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Designing Mobile Education for Postgraduate Human Resource Management Courses

Muhdi[1*], Achmad Buchori[2], and Nurkolis[1]

[1]Department of Educational Management, Universitas PGRI Semarang, Indonesia
[2]Department of Mathematics Education, Universitas PGRI Semarang, Indonesia

Abstract.
The postgraduate programs in human resource management at PGRI University Semarang include only the teaching materials provided by the lecturer. No form of media is used to improve students' learning interests. Thus, this study explores a mixed reality-based educational mobile application that enables students to see the real world based on virtual and augmented realities, displaying information in 3D to ultimately increase their motivation and learning outcomes. The current research uses the R&D model ADDIE (Analysis, Design, Develop, Disseminate). In their first year of research, the authors have developed a mobile education product based on mixed reality for the postgraduate human resources management course. The product has been validated by a material expert with an average score of 93 and a media expert with an average score of 92. This shows that a mobile education product is effective in improving students' learning interests and outcomes.

Keywords: design, educational games, courses, education human resource management

Corresponding Author: Muhdi;
email: muhdi@upgris.ac.id

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1. Introduction

The development of Information and Communication Technology is currently growing very rapidly. This development causes changes in people's behavior and activities in daily life. One technology that is now developing very rapidly is information and communication technology (mobile) one of which is MR (Mixed Reality) which is able to display interesting virtual objects and interesting augmented reality [1]. Mobile technology which is currently not only used as a communication tool, but also as a tool to facilitate users in everyday life. This can happen because in mobile technology there are many facilities, including: internet access, e-mail, organizer, music, games and so on that can be used anywhere, anytime more quickly and easily [2].

Mixed reality (MR) or a combination of virtual reality and virtual virtual reality is a technology that allows users to interact with an environment that is simulated by computers and smartphones, an actual environment that is imitated or truly an environment

that only exists in imagination. Current virtual reality environments generally provide a visual experience, displayed on a computer screen or via a stereoscopic viewer, but some simulations include additional sensory information, such as sound through speakers or headphones. Meanwhile, mixed reality is a combination of virtual reality and augmented reality so that the added reality of 3D image objects and virtual reality will complement each other, so that students seem to live in a real virtual space [3].

In practice it is currently very difficult to create virtual reality and augmented reality experiences with high clarity, due to technical limitations on processing power, image resolution and mobile-based communication bandwidth [4].

However, these limitations are expected to be quickly overcome as processing, imaging and data communication technologies become more cost-effective and more robust over time. However, no matter how sophisticated the media used needs to be adapted to its users, in this case learning human resource management courses in the postgraduate program at PGRI Semarang University which does not yet have virtual and augmented facilities, so it needs to be developed as a unique work in the field of mixed reality, in Indonesia. In the world of postgraduate education in education management, there is no mobile education based on mixed reality, so it is very good to be developed.

Learning conditions in the UPGRIS postgraduate laboratory for educational HR management courses only look at modules and lecturers have not used mobile applications in learning, thus making students bored in learning, based on interviews that students need innovation from lecturers in packaging educational HR management materials based on renewable media, one of which is based on virtual augmented reality or mixed reality which is able to see the reality of the real world based on virtual so that simple products can appear in 3D in an amazing way.

This research has referred to several previous studies which showed that the augmented reality prototype introduction of the android-based solar system with the marker-based tracking method was able to increase students' learning motivation [5]. Then it was strengthened by the effective use of educational games based on virtual augmented reality in learning in kindergarten in the city of Semarang which showed that students and kindergarten teachers were very enthusiastic about participating in learning in a fun and fun way [6], then students were very enthusiastic about using textbooks. based on augmented reality which is able to display augmented reality in learning in schools [7].

Based on the above background, research has been carried out on how to design mobile education products based on mixed reality with a constructivist approach in good and interesting educational HR management courses.

2. Research Methods

This type of research is research and development. The population in this study were postgraduate students of educational management programme Universitas PGRI Semarang. Data collection techniques used are tests validation expert judment, questionnaires and documentation. The material in this learning media is human resource management courses education. Data analysis techniques in this study were analysis questionare. The development model used is the ADDIE model which includes analysis, design, development, implementation, and evaluation. **The ADDIE model can be shown in Figure 1.**

Figure 1: ADDIE Model [8].

3. Results and Discussion

3.1. Analysis

The analysis step consists of two stages, namely performance analysis and needs analysis. The first stage, namely performance analysis, is carried out to find out and clarify whether the performance problems faced require solutions in the form of program implementation or management improvements. In the performance analysis, an in-depth study has been carried out on the performance of lecturers at Universitas PGRI Semarang who teach ordinary differential equations courses which shows that so far there have been no Universitas PGRI Semarang lecturers who have used AR-based mobile educations during the covid-19 pandemic, so it is very necessary to have media. This mobile education is to help students practice AR in understanding differential material and its types.

