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DEVELOPMENT OF VIRTUAL REALITY-BASED LEARNING MEDIA FOR PRODUCT-SETTING SUBJECTS IN VOCATIONAL SCHOOLS

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ABSTRACT
The research aims to develop learning media based on Virtual Reality for the Product Management subject at SMKN 14 Jakarta. The study uses research and development methods (Research & Development) using the combined procedure reference development model between the Borg and Gall models, the Dick Carey Model), and the Hannafin and Peck Models. This model is carried out through needs analysis, design, development, testing, implementation, and maintenance. The results of this study are as follows. (In summary, the research went through several key stages: 1) The analysis stage highlighted the limitations of practical facilities for the Limited Product Arrangement subject. 2) The design phase resulted in a comprehensive design, including Virtual Reality illustrations with 3D display designs, color selection, typography, page layouts, images, videos, audio, and interface designs. 3) During the development of Virtual Reality products, the researcher processed the content into a medium using the Unity Engine application. 4) The testing phase, which included material and media testing, produced highly favorable results. Material experts rated content quality and objectives at 4.8 in the "very feasible" category, while media experts found functional suitability very doable with a percentage score of 4.67. Usability testing yielded a score of 4.7, indicating good usability. Performance efficiency met standards and effectively engaged students' learning interest. Overall, these findings demonstrate the success of the research in developing Virtual Reality-based learning materials for the Product Arrangement subject.

Keywords: school facilities, technology, multimedia.

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INTRODUCTION

Education is a significant thing for the progress of life in a country. Every citizen has the right to get a decent and good education. Knowledge about learning is often obtained through observing the behavior of individuals or groups who are carrying out learning tasks. This process is often referred to as “observation of learning” or “observation in a learning context.”(Soda & Fahmi, 2022). Good and quality education, of course, dreams all over public moment (Sonita & Susanto, 2022). One place to enjoy education is school. A school is a place for a student to demand science. School is very important for life man without school, then quality education the people in a country will no good.

Facilities at school play a crucial role in advancing the world of education, especially in vocational schools. Quality factor vocational school graduates are facilities and infrastructure like buildings and facilities other for support the learning and teaching process like tool demonstration and practice, laboratory or hall exercise work (BLK) as place practice Work for school Vocational skills are needed by students (Rahmawati dkk., 2022). If the standard still needs to be fulfilled by the students, they can practice or exercise To apply knowledge obtained from the teacher.

Currently Lots of schools No own or lack facility practice. That will give rise to the gap between understanding theory and Practice, ultimately producing quality graduates. Practice is activities that are not inseparable from the learning process teaching in vocational education (Raihany dkk., 2022). Provision through Practice is beneficial in preparing competent, participant-ready students. For example, at SMKN 14 Jakarta, in the familiarity program Business and Marketing, which is a Skills Program, that is a lot of tool practice, especially the eyes lesson Structuring Products that require various types of products for practice students (Djafar & Novian, 2021). Until now, students Practice For eye lessons and Structuring Products at an outlet owned by SMKN 14 Jakarta with partial products big products, food, and necessities daily like food/drinks and necessities (Wibisono & Indriari Wardhani, 2020).

As stated in Basic Competency 4.5 on the eye lesson Structuring Products containing material Practice about grouping characteristics of product drink, food, fresh and cosmetics in supermarkets, FashionFashion and sport (Anwar et al., 2021). Because that school can facilitate tools and materials for adequate Practice under competence basic 4.5 and standard industry, students can acquire appropriate knowledge in the field competence (Handayani, 2020). SMKN 14 Jakarta has an outlet for practice eye lessons. They were structuring the Products in a mini market with dairy products, food, and necessities. Naturally For eye lesson Structuring Product No Enough only one outlet type only. Many types of outlets and products others as necessary, such as fashion outlets and products FashionFashion written on competence basic 4.5. The results, interviews with expert program teachers, and business from marketing at SMKN 14 Jakarta can depicted in form Table 1.

