Development of Face Care Learning Models Using Augmented Reality Applications

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⬜**Abstract**— This study aims to produce a facial care learning model using augmented reality applications to improve student learning outcomes. This research method uses research and development methodology (R and D) by adopting the Borg and Gall model in collaboration with the Step of System Approach Dick and Carey Model of Educational R&D and the development model by Lee & Owen. The results of the development of this learning model determined by the formative evaluation of expert judgment that the learning model is excellent, then in the ono-to-one evaluation with three students getting a score of 4.62 on a scale of 1-5 so that facial care learning materials using augmented reality applications are suitable for use in facial care courses. The small group evaluation was carried out on nine students and got an average score of 4.69 meaning that the learning material was suitable for use, then in the Field Trial evaluation was carried out on 30 students and got an average score of 4.74 so that it can be concluded that the learning material is outstanding. The results of testing the effectiveness of facial care learning models using augmented reality applications can be seen from the results of the student's pretest and posttest to determine the level of knowledge, based on the average pretest and posttest scores of 63 and 87 respectively. From the average pretest and posttest, it is known that there is an increase. Then continued with the t-test, the results of the t-test are known t-count of 22.480 and t-table of 2.045. Because t-count > t-table, it explains a significant increase in the average learning outcomes before and after learning facial skin care using augmented reality applications. This study results based on research that Augmented reality can improve visualization skills in abstract things or unclear material in facial care learning with a focus on facial skin anatomy, facial skin structure, and facial skin diseases. Augmented Reality (AR) media is designed to simulate observing the mechanism of skin regeneration, the process of acne, and the healing of skin diseases.

Keywords: Media, Augmented Reality, Facial Skin Care, Study Result

I. INTRODUCTION

The Cosmetology Education Study Program, at Jakarta State University is a higher education provider study program with a curriculum based on KKNI and SKKNI which is oriented to improve the quality of students to become graduates who have academic abilities, develop science and technology in the field of health and beauty. One of the courses in the curriculum is facial care courses. This course includes the concept of anatomy and skin structure, terminology of skin disorders, facial skin analysis, and facial skin care procedures.

The achievement of this course is that students not only gain knowledge but also must be able to practice techniques for caring for facial skin according to procedures. But in fact, students tend to be more passionate about participating in practice hours than theory. So, it is known that not all students have gained the ability through internalization of knowledge and skills, which causes misconceptions in facial care learning materials. Developing knowledge can make learning more meaningful through the development of student thinking, which has an impact on students not only knowing what facial skin problems are but also being able to understand, practice, analyze, and provide relevant facial care suggestions to overcome facial skin problems or disorders

so that the maturation of this concept is known as pre-lab as a preparation for students to practice in the lab with real clients. [1], Prelab oratory is seen as integral in encouraging students' understanding and experience while learning in the laboratory.

According to [2], achieving effective learning in Higher Education depends on the ability of the lecturer or tutor to invent learning experiences that can discover the learning outcomes taught. Effective learning can be embodied by increasing the activity of each student in the class, which is by presenting interesting learning media and can increase students' imagination to improve critical thinking skills, especially in competency-based learning. Critical thinking has a crucial mediating role between other 21st-century skills and problemsolving [3]

Learning facial care requires students to be able to understand the concept of skin structure, skin function, and various skin diseases. Students can sweeten knowledge to analyze the mechanisms of facial skin, to decide the statement cause -effect and to propose conclusions that are following the facts that have been known (essential). In learning facial skin care, students must be able to understand the immersive and abstract material so students

can practice good facial skin care techniques according to procedures.

According to the results of research by Beat A. [4]to get great opportunities in the field of Vocational Education and training (VET) to get practical benefits in the vocational/vocational field, related (motor skills, factual knowledge, and procedural knowledge),[5], [6] it is necessary to design vocational learning by developing or collaborating learning with the use of computer-based technology such as games, simulations etc.

[7] "Having the AR platform installed in the smartphone would enable visualization of abstract concepts to be carried out in detail using AR. Thus, AR is flexible in its usage, easy to operate, and can support online learning". Augmented reality is a very efficient technology for universities and colleges because students can improve their knowledge and skills,
especially in theory or complex system mechanisms, in this case, AR is very helpful for visualizing complex material in college learning [8]

The learning of facial care using Augmented reality is a learning that uses virtual technology to enhance visual senses to enrich information through real sensations. In learning facial care, the material presented is in 3D form so that it simulates or makes similar objects, especially in abstract material.[9]–[11] Learning experiences affect the level of student acceptance of information and materials. A varied learning experience by involving as many senses as possible in capturing information and material, making it easier for students to understand learning messages, so educators must be able to create learning experiences for students through various attributes such as e-book media, internet, interactive multimedia, and others that can enrich students learning experiences, especially the latest learning media that can provide immersive experiences and expected to be stored in students long-term memory.

