Jurnal Teknologi Pendidikan Vol: 1, No 3, 2024, Page: 1-7

Development of 3D Augmented Reality Based Learning Media as an Effort to Improve the Quality of Literacy in High Schools

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DOI: https://doi.org/10.47134/jtp.v1i3.330
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Received: 04-01-2024
Accepted: 20-02-2024
Published: 28-03-2024

Abstract: The development of globalization requires countries to develop technology in various aspects of life. Quality education is one of the highlights, because it is the key to solving various ongoing problems, including students' low interest in literacy, especially digital literacy. This research aims to produce solutions for learning Indonesian at the high school level through the application of Augmented Reality (AR) technology developed by Gratise. Inc. The application of AR in Indonesian language learning is considered minimal and relevant, especially in increasing interest and quality of learning. The concept of this application will focus on providing language detectors, Indonesian folklore, and expert information in the language domain. The objectives of developing this application are: (1) Make it easier for students to utilize technology in learning, (2) Improve the quality of educational devices, and (3) Improve the quality of student exam results in learning Indonesian in high school. Through the development of 3D AR-based learning media, it is hoped that it can make a significant contribution to increasing student literacy in high school.

Keywords: Augmented Reality, Literacy, Learning Media

Introduction

Indonesia is a country with minimal coverage of technological development. This is represented by the provision of learning tools both in terms of technology and the use of conventional learning media amidst the development of globalization/digitization. Meanwhile, from a different point of view, the era of digitalization and the development of science and technology has become a consensus that is increasingly highlighted in society, especially in the realm of education as an indicator of implementing more advanced technology and science (Blau, 2020; Chai, 2019; Dunn, 2019; Eidin, 2023; Fu, 2020; Neumeyer, 2021). Regarding the above, in the new normal period and the development of the order of life towards restoration—SDGs—this requires every country to be competent in utilizing existing components to achieve predetermined goals, especially in the realm of education (Fukuda-Parr, 2019; Health, 2020; Menton, 2020). In line with that, in this case the SDGs are intended as a form of implementation of various indicators in a new order of life that continues the previous concept, namely the MDGs (Appau, 2023; Bresson, 2022; McGregor, 2020; Mukherjee, 2022). This consensus is the result of agreement between the delegates of each nation. This aims to resolve problems which generally become annual problems in every country under the auspices of the UN.

Regarding the SDGs as a main concept in realizing change, one of the important points in the SDGs—out of 17 points—is quality education—the fourth point—. Looking at this, education is seen as an effort to increase a person's knowledge of certain interdisciplinary disciplines (Elder, 2019; Giles-Corti, 2020; Sharma, 2021). This is in line with the goal of national education, namely to develop the potential of students to become complete Indonesian people, namely people who believe and are devoted to God Almighty, have knowledge and skills, have noble character, are physically and spiritually healthy, have a stable personality, are intelligent, creative, independent and have a sense of responsibility.

Education is used as a benchmark for the progress and/acceleration of a nation. Based on this, the same perspective was stated by Pribadi (2015) that education is the basic key to a country's development. Meanwhile, Hosmari at al. stated that education is one of the main agendas in planning the country's development. Continuing the perspective above, Hasmori at.al (2015) states that education is an effort made to awaken the potential that exists within humans. Moreover, education in Indonesia and specifically the quality of education in NTB (Fadlli, 2019). Comprehensively, the quality of education, especially literacy, in the NTB area is still very worrying. This condition is not relevant to the quantity of people in the relevant area—based on the census database of the BPS (Central Statistics Agency) of West Nusa Tenggara Province—in 2020, namely 5 320 092 people.

Based on data in the KOMINFO database regarding Indonesian people's reading interest, Devega (2020) stated that according to UNESCO data, Indonesian people's reading interest is very worrying, only 0.001%. This means that out of 1,000 Indonesians, only 1 person is interested in reading. Meanwhile, in the LPW NTB (West Nusat Tenggara Regional Development Institute) database, it is recorded that NTB is in one of the three provinces with the lowest index in the literacy realm, namely Papua with a figure of 60.51%,

NTB 68.36%, NTT 70.49%. Apart from the indicators above, the biggest contribution to the low quality of literacy in NTB is held by illiteracy, namely 12.48% in all regions starting from West Lombok, East Lombok, North Lombok, Sumbawa, and several other areas.

Apart from having an impact on the realm of literacy, the above problems also give rise to a new cluster segmentation in the realm of education in NTB, namely the decline in the quality of National Examination results in the SMA domain, especially in Indonesian language subjects. This is based on the results of the data summary in the KEMENDIKBUD PPP database (Educational Assessment Center of the Ministry of Education and Culture) which shows that the final score for the Indonesian National Examination (UN) in the SMA domain is classified at 56.87, the average score for the Indonesian national exam for high school students in NTB.

Methodology

This research methodology begins with the data collection stage through a predetermined platform, such as creating a survey form and observing feasibility as well as reviewing the concept from the user's perspective. This process was carried out to obtain a comprehensive understanding of reading interest and public perception of Augmented Reality (AR) technology in Indonesian language learning. After initial data was collected, qualitative analysis was carried out to explore the main patterns and themes of community responses to the use of AR technology in the learning process. A qualitative approach allows researchers to understand in depth how society responds and perceives these innovations.

Next, data obtained from surveys and feasibility observations will be used as a basis for designing quantitative research instruments. A quantitative approach will be used to measure the magnitude of society's response to the innovation developed by the research team. The quantitative data obtained will be analyzed statistically to identify the level of public acceptance and tendency towards the use of AR technology in Indonesian language learning.