Table 1. Condition of outlets at SMKN 14 Jakarta

Types of Learning	Outlets	Product	Information
Structuring drink, food, fresh and cosmetics	There is	There is	Learning to Walk with Good
Structuring Fashion and sport	Nothing	Incomplete	Learning is not effective

From the interview results, it is necessary To develop the learning process on the existing Basic Competency 4.5 curriculum fashion and sports styling that can filled by schools.

As time, development, technology, and information become things that do not can denied again. Progress demands that man be more used to sophisticated technology, likewise, in the world of education. Onward development of technology and information can make it easier for schools, for example, by utilizing media-based learning technology and creativity and innovation (Syuhada, 2017).

One technology that is very popular now is Virtual Reality. Virtual Reality constitutes An enabling technology we enter the Virtual world with A glass eye projection (Kalsum dkk., 2020). Virtual Reality benefits the world of education, especially in making exciting teaching materials and tools easy to obtain in virtual Practice.

Based on research conducted by Soliman, M., Pesyridis, A., Dalaymani -Zad, D., Gronfula, M., & Kourmpetis, M. (2021) with the title " The Application of Virtual Reality in Engineering Education" states that the use Virtual Reality concluded beneficial for students and universities (Wang dkk., 2021). Profit cognitive and pedagogical student leads to improved performance and value. That is the direct result of the design application Virtual Reality focused on goals learning and integration theories learning. Additionally, engagement in active student use of Virtual Reality is a more student-centered approach than approach passive and traditional learning.

Virtual Reality can help eye lesson arrangement products for SMKN 14 Jakarta. With virtual Reality, practice eye lesson arrangement product participants can feel a lasting atmosphere in an outlet and organize products in the virtual world. This, too, will make SMKN 14 Jakarta more economical Because there is No need to buy products or build A room practice in the form of a new outlet.

From the description above, the researcher interested in creating learning media based virtual Reality uses Unity Engine free software to do a study titled " Development of learning media based Virtual Reality for Arrangement Subjects Products at SMKN 14 JAKARTA." To develop the appropriate learning media for the Product Arrangement subject in the Business Online and Marketing program at SMKN 14 Jakarta and assess the feasibility of Virtual Reality-based learning media for the Product Arrangement subject in the Business Online and Marketing program at SMKN 14 Jakarta, based on expert assessments in the field of content, media, instructional design, and feedback from students. Providing benefits to the world of education to achieve learning objectives by utilizing the latest technology and expanding the researcher's knowledge of the utilization process of Virtual Reality media for school-based learning. Also, benefits for students, as a learning medium that can assist in the Product Arrangement learning process for the Business Online and Marketing program.

METHOD

The research uses research and development methods (Research & Development). In this research, we developed virtual reality-based learning media for the Product Styling subject. Experts validate each manufacturing stage. Products produced from research can help implement learning in the Product Arrangement subject so that the learning and teaching process will be more effective.

Research for product development was carried out at SMKN 14 Jakarta. The research object is students who take the Product Styling subject. The study was conducted from July 2020 to September 2022.

RESULTS AND DISCUSSION

Analysis Results Need

Analysis needs to be implemented in the even semester 2021/2022 through observations and interviews with ten students majoring in Online Marketing Business at SMKN 14 Jakarta regarding the learning process eye lesson arrangement product. Observation results can seen in Table 2.

Table 2. Preliminary Analysis Study Results Need

Question	Answer	Respondent	
		Amount	%
Availability Room Practice /Outlet	Adequate	2	20%
	Inadequate	8	80%
Study Using Outlets	Need	10	100%
	No Need	0	0
Alternative Media	Book Print	2	20%
	Book Electronic	1	10%
	Other	7	70%
Difficulty in learning	Yes	10	100%
	No	0	0%
Use of Technological Media	Once	10	100%

Question	Answer	Respondent	
		Amount	%
Interest in learning media Virtual Reality-based	Never	0	0%
	Yes	10	100%
	No	0	0%
Interest learning practice fashion and sport visualized in the form of Virtual Reality.	Yes	10	100%
	No	0	0%

From the interview, analysis revealed that as many as 10 participants (80%) stated that the availability of room practical outlets is lacking, and 10 participants (100%) indicated that they were interested in learning media. There needs to be more adequate outlets due to the available outlets only for food and drink. Participants were educated to state their interest in learning material fashion and sports visualized as Virtual Reality.

Draft Model 1

Product P design

On design, Media products undergo a drafting process for creating 3D models for every 3D Object required For the creation of Fashion and sports outlets. This stage will also determine the type, color, texture, shape of the Object, size of letters, and pictures used (Zhang dkk., 2019). 3D Model design process using Blender 3D software.

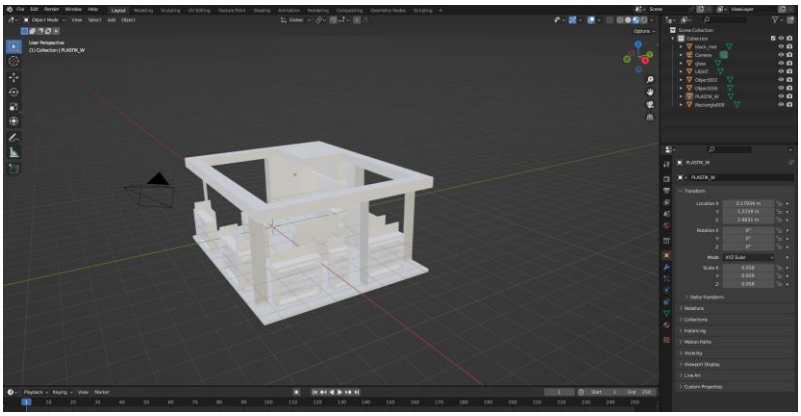

Figure 1. 3D Outlet Object

Figure 2. 3D shoe object sport

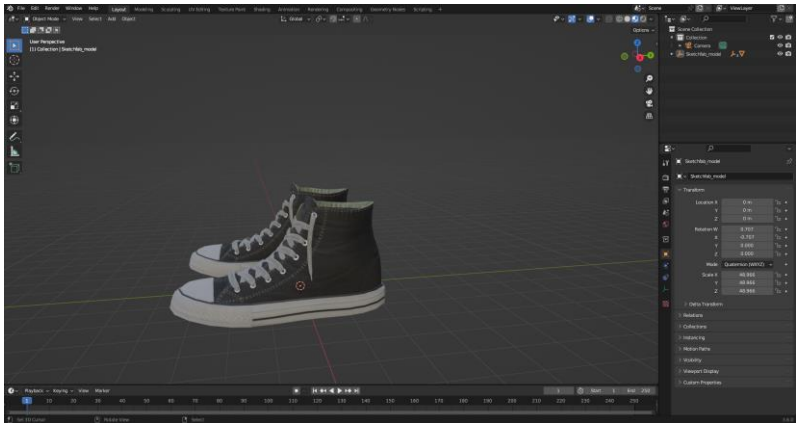

Figure 3. 3D shoe object casual

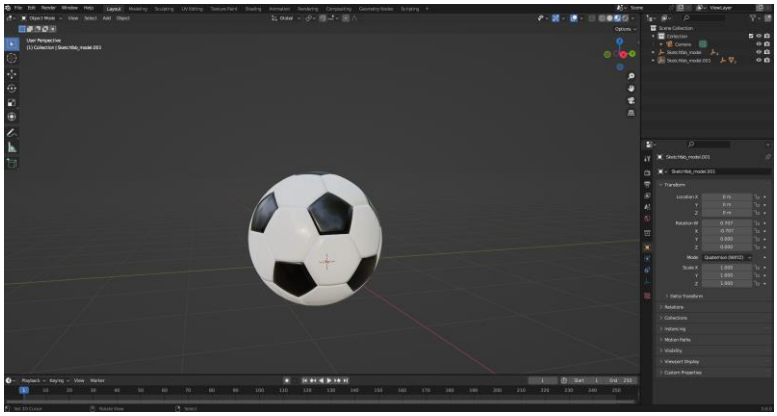

Figure 4. 3D ball object

Development Product

Development product is stage results from existing products researched and developed. Learning media products based Virtual Reality This developed uses game engine software Unity (Zhu dkk., 2019). Development using Unity software can support various types of script programming. Available 3D objects done previously in stage design will entered and processed until they become a learning medium based on Virtual Reality using Unity software.