In the second stage, the needs analysis is a necessary step to determine the abilities or competencies that students need to learn to improve learning achievement [9]. What is clear is that learning media is needed that is able to produce ordinary differential equations that are packaged in mixed reality and make students able to practice recognizing other differentials in an interesting and systematic way.

3.2. Design

This step requires a clarification of the learning program designed so that the program can achieve the learning objectives as expected [9].

In product design, what is done is the next stage of the ADDIE model, namely design. At this step, it is necessary to clarify the learning program designed so that the program can achieve the learning objectives as expected [10].

In making augmented reality-based mobile education products, the material for ordinary differential equations has been made in a team by the Universitas PGRI Semarang research team and assisted by IT experts outside Universitas PGRI Semarang so that there is good collaboration with the Universitas PGRI Semarang research team to create a material framework and design that is expected in making ordinary differential equations based on MR, then executed by IT experts who are competent in their fields, after the design of the MR-based mobile education is approximately 3 months according to expert judgment advice, the product is continued in the third stage, namely development.

Figure 2: Design of AR-based mobile educations for HR management after revision.

3.3. Development

This development step includes creating, buying, and modifying learning media to achieve predetermined learning objectives. The development step, in other words, includes the activity of selecting and determining the appropriate methods, media and learning strategies used in delivering personal material [10]. In this development stage, the framework that has been designed will be realized so as to produce a product that can be implemented. In this development stage, Mixed reality based thematic mobile education products for differential equations are usually validated first to experts, namely material experts and media experts, so that augmented reality-based mobile education products are feasible to be used before being tested limitedly at PGRI University Semarang. . At the development stage, MR-based mobile educations will be made according to the material, after the print-based and MR-based media are complete, they will be validated by media experts and material experts by the validator to get input and evaluate according to the input given by the validator. Furthermore, the android-based media is revised according to the input given by the validator to improve the product.

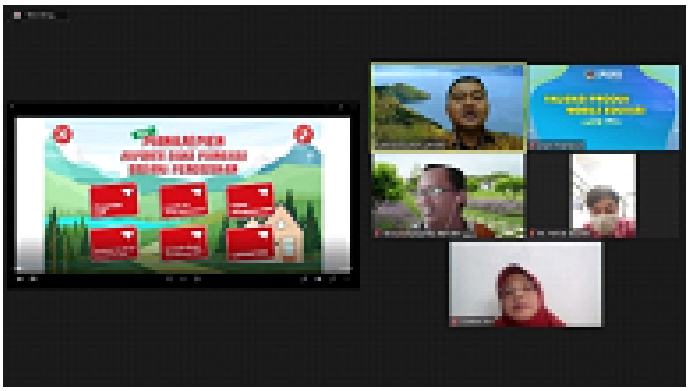

Figure 3: Product validation of AR-based elementary thematic mobile educations by experts.

Based on 2 validators who are experts in the field of technology education from Technology Education Malang state university) and learning media expert and material expert from Universitas PGRI Semarang, the following data were obtained:

Table 1: Validation of learning media experts.

Media expert	Application aspect	Creativity aspect	Innovation aspect	Visual communication aspect
Score validation	92%	95%	90%	91%

From the table above, an average score of 92% means that this mixed reality-based mobile education is very suitable to be used in learning management human research of education courses at Universitas PGRI Semarang and partner campuses.

Then continued with the validation of learning media experts, it was obtained data that mixed reality-based mobile education media was feasible to use, so that MR-based mobile education media products in ordinary differential equations courses could be used optimally.

Table 2: Validation of learning material experts.

Material expert	Material substantion aspect	Language aspect
Score validation	90%	88%

From the table above, an average score of 93% means that the material in the Augmented Reality based mobile education media in the ordinary differential equation course is very suitable for use in learning in universities, especially the Management Education study program. This is reinforced by the development of mobile-based educational game learning media about the concept of art that can increase high school students' learning interest [11], then with the development of Jquery Mobile-Based Mobile learning media for Learning Photography Courses, it shows that students improve their spatial abilities and cognitive abilities [12]. So mobile learning as new forms and methods of increasing the effectiveness of education, many student was used mobile to improve knowledge every time in the school or home [13], so the effectiveness of using mobile learning techniques to improve learning outcomes in higher education, many collage student interesting to use mobile application because very simple [14], and then about an investigation of effectiveness of mobile learning apps in higher education in India so many collage student average 98% using apps to help understand material [15].

Then continued with material expert validation so that the suitability of the material content can be accounted for, so that mixed reality based mobile education media products can materially be used.

4. Conclusion

Based on the results of the study, it can be concluded that the application of mobile education mixed reality-based learning media with an contructivis approach in postgraduate meets the very visible criteria. This is indicated by validation of learning media experts an average score of 92% means that this mixed reality-based mobile education is very

suitable to be used in learning management human resource of education courses at post graduates Universitas PGRI Semarang

Authors' Contributions

The author hopes that the results of this study can be an alternative for lecturer to using mobile education media with an contructivis approach with different materials. So it is expected to improve motivation college student learning outcomes.

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