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Learning Through Augmented Reality: The Indonesia Open University Experience

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Abstract: Augmented reality is a combination of the real dan virtual worlds that has an opportunity to be an integrated learning medium in online tutorial classes. The potential of augmented reality with multimedia capabilities creates an immersive learning environment. TPEN4314 Produksi Media/ TV course is a course that requires practice through augmented reality media for students in Open University specifically in the Educational Technology study program. This study aims to investigate the correlation between the experience of using augmented reality with student learning motivation, engagement, and acceptance of technology as well as the influence of the three variables on the experience of using augmented reality. The research method used quantitative with Likert Scale questionnaires and data analysis with multiple regression tests. The result of the analysis showed that there was a correlation between the variables of augmented reality experience and the three independent variables that affected the dependent variable. It is hoped that this research can contribute to tutors and learning media developers to design learning media that facilitate the independence of distance student learning to achieve the goal of competency in practical courses so that students get a meaningful learning experience.

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Introduction

The geographical spread of location of the location of the students who take distance education, and communication in online tutorials is one of the ways teachers and students can communicate. To facilitate learning interactions, distance learning utilized technology and media to design quality learning opportunities (Bozkurt & Richter, 2021). Modern practice in distance learning uses technological resources to facilitate communication between students and instructors such as university learning management systems, electronic data, or online textbooks to video conferencing (Ntaba & Jantjies, 2021).

Students' interaction with the teacher in distance range from asynchronous, not limited in time to flexible and synchronous, which can be timed specifically. The asynchronous concept is developed into learning in a virtual environment. Teachers can design online interactions, so that they are fun and useful, and allow students to be involved at any time and anywhere (van Berg, 2020). Virtual-based media also influences the needs of the new generation of students. One learning tool that has been developed and effective is augmented reality. This media creates real conditions for immersive learning, where students gain new knowledge through interactive activities, involving at least 65% of the senses of

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vision, perception, and emotion simultaneously (Chen, 2019). Teachers can deliver material online so that students can immediately respond through devices connected to the internet. The virtual concept presented in augmented reality displays visualizations that are similar to the real environment and have the opportunity to grow the user's perception.

The combination of virtual and real-world objects resulting from computer capabilities creates unique interactions and situations and also provides unique experiences. Interaction and immersive features can encourage users to engage in meaningful learning activities that have the potential to increase motivation (Khan et al., 2019). The Open University provides marker-based augmented reality learning media as a study assistance service for students, which is integrated with online tutoring for students of the Undergraduate Study Program of Educational Technology. Activities designed to mimic real-world experiences in learning assignments can strengthen students' understanding, ability to retain and support knowledge for collaborative learning. The development of immersive learning technologies in the form of virtual reality has the potential to improve the experience and be of better value when used in online teaching (Stefaniak & Xu, 2020). Studies on the application of augmented reality in universities found that augmented reality enables to encourage motivation, creativity, participation, and innovation because the completeness of the resulting communication, interactivity, and perception of information supports the learning process (Moreno-Guerrero, 2020). A memorable learning experience in an immersive environment will increase student motivation accompanied by active involvement as users of augmented reality, enriching student knowledge.

Student engagement in higher education can be interpreted as a positive, satisfying state of mind, related to learning characterized by enthusiasm (willingness to achieve learning goals diligently), devotion (high dedication, full of enthusiasm and inspiration), and high absorption with full concentration. All aspects of this dimension lead to behavioral engagement, affective engagement, and cognitive engagement which positively affect student engagement with their studies (Snijder et al., 2020). The active role of students in their studies gradually leads students to meet learning satisfaction through better attitudes and ways of thinking.

Augmented reality can provide a way of learning with a simulation model, which can provide opportunities for students to practice that resembles real situations, exploring knowledge independently as needed. Simulation-based learning provides opportunities for students to participate by controlling the actions and desires of students to acquire their knowledge. Students are allowed to conduct system simulation tests designed to resemble real settings or settings, taking place continuously. The attitude of participation as a constant reflection supports students' cognitive to be active, play a role, and connect emotionally to increase exploratory behavior (Lee et al., 2021).

Furthermore, learning is carried out utilizing practice so that students are cognitively, emotionally, and behaviorally engaged. Augmented reality technology is used by students as a way to increase their understanding of electrical engineering materials. This learning subject requires learning media that can present practice-based learning strategies close to real situations. Learning activities cannot be separated from student engagement. The engagement itself is identified in three dimensions as expressed by Bloom (1959), namely behavioral engagement, emotional engagement, and cognitive engagement (Suryaman et al., 2020).