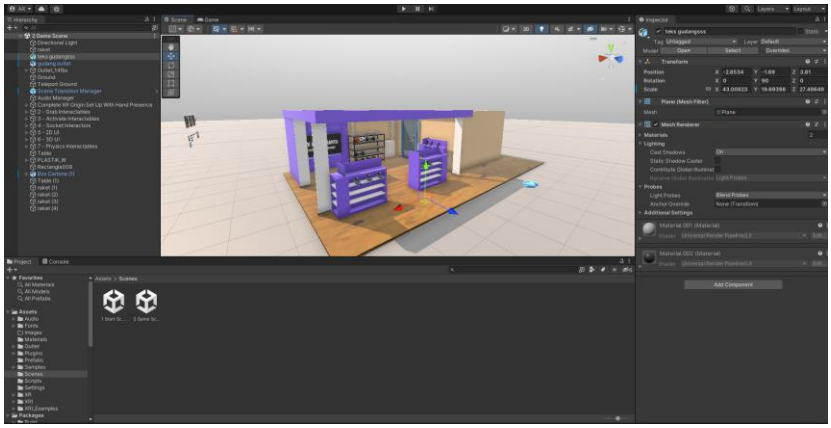

Figure 5. Import 3D Object to Unity

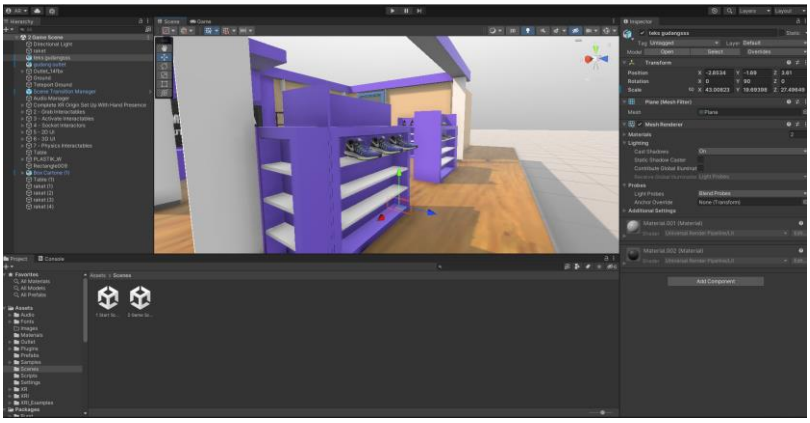

Figure 6. Compiler and 3D Object

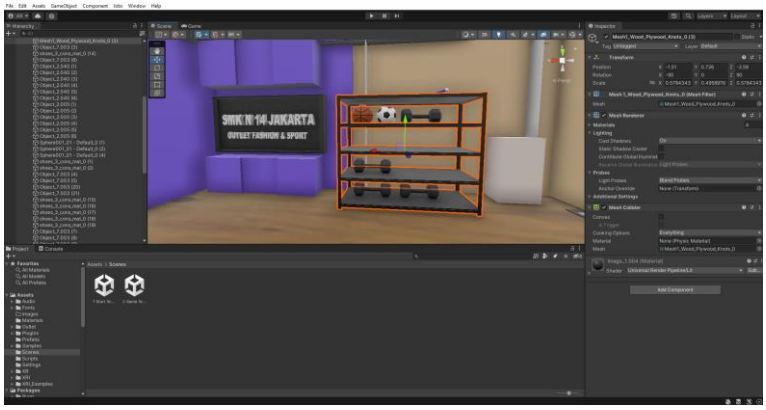

Figure 7. Formation of Fashion and Sports Outlet writing

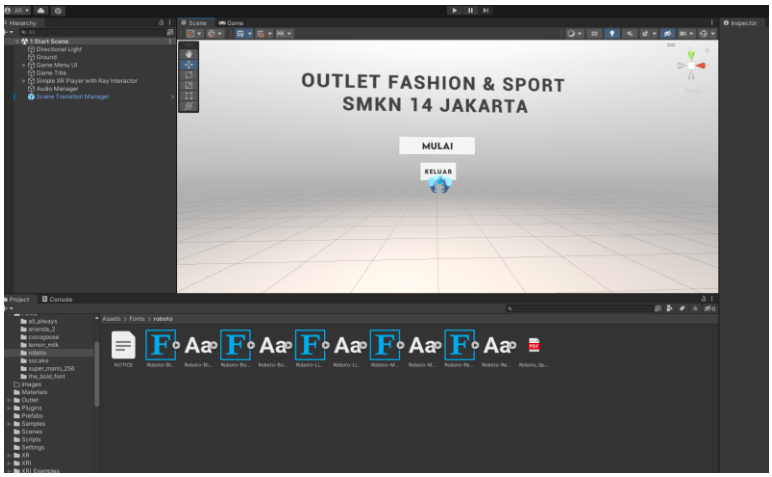

Figure 8. Initial menu display

Draft Model 1 Results

Learning media profound virtual Reality based draft form 1 is validated by expert material and expert mediaso obtained draft model 2 (Prasetiyo dkk., 2018). Based on assessments from media experts, have fewer object collisions oK, improvements