Design Virtual Tour Technology Application to Improve Digital Literacy of Teachers and Students About Edu-tourism

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A R T I C L E   I N F O

A B S T R A K

Kurangnya inovasi teknologi di sektor pariwisata yang terintegrasi dengan aspek edukasi dan literasi digital, terutama di masa pandemi yang membatasi kunjungan fisik ke objek wisata. Meskipun sudah ada beberapa aplikasi wisata yang dikembangkan, tetapi belum banyak yang dirancang secