



The Effect of Augmented Reality Module and Student's Critical Thinking in Ability to Diagnosing Skin

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Abstract. This study aims to determine the effect of Augmented reality applications in learning modules and student's critical thinking in ability to diagnosing skin. This research includes quantitative using descriptive analytic to students of Cosmetology Study Program, and obtained 60 students. Based on the results that Augmented reality applications in learning modules reveal a value of sig. of $0.007 < 0.05$ and the t test have a value of $2.822 > 2.014$ so the hypothesis is accepted, implying Augmented reality in learning modules has a significant effect on skin diagnosis ability. The second hypothesis show student critical thinking has a sig. of $0.000 < 0.05$ and the t test have a value of $5.582 > 2.014$. The second hypothesis is accepted, indicating that the variable Students' critical thinking has a significant effect on skin diagnosis ability. The third hypothesis asserts that Sig. $0.000 < 0.05$ and Fcount $>$ Ftable with a value of $71.399 > 3.20$ were obtained, the third hypothesis is accepted, implying the Augmented Reality application in the learning module and critical thinking ability have a significant effect on to improve ability diagnosing skin. There is a favorable and significant relationship between Augmented Reality applications in learning modules and critical thinking skills to improve diagnosis ability. Augmented reality application in the facial skin diagnosis module can help improve visualization skills student's as well as help lecturer explain well and make it easier for students to understand and can increase students' rationalism in absorbing on facial skin diagnose learning material.

Keywords: Augmented Reality · Critical Thinking · Diagnosing Skin · Module

1 Introduction

Higher education as an educational unit is expected to improve learning systems, especially in vocational education of cosmetology programs. In recent years, it is known that the ability of students to diagnose facial skin in facial care courses is still relatively low. Whereas before determining treatment actions, students should understand in-depth skin anatomy so that skills in diagnosing become more accurate and can continue to select the right treatment and cosmetics for clients and to improve student performance on the skill. Developing students' critical thinking is a major educational goal in societies around the world. [1]. The student's critical thinking ability is needed to diagnose skin,

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critical thinking help students to create learning experiences and improves the ability to generate multiple alternatives and goals in problem solving in facial treatment learning and also decision-making how to treatment the client. Information and communication technologies can be used as effective tools to improve instructional approaches and critical thinking skills [2].

Using technology in vocational education have sought to prevent students from being left behind because of conventional learning in class. So that an immersive understanding of the material for diagnosing skin is needed using learning media that can improve students' understanding of complex and abstract material by presenting material through visualization and concrete illustrations. The potential of AR application in education will be demonstrated if bring reality into the study, provides emotional and cognitive experiences that involve students in the rational learning effort, and gives correct information [3, 4]. Augmented Reality a trend in of educational technology in recent years. AR applications using technologies such as Kinect, the internet of things, and virtual reality make a useful contribution to science studies [5]. Augmented Reality has a positive effect, AR materials can increase learning effectiveness. Augmented Reality is technology to support various learning approaches in education such as collaborative [6]. Developing critical thinking is crucial to improve students' ability to diagnose skin. Augmented reality is a media to support students' understanding of complex and abstract learning material, especially facial skin diagnostic materials.

2 Literatur Review

Critical thinking skills and dispositions improve substantially over a normal college International Seminar and Conference on Educational Technology (ISCET) - 69 experience. [7] "critically analyse the substance of empirical studies on teaching critical thinking" [8]. According Claire Hart that there are important implications for the assessment of higher education students' critical thinking skills based on the quality of reasoning [9]. The importance of critical thinking skills at a higher education is to solve problem. Virtual Reality also encourages repetitive learning, stimulates creative thinking [10].

Augmented Reality can involve students in learning and help improve visualization skills [11]. Augmented reality (AR), instead of transporting the user to a virtual environment with the real world. Applying AR in an educational context equals to using "technology to add virtual objects to real scenes, by adding missing information to real life" [12]. As the AR develops more about interactive applications, students can become critics [13]. Augmented reality stimulated students to retain new information as well.

Students' laboratory skills were found to be positively affected using AR technology [14]. The AR influences students interactions relating to knowledge construction [15]. AR in anatomical education help for student motivation, allowing opportunities with autonomous work and spatial interpretation [16]. The present AR application was conceived to improve the student's understanding and increase motivation using technologies [17]

Medical informatics is an interdisciplinary area (combining more academic fields), one of which is facial treatment for beauty skin care but before beautician treatment the client, they have to ability for diagnose client. The introduction of technology to the labor

training contributes to increasing the level of students' success and develops practical skills [18]. Diagnosing a skin disease correctly is challenging since a variety of visual clues [19]. Development of medical expert systems that use artificial neural networks as their knowledge bases appears to be a promising method for predicting diagnosis and possible treatment [20]. Diagnoses are visually performed by dermatologists, by manual observation. An augmented reality smartphone application for supporting the dermatologist in the real-time analysis of a skin lesion.