to that part This can arrange collision under form object t so results from collision more maximal. Virtual reality stages revision according to media experts in Figure 9 and Figure 10.

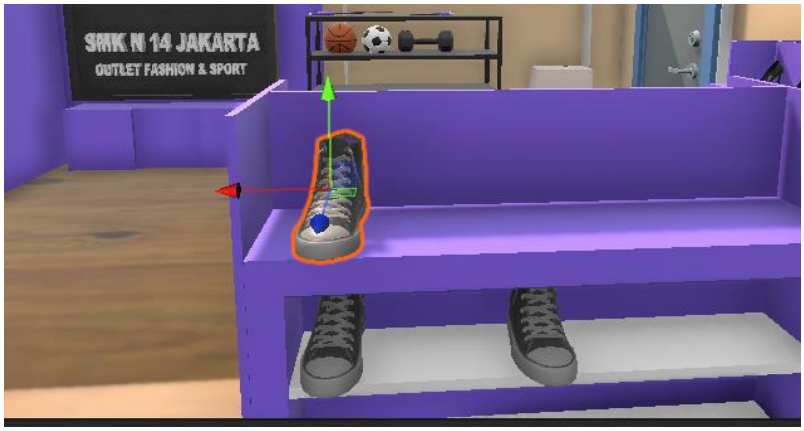

Figure 9. Selection object

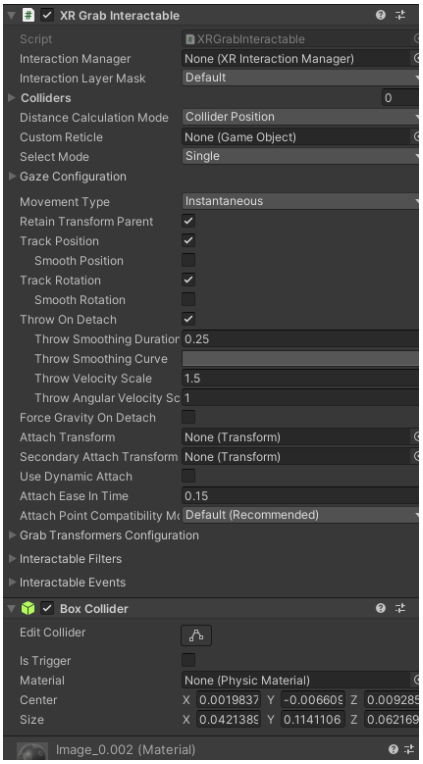

Figure 10. Setting Collider

Draft Model 2

After the experts tested the draft 1 model, the stage was further repaired, so draft model 2 was further tried out through group testing (small group try-out). Draft 2 does not Lots experience resulting changes good visually, interactions and objects.