In Higher Education achieving effective learning depends on the ability of lecturers to create learning experiences that achieve learning outcomes from the learning taught. Managing the learning process requires understanding the way students learn and learning styles. Combining different approaches to learning practices has implications for teaching and the activities associated with those teachings. According to Gill [12]Effective teaching is related to the best approaches to realize maximum learning outcomes.

Augmented Reality (AR) technology has the potential to be developed in the world of Education because AR features can help improve students' visualization skills and can help lecturers to explain well the content taught. [13]The use of AR has a positive impact on student achievement in the lab. Students can see the process steps and instructions directly, making it easier for students to work to complete practice faster. AR is very appropriate to be used in applied subject education [7]

AR adds to the existing real-world environment some extra virtual information generated by computer techniques that can enhance the overall experience. [14]Results indicate a positive effect of integrating AR technology in teaching and learning on all dimensions of motivation (attention, relevance, satisfaction, and volition) between experiment and control groups. [4]According to [15]the integration of new technologies such as Augmented virtual/reality presents real knowledge in a learning environment.

Based on the theory above, the researcher wants to create a facial care learning design using Augmented reality to help students visualize skin problems on complex material. Augmented reality will be realized in the form of applications embedded in Android phones, downloading the United AR application can be done by anyone free of charge. Applications can be downloaded through the barcode listed in the makeup learning module to provide an effective learning experience, increased motivation, and active engagement between students.

II. METHODOLOGY
A. Research Design
This research method uses research and development methodology (R and D) by adopting the Borg and Gall model in collaboration with the Step of System Approach Dick and Carey Model of Educational R&D and the development model by Lee & Owen. R&D research is conducted to design new procedures and products, which are then systematically tested in the field and refined until they meet effectiveness criteria. The development of teaching materials in this study uses the Lee&Owens development model. In the Lee Owens model, there are several stages, namely the analysis and assessment stage, the design stage, the development and implementation stage, and the evaluation stage.

B. Sampel
This formative evaluation is carried out after the learning product has been developed. In this study, formative evaluation begins with 1) one-to-one evaluation by experts, consisting of material experts, instructional design, media, and language. 2) One-to-one evaluation by learners, students selected a total of three students with criteria of high, medium, and below average ability. 3) Furthermore, learning materials are evaluated by students in small groups or small group evaluations totaling nine people. 4) After revision in the small group evaluation, the field tryout or field testing is continued to the final stage in the formative evaluation. The number of students who become samples is 30.

C. Instruments Design
The instruments used include interview instruments, questionnaires/questionnaires given to students, and test instruments (in the form of multiple-choice tests to measure student knowledge by pretests and posttests).

Score Average	Criteria
>4,2	Excellent
>3,4-4,2	Good
>2,6-3,4	Enough
>1,8-2,6	Less
<1,8	Very lacking

Table 1. Score Average Assessment Criteria [14]

I. RESULT

The results of the facial skin care development model with an AR-assisted PBL approach in this study show that the development of a facial skin care learning model with an augmented reality-assisted problem-based learning approach is feasible to be used with an instructional design expert formative evaluation test of 4.35 for material expert validation of 4.80, media expert evaluation of 4.70 and language expert evaluation of 4.70. The results of the practicality test can be known from the average practicality value of 4.7, so it can be concluded that the teaching model developed is very practical to be applied to facial skin care learning.

The application of learning with PBL supported by AR technology can bind students' activeness in interacting, asking questions, generating hypotheses, and improving critical thinking skills to solve cases or facial skin problems faced by clients during practical classes in the lab.

The effectiveness test is carried out using a pre-posttest to test the increase in student knowledge. The results of descriptive statistical test research can be seen in the table below.