The Augmented Reality application in education present reality and experiences into study. Augmented Reality can involve students in learning and help improve visualization, Augmented reality stimulated students to retain new information and also encourages repetitive learning, and stimulates critical thinking.

3 Methods

This research used a quantitative method with descriptive analytic and a cross-sectional methodology. This study's population consisted of all Makeup Education Study Program class 2019 students. The trial population of the study was 60 students. Purposive sampling was used to determine the sample in this investigation. This study's data collection methods included distributing surveys through Google Forms.

The questionnaire instrument was utilized to collect information on the influential variables, which were self-efficacy (X_1) and motivation (X_2). Whereas the dependent variable (Y) as the variable that is impacted, namely opening a freelance makeup artist service business. Questionnaire instruments are utilized to collect data on variables that influence, namely Augmented Reality in Module (X_1) and Critical Thinking Ability (X_2), using Facial Skin Diagnosis as the dependent variable (Y). The Person Product Moment Correlation is used for validity testing in SPSS 25 program for Windows, while the Alpha Cronbach formula is used to measure reliability. This study uses multiple linear regression analysis.

Formula's information:

Y = dependent variable (dependent)

x_1, x_2 = independent variable (independent)

a = constant

b = regression coefficient

In this study, the statistical hypothesis was determined by the null hypothesis (H_0) and the alternative hypothesis (H_a), as well as the statistical test result, level of significance, and criterion.

The hypothesis formula as a temporary answer will be tested and verified, while the partial and simultaneous hypothesis testing is as follows:

3.1 Partial Hypothesis Test

Hypothesis 1 is $H_0: \rho_1 = 0$, This means that the Augmented reality (AR) application variable has no effect on the capacity to diagnose skin. $H_a: \rho_1 \neq 0$, It means that the use of Augmented Reality (AR) application in learning modules has a varying effect

on improving Skin Diagnosis Ability. Hypothesis 2 is $H_0: \rho_2 = 0$, This suggests that variable Critical Thinking has no influence on increasing Skin Diagnosis Ability. $H_a: \rho_2 \neq 0$, It implies that there is a variable influence on Critical Thinking in increasing Skin Diagnosis Ability.

To test the partial hypothesis, it can be tested using the t-test and decision-making criteria: Accept H_0 (Reject H_a), if t count < t table or sig t > $\alpha 5\%$ (0,05)

Reject H_0 (Accept H_a), if t count > t table or sig t < $\alpha 5\%$ (0,05)

Hypothesis 3 is $H_0: \rho_1 = \rho_2 = 0$, It means that the variable implementation of Augmented Reality (AR) in learning modules and Critical Thinking Skills has no influence on increasing Skin Diagnosis Ability.

$H_a: \rho_1 = \rho_2 \neq 0$, It suggests that there is a variable influence of Augmented Reality (AR) on learning modules and Critical Thinking Skills working together to improve Skin Diagnosis Ability.

The F test and decision making criteria can be used to examine the simultaneous hypothesis: Accept H_0 (Reject H_a), if F count < F table or sig F > $\alpha 5\%$ (0,05)

Reject H_0 (Accept H_a), if F count > F table or sig F < $\alpha 5\%$ (0,05)

3.2 Coefficient of Determination (R^2)

The most significant influence may be seen in the highest amount of the largest Standardized Coefficient Beta values of the independent variables combined where: $0 < R^2 < 1$. In contrast, if R^2 declines (near 0), it can be stated that the effect of the independent variable on the variable is small.

4 Result

a. Research Results

The data given in this study are original data collected through a questionnaire instrument that was distributed directly to respondents. The research data consists of two independent variables: Augmented reality (AR) application in the learning module (X_1) and Critical Thinking Ability (X_2), with Skin Diagnosis Ability as the dependent variable (Y). A simple descriptive statistical technique was used to process the data. According to the study's findings, the probability value is 0.082 is more than 0.05, indicating that all variables are normally distributed.

4.1 Hypothesis Test

To determine if the independent variables in the regression model influence the dependent variable, a test is performed that includes a partial test (t test), a simultaneous significant test (F test), and the coefficient of determination (R^2). SPSS 25 was used for hypothesis testing in this study.

1. Test (Partial Hypothesis Testing)

The t test is used to evaluate hypotheses 1 and 2 in part, as shown in the table below (Table 1 and 2):

2. F Test (Simultaneous Hypothesis Testing)

Hypothesis 3 testing is carried out simultaneously using the F test can be seen in the table below:

Value of Sig. For the effect of X₁ and X₂ together a significant effect on Y is 0,000 < 0,05. In addition, the value of F table is reached at 3.200. So, given a value of 71.399 > 3.200, F count > Ftable. It is possible to conclude that H₀ is rejected and H_a is accepted, implying that the Augmented Reality (AR) application in the learning module and Critical Thinking Ability work together to improve Skin Diagnosis Ability.