Final Model

The result of the revision draft 2 product is that the next ending will tried out to group more students. After being tried out, participants will use Learning media-based virtual Reality to educate for doing a post-test after using learning media-based virtual Reality.

Media Due Diligence

Draft Model Trial 1

Learning media-based virtual Reality, which has been successfully developed, will tested by media and material experts To evaluate the appropriateness of learning media products-based virtual Reality (Sugianto & Saputra, 2015). The result of evaluation This will become a reference for revision from lack so that appropriate learning media is produced.

Test learning media experts based virtual Reality validated media experts who have background skill in field development of learning media and programmers developer application. Evaluation from earned media experts results in an average score of 4.67, which shows a very worthy category with an evaluation of several aspects seen in Table 3.

Table 3. Validation Results by Media Experts

No	Rated aspect	Media Expert 1
A	Display Aspects	4. 67
D	Aspects of Media Use	4.67

Expert test material validated by two experts who have skills in department teacher field Marketing Online Business eye lesson arrangement product. The result of the Assessment by experts got an average score of 4.8, which shows a very worthy category with an evaluation of several aspects seen in Table 4.

Table 4. Validation results by material experts

No	Rated aspect	Material Expert 1
A	Material Aspects	5.0
B	Suitability of Practice Tools	4. 6

Assessment results in expert material regarding learning media virtual reality-based for eye lesson arrangement products can conclude that the material presented can help the learning process practice for eye lesson arrangement products (Pamudji dkk., 2017). The practical material presented is appropriate and provides knowledge and experience atmosphere practice to participant education. According to expert material, this program is exciting and needed for practice eye lesson participants.

Pilot Model Draft 2

After getting entered and continuing with revisions following input and suggestions from media and materials experts, group testing was carried out with 5 participants educated. Test draft 2 aims to get information and feedback from participants regarding learning media-based virtual Reality and the effectiveness of the media on each aspect, which consists of aspects of the material, aspects attractiveness, appearance, aspect convenience uses, and aspects usefulness. Participants are educated to carry out the learning process using virtual Reality; after learning, participants are asked to give an assessment on the questionnaire and give comments in the form of suggestions regarding learning media-based virtual Reality for eye lesson arrangement products (Awalla dkk., 2018). Trial phase group small obtain results category very worth it seen in Table 5.

Table 5. Small Group Test Assessment Results

No	Rated aspect	Average Results
A	Material Aspects	4, 66
B	Aspects of Attractiveness Skills	4, 64

No	Rated aspect	Average Results
C	Aspect Convenience Usage	4, 68
D	Benefit Aspect	4.45

Final Product Testing

Product end constitutes results final after a revision process from the draft 2 model trial, then continued testing field with 35 participants educated. Please test it out. The product aims to get information and feedback from participants regarding learning media based on virtual Reality and the effectiveness of the media in each aspect. Participant students are very enthusiastic. For practice arrangement products, use virtual Reality (Burhanudin, 2017). Learning based on virtual Reality ensures participants are educated on easy-to-practice arrangement products, especially for fashion and sports material. Test results product end of learning media-based virtual Reality from all aspects with the average value of 4.4 deep category is very feasible and can be seen in Table 6.

Table 6. Final Product Trial Assessment Results

No	Rated aspect	Average Results
A	Material Aspects	4, 42
B	Aspects of Attractiveness Skills	4, 36
C	Aspect Convenience Usage	4, 45
D	Benefit Aspect	4, 38

CONCLUSION

Research and development (R&D) methods generally cover the stage study initial, development of the product, and testing and revision of the product. After success, develop the product. Stage further testing was carried out on products tested by media and materials experts based on test results. Based on learning media trial results based on virtual Reality stated that the use of learning media virtual reality-based for eye lesson arrangement products can be said worthy based on results from media expert tests, experts materials, and feasibility tests to respondents participant educate.

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