In terms of providing online course guidance, it emphasizes the importance of support for students to increase self-efficacy. Perceived perceptions through ease of use and perceived

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usability of tutoring services such as instructional feedback to students. The findings obtained regarding the model of acceptance of technology, perceived usability, and perceived ease are associated with the learning experience. There is a relevance between perceptions of perceived online tutoring services, ease of use, and perceived benefits (Hanham et al., 2021).

Augmented reality applications are increasingly popular in technology and the gaming industry as well as augmented reality application-based games, users are presented in virtual situations to be able to experience reality. User satisfaction with augmented reality application products is characterized by repeated actions and even being able to utilize and understand the available features. The activeness of users in using the application and having the intention to continue using the application increasingly often shows satisfaction and good assessment of augmented reality applications (Alessa et al., 2021). The benefits felt by users, ease of use, fun and stunning visual appeal have the potential to be accepted and applied as distance learning platforms in higher education (Ghanbarzadeh & Ghapanchi, 2019).

Learning media design innovations are developed to meet the needs of distance education students. In the context of education at the Open University, learning media are provided according to student learning needs, which are designed to the characteristics of self-learning and self-instruction, and can be used flexibly even without face-to-face meetings. Augmented reality media is developing as an innovative digital media. The illusion created is considered to be able to improve visual-spatial skills so that students have unique experiences and even show high levels of motivation, self-confidence, interest in learning, and perceived satisfaction (Saavedra et al., 2019).

Some individual aspects related to the experience of using augmented reality are of concern to the author, including learning motivation, engagement, and acceptance of technology in universities. As far as the author's knowledge, some of these aspects have not been done much for research, so the author considers it important to study them in research.

Based on the background and results of research studies that focus on the use of augmented reality covering theory, relevant research result, and research objectives, the author put forward four research hypotheses, namely the relationship between learning motivation and experience using augmented reality, the relationship between engagement and experience using augmented reality, the relationship between acceptance of technology and experience using augmented reality, and the influence between learning motivation, engagement and acceptance of technology together on the experience of using augmented reality in Study Program of Educational Technology' students in 2020 and 2021 at the Indonesia Open University. The author sees the importance of tutors and learning media developers knowing student learning motivation and student involvement in using augmented reality, besides that they can also find out students' perceptions of receiving technology to achieve practical competency.

Research Method

This study uses survey methods to measure user experience, applying quantitative research procedures with correlational and regression analysis techniques. The research sample was taken from students at the Indonesia Open University, Study Program of Educational Technology who participated in the online tutorial of the Video/ TV Media Production Course in 2020-2021 as many as 73 students, purposive sampling method with a one-shot case study. Data were collected with an instrument in the form of a questionnaire on a Likert Scale of 1-4. Validity and reliability test are performed to test instrument items. Test the analysis requirement using the Kolmogorov-Smirnov normality test at a level of

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significance/ alpha 5% with the help of SPSS software and test the hypotheses on the interval data type.

Tabel 1. Likert Scale

Answer Scale	Score
Disagree	1
Less Agree	2
Agree	3
Very Agree	4

Result and Discussion

The results of data collection are displayed descriptively, as presented below:

Table 2. Descriptive Statistics

Variable	Min	Max	Mean	Frequency Agree	St. Dev
Experience	3,15	4,00	3,17	95,4%	0,36
Learning Motivation	3.17	4,00	3,15	93,8%	0,40
Engagement	3,00	4,00	3,10	91,6%	0,38
Technology Acceptance	3,17	4,00	3,14	94,4%	0,37

Source: Data processing (2022)

After descriptive analysis, the author tested the validity and reliability of each variable's questionnaire items and found out that each item was valid and reliable. Correlation test with the Pearson Product Moment method, a significance test is obtained by comparing the calculated r value greater than the r table (sig. 0,05) to produce valid instrument items. Most of the respondents total of 73 students agreed on the statement items for the learning motivation variable of 93.8%, the engagement variable of 91.6%, and the technology acceptance variable of 94,4%. In general, students stated that the experience of using augmented reality can meet expectations because it is visually appealing, presents situations like reality, attracts attention, easy to use with the advantages of modern, creative, efficient, and innovative media. The results of the static test of data normality are shown in Table 3.