According to partial or simultaneous correlational data, the use of Augmented Reality (AR) in the learning module and Students' Critical Thinking Ability has a favorable and substantial effect on enhancing Skin Diagnosis Ability. The Augmented Reality (AR) application in the learning module, along with the students' Critical Thinking Ability, have a positive and significant effect on enhancing Skin Diagnosis Ability. The skin diagnosis lesson module, which is integrated with the Augmented reality application, provides in-depth information, knowledge, and depth of understanding; the material content becomes clearer and more detailed, and the photos in the module can be clearly observed because the images can present a real illustration of skin object.

Table 1. Hypothesis

Coefficients		
Model	t	Sig.
(Constant)	3,490	.001
Augmented reality (AR) in learning modules	2.822	.007
Critical thinking	5.582	.000

Table 2. F-test

ANOVA ^a		
Model	F	Sig.
Regression	71.399	.000 ^b
Residual		
Total		

a. Dependent Variables:Skin Diagnosing Ability

b. Predictors: (Constant), Augmented reality (AR) application in learning modules and Critical Thinking Skills

1. Based on statistical regression analysis data, Augmented reality (AR) applications in learning modules reveal a value of sig. of $0.007 < 0.05$ and the results of the t test, which obtained a value of $2.822 > 2.014$. As a result, the first hypothesis is accepted, implying that the variable Augmented reality (AR) in learning modules has a significant effect on skin diagnosis ability. AR applications in learning modules might assist students' creative thinking by converting abstract subject matter into concrete.
2. The outcomes of evaluating the second hypothesis show a favorable and substantial relationship between Students' Critical Thinking and Skin Diagnosis Ability. Students can increase their ability to objectively assess challenges. Understand real-world learning materials and help students enhance their rational thinking skills. Based on the data in the statistical regression analysis, Student Critical Thinking has a sig. of $0.000 < 0.05$ and the t test findings have a value of $5.582 > 2.014$. As a result, the second hypothesis is accepted, indicating that the variable Students' Critical Thinking has a significant effect on skin diagnosis ability.
3. The third hypothesis asserts that there is a favorable and significant relationship between Augmented Reality (AR) applications in learning modules and Critical Thinking Skills in enhancing Skin Diagnosis Ability at the same time. Augmented reality (AR) application in the facial skin diagnosis learning module can help improve visualization skills, as well as help instructors explain well and make it easier for students to understand what is being taught, while the ability to think critically can increase students' rationalism in absorbing information on facial skin diagnostic learning material. Based on the third hypothesis testing, results on Sig. $0.000 < 0.05$ and $F_{count} > F_{table}$ with a value of $71.399 > 3.20$ were obtained.

As a result, the third hypothesis is accepted, implying that the Augmented Reality (AR) application variables in the learning module and Critical Thinking Ability have a significant effect on the learning process. Improve your skin diagnosis skills. And if the determinant coefficient (R square) determined from the data acquired in the statistical regression analysis is 0.760, then the determinant coefficient is $0.760 \times 100\% = 76.0\%$. These findings imply the use of Augmented Reality (AR) in learning and ability modules. Critical Thinking influences skin diagnosis by 76.0%, whereas the remaining 24.0% is impacted by other factors

b. Discussion

Based on the findings of this study's analysis, Augmented reality (AR) applications in the learning module have a positive and significant influence on the Ability to Diagnose Skin.

Students' Critical Thinking Ability has a beneficial and significant influence on Skin Diagnosis Ability, Augmented reality (AR) applications in the learning module and students' critical thinking ability have a beneficial and significant influence on skin diagnosis ability.

5 Conclusion

The conclusion of this research is:

1. Augmented reality (AR) applications in the learning module have a positive and significant influence on the Ability to Diagnose Skin, which obtained a value of $2.822 > 2.014$. As a result, the first hypothesis is accepted, implying that the variable Augmented reality (AR) in learning modules has a significant effect on skin diagnosis ability.
2. Student Critical Thinking has a sig. of $0.000 < 0.05$ and the t test findings have a value of $5.582 > 2.014$. As a result, the second hypothesis is accepted, Students' Critical Thinking Ability has a beneficial and significant influence on Skin Diagnosis Ability.
3. Augmented reality (AR) in the learning module and students' critical thinking ability significant influence on skin diagnosis ability. Based on the third hypothesis testing, results on Sig. $0.000 < 0.05$ and Fcount $> F_{table}$ with a value of $71.399 > 3.20$ were obtained.

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