Table. 2. The effectiveness test

Test	Mean	Median	Modus	Minimum Score	Maximum Score	Std. Deviation
Pretest	63	63	70	50	73	6,7
Posttest	87	87	87	77	97	5,9

Based on the table 2. above, obtained first, the average pretest and posttest are 63 and 87 respectively. From the average pretest and posttest, it is known that there is an increase. The difference in descriptive tests can be seen more clearly in the graph below.
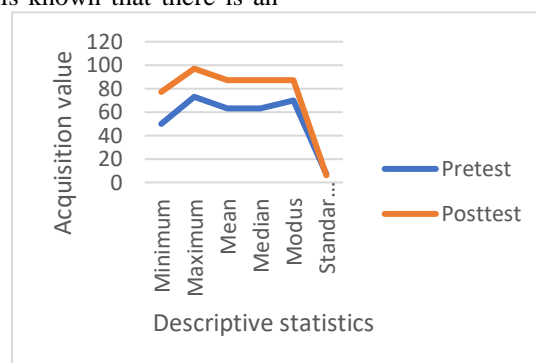

Table 2. T-test

Tes	t-hitung	t-tabel	Sig.
Pretest Posttest	22,480	2,045	0,000

Based on the results of the t-test data in the table above, it is known that the t-table price is 22,480, and the t-table price is 2,045. Because the price of the t-count is greater than the t-table, H0 is rejected or there is a significant increase in the average learning outcomes before and after learning facial skin care with AR media. Furthermore, N-gain calculations are carried out to determine the increase that occurs.

Table 3. N-gain calculations

Treatment	N-gain	Category
Pretest-Posttest	0,65	Medium

Based on the table 3 above, an average N-gain of 0.65 is obtained. This means that there is an increase in learning outcomes from the pretest to the posttest on the facial skin care learning model with augmented reality media can increase student knowledge. The facial skin care learning model with a problem-based learning approach assisted by augmented reality developed is very helpful in improving students' ability to solve problems related to skin conditions.

I. DISCUSSIONS

The Discussions showed that designing effective learning with a PBL approach can increase student knowledge of complex materials, improve independent learning skills, improve higher-order thinking skills, problem-solving skills, and student collaboration skills.[16] [14], [17] "If designed and implemented effectively, PBL can help students develop self-directed learning, problem-solving, higher order thinking, and collaboration skills, as well as a deep understanding of subject matter content". [18], [19].

The feasibility test results of the facial skin care development model with an AR-assisted PBL approach in this study show that the development of a facial skin care learning model with an augmented reality-assisted problem-based learning approach is feasible to be used with an instructional design expert formative evaluation test of 4.35 for material expert validation of 4.80, media expert evaluation of 4.70 and language expert evaluation of 4.70. The results of the practicality test were carried out on one-to-one evaluation, small group, and field trial with an average value of 4.7 so that it can be concluded that the teaching model developed is very practical. The effectiveness test was carried out using a pre-posttest to test the increase in student knowledge, this was based on the effectiveness test of each pre-test and post-test group, where the increase was obtained from an average N-gain of 0.65.

The results of the practicality test can be known from the average practicality value of 4.7, so it can be concluded that the teaching model developed is very practical to be applied to facial skin care learning. The model of facial skin care development with an Augmented reality assisted PBL approach was declared feasible after a series of tests. Formative evaluation tests of instructional design experts, material experts, media experts, and linguists suggest that the developed models are valid and feasible for use in facial skin care learning.[5], [6], [14], [20] The model developed is also considered practical because it can have a positive influence on students. This means that there is an increase in learning outcomes from the pretest to the posttest in the facial skin care learning model with augmented reality media can increase student knowledge.

The application of learning with PBL supported by AR technology can bind students' activeness in interacting, asking questions, generating hypotheses, and improving critical thinking skills to solve cases or facial skin problems faced by clients during practical classes in the lab.

II. CONCLUSION

The model of facial skin care development with an Augmented reality assisted PBL approach was declared feasible after a series of tests. Formative evaluation tests of instructional design experts, material experts, media experts, and linguists suggest that the developed models are valid and feasible for use in facial skin care learning. Therefore, the facial skin care learning model with augmented reality media is declared feasible, practical, and effective to be used in learning facial skin care.

CONFLICT OF INTEREST
"The authors declare no conflict of interest".

AUTHOR CONTRIBUTIONS
Nurul Hidayah conducted the field research, analysed the date and carried out the literature review. M. Sukardjo and Uwes. A Chaeruman guided the research, reviewed, and corrected the article. All authors agreed with the final version of the article.

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