Through this mixed methods approach, it is hoped that researchers can gain a holistic and in-depth understanding of the community's responses and reactions to the learning innovations that have been developed. The combination of qualitative and quantitative analysis also allows researchers to combine the advantages of each method in exploring different aspects of the phenomenon under study.

Result and Discussion

A preliminary study was carried out to understand the scheme for forming and providing features in the application being developed. The technical stages of this study are divided into several parts which include interviews with other developers, reviewing the feasibility of the application, and conducting in-depth research on Augmented Reality (AR) technology in Indonesian language learning.

Next, the instrument preparation stage is carried out to ensure the accommodation required by the user. It aims to understand user responses and needs towards this application.

In the context of application user segmentation, there are two main groups that are the focus, namely elementary school students with parental supervision and middle and high school students. The first segmentation considers the role of parents in supervising their children when using these applications. Apart from that, there are also other factors that need to be considered, such as including the biodata of the parent as the person responsible for the user.

The second segmentation reviews application concepts in general, especially in improving the understanding of middle and high school students, especially in learning Indonesian. The hope is that this concept can have a positive impact on the final exam results in the field concerned. Thus, this segmentation is important in designing features that suit the needs and level of understanding of students at the middle and high school levels.

Table 1. Survey Data

Survey Data	Percentage
Aware Of AR	57.1%
Unaware Of AR	42.9%
Very Significant	57.1%
Highly Impactful	28.6%
Less Impactful	14,3%

Based on the data above, this concept development scheme continues to provide several features that can be enjoyed by users. This feature consists of several indicators, namely 1) Detector, 2) Foklor Nusantara Language Detector is one of the features provided as an accommodation for checking errors and linguistic status in text. Based on the indicators mentioned, the cause of the decline in students' national exam scores in learning Indonesian is often caused by several factors. First, lack of literacy causes low understanding of the text. Second, errors in understanding the exam questions can result in incorrect answers. Lastly, lack of understanding of the standard vocabulary used in the text.

The Folklore Archipelago feature is part of an application that presents various folklore from West Nusa Tenggara (NTB). This system was initiated as an effort to improve the quality of folklore by utilizing modern technology. Seeing this, packaging folklore in a modern way is a new approach in increasing literacy. Therefore, this feature is considered very important to pay attention to and integrate in learning applications.

Discussion

The development of 3D Augmented Reality (AR) based learning media marks a significant stride towards enhancing literacy levels in high schools. This innovative approach integrates cutting-edge technology with educational practices, aiming to

revolutionize the learning experience. By leveraging 3D AR technology, students are immersed in interactive and immersive environments that stimulate engagement and comprehension. Such immersive experiences transcend traditional learning methods, fostering a dynamic and participatory learning environment.

One of the primary objectives of developing 3D AR-based learning media is to address the evolving needs of high school education. In an era dominated by digital advancements, traditional teaching methods may fall short in capturing students' attention and fostering deep understanding. Hence, by harnessing the power of AR, educators can tailor learning materials to align with students' preferences and learning styles, thereby enhancing the quality of literacy education. Moreover, the utilization of 3D AR-based learning media offers unparalleled opportunities for experiential learning. Students can interact with virtual objects and scenarios, facilitating hands-on exploration and experimentation. This experiential approach not only enhances retention but also cultivates critical thinking and problem-solving skills essential for navigating today's complex world.

Additionally, the development of such innovative learning media underscores the importance of adaptability in educational practices. As the educational landscape continues to evolve, educators must embrace technological advancements to remain relevant and effective. Integrating 3D AR-based learning media into high school curricula reflects a proactive approach towards meeting the demands of 21st-century education. Furthermore, the implementation of 3D AR-based learning media fosters inclusivity and accessibility in education. By providing multi-sensory learning experiences, it caters to diverse learning needs and preferences. Students with varying abilities and learning styles can benefit from this inclusive approach, thereby promoting equity and diversity in education.

Another crucial aspect of developing 3D AR-based learning media is its potential to bridge the gap between theoretical knowledge and real-world application. By simulating authentic scenarios and environments, students can contextualize their learning and understand its practical implications. This bridge between theory and practice enhances the relevance and applicability of literacy skills in real-life situations. In conclusion, the development of 3D Augmented Reality based learning media represents a groundbreaking effort to enhance the quality of literacy education in high schools. By providing immersive, experiential, and inclusive learning experiences, it empowers students to become active participants in their learning journey, ultimately preparing them for success in an increasingly complex and interconnected world.

Conclusion

Based on the explanation regarding the development of Augmented Reality (AR) technology in Indonesian language learning, it can be concluded that AR technology is a 3D feature that is very relevant to be applied in the Indonesian language learning process. The use of AR in Indonesian language learning makes it possible to create a more interactive and interesting learning experience for students, enriching their understanding of the material being taught.

The output of this research is the creation of a text-based Indonesian language learning application with the help of AR technology. This application is designed to utilize AR technology to increase the effectiveness of Indonesian language learning in schools, by presenting text content visually and interactively. Specifically, this application carries a 3D concept to provide references in the form of indicators of the validity of the word forms used in the text. In this way, students can more easily understand the structure of the Indonesian language and improve their ability to read and interpret texts in more depth. Thus, the development of AR-based Indonesian language learning applications has great potential to improve the quality of Indonesian language learning in schools.

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