media, and research materials:

**Table 1.** Sa summary of the product's feasibility findings that have been confirmed by tests and experts

No	Categorization	Percentage of average score	Criteria
1.	Media Validation	92,96%	Very Eligible
2.	Material Validation	95,19%	Very Eligible
3.	Individual Trial	81,81%	Very Eligible
4.	Small Group Trial	90,90%	Very Eligible
5.	Field Trial	91,47%	Very Eligible
Average		<b>90,46%</b>	<b>Very Eligible</b>

As shown in the table above, the results of Project Based Learning Using Augmented Reality Learning Media in Building Construction Subjects have been deemed "Very Worthy" by material experts, media experts, individual trials, small group trials, and field trials.

After demonstrating satisfactory results in achieving the stated objectives, the media is said to be feasible. As part of the learning process, a product trial was conducted in this instance. The significance of student learning outcomes determines the media's efficacy. Chen and others (2018:49–60) also state that introducing novice students to augmented reality as part of a skill-based curriculum is a successful strategy. Using augmented reality, such as in a classroom, to teach their specialty skills is a reasonable approach. The project-based learning model, as stated by Saputra (2018:171), demonstrates that the model's implementation influences the development of student learning activities that persist throughout each learning cycle. The t-test results show that the average value taught in Building Construction subjects using Project Based Learning-based augmented reality learning media is higher than those taught using visual learning media, with  $t_{count} = 5.63$  and  $t_{table} = 1.63$ , respectively. According to these findings, students who use visual learning media and students who use augmented reality learning media based on Project Based Learning in Building Construction subjects have different learning outcomes. Because  $t_{count} = 5.63 > 1.63$ , it is possible to conclude that student learning outcomes with Project Based Learning-based augmented reality media are superior to those with visual learning media.

From the results of the calculation,  $t_{count} = 5.63 > t_{table} = 1.63$   $t_{table} dk = 63$  with a 0.05 significance level achieved by interpolation of  $t_{table} = 1.63$ . The research hypothesis that Project Based Learning-based augmented reality media can be used and is effective has been confirmed as the value of  $t_{count} > t_{table}$  indicates that  $H_0$  was rejected and  $H_a$  was accepted.

#### 4. Conclusion

The use of augmented reality learning media based on Project Based Learning is more effective than using visual learning media for improving the learning outcomes of Building Construction students. This conclusion can be drawn from the study's findings and discussion of the development of augmented reality learning media in the subjects of Soft Building Construction

and Building Interiors, which were tested on class XI students at SMK N 2 Binjai.2) In terms of building construction subjects, the use of augmented reality learning media based on Project Based Learning is said to be very feasible and appropriate for class XI students at SMK N 2 Binjai.

## References

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