Table 3. Normality Test

		Unstandardized Residual
N		73
Normal Parameters	Mean	0,0000
	Std. Deviation	5,141
	Absolute	0,141
	Positive	0,141
	Negative	-0,130
Kolmogorov-Smirnov Z		1,205
Asymp. Sig. (2-tailed)		0,109

a. test distribution

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The interpretation of the Kolmogorov-Smirnov Normality Test based on the SPSS output is known that the significance value or Asymp. Sig (2 tailed) of 0.1 which means greater than 0.005. Then it can be concluded that the residual values are normally distributed, so the normality requirements for the regression model are achieved.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0,793[a]	0,693	0,613	0,22202

a. predictor: (Constant), Acceptance, Engagement, Motivation
b. Dependent Variable: Experience

The results of the correlation test between each independent variable and the experience using augmented reality showed a positive relationship. Meanwhile, based on regression analysis for the variables of learning motivation, engagement and acceptance of technology together proved to have a significant effect on the variable of experience using augmented reality, which was stated to be strong because of the degree of closeness of the relationship was known to be at a value of 0.793.

The contribution made by the three independent variables to the dependent variable is explained in the table shown by the value of R Square or the value of the Coefficient of Determination obtained 0.639 or 63,9% variation of the variable experience using augmented reality, which can be explained as by the variation of the three independent variables namely learning motivation, engagement, and acceptance of technology. The remaining 36.1% was explained by other causes. Std. Error of Estimate which is 0.22202 describes the level of accuracy of regression predictions which means good predictions.

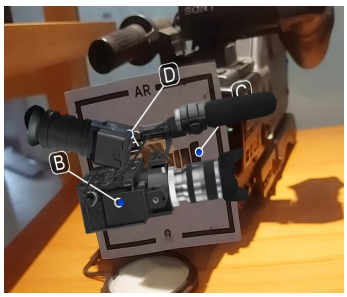

Figure 1. Augmented Reality Media

The results of this correlation can be interpreted that the high and low level of experience using augmented reality respondents by the high and low learning motivation of respondents. This means that if the level of learning motivation increases, then the experience of using augmented reality students also increases. As research on learning motivation and intrinsic motivation, theory has a relationship with the use of mobile-based augmented reality with an average score smaller than the value of the level of significance, it is stated that learning motivation increases along with the experience of using augmented reality (Khan et al., 2019). Based on the presentation of these data and theories, it can be concluded that learning motivation has a close relationship with the experience of using augmented reality and is consistent with theories that discuss the relationship between the two.

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Based on the results of data processing and regression analyses testing the variables of learning motivation, engagement, and technology acceptance of experiences using augmented reality, it is known that learning motivation, engagement, and acceptance of technology together affect the experience of using augmented reality. The results of the hypotheses test regarding the influence of the three independent variables on the experience variable using augmented reality stated that there are at least two independent variables that have predictions on the dependent variable. This is proved by the results of the regression equation so that the formulation of the static hypotheses about the influence between the independent variable and the dependent variable is known. The result of the coefficient of determination which shows the percentage of influence of the independent variables was found to be 62.9% can explain the dependent variable.

The popularity of augmented reality extends as digital-based game software advances. Augmented reality users will feel their presence in multidimensional space in a hybrid manner, so they will have a location-oriented experience in communication and virtual games (Sdravopoulou et al., 2021). Based on a brief interview with a tutor who teaches the Video/ TV Media Production course, information was obtained that the use of augmented reality at Indonesia Open University has a different concept, which is based on the principles of distance learning (self-learning and self-instruction) with the use of augmented reality in conventional educational institutions face-to-face generally. This answers a hypothetical question about the effect of student learning motivation, engagement, and technology acceptance on the experience of using augmented reality at Indonesia Open University.

Conclusion

In the concept of distance education, the most prominent concept is the separation of distance between teachers and students, students are required to be able to learn independently on their initiative. This is a challenge for Indonesia Open University to be able to develop and provide teaching materials that can be studied independently and facilitate student learning, multi-entry dan multi-exit characteristics, and digital literacy generation. Judging from the theoretical side described earlier by the author, the experience of using augmented reality has an important role in meaningful learning, because it can increase students' (user) understanding of concepts that are difficult to observe directly. Learning media for practical courses developed by the Indonesia Open University requires further development that varies according to needs, paying attention to the advantages and limitations of users with distance student learning styles.

Recommendation

Teaching materials in the form of marker-based augmented reality that already exist as much as possible are used by students who take practical courses and facilitate learning. As a result of the discussion, the augmented reality experience supports positive factors including learning motivation, engagement, and acceptance of technology. The uniqueness of the application of augmented reality media at the Indonesia Open University has advantages with the ease of distributing material because of the ease of access by downloading online, the simplicity of the navigation system of augmented reality applications that have been designed according to the concept of self-regulated learning that is typical of distance learning.

Teachers or tutors with practical courses at Indonesia Open University as much as possible, can develop a variety of learning media that students can use to practice like real. Lecturers of courses with hands-on experience characters need to be equipped with broader knowledge

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about the development of augmented reality media for learning at the Indonesia Open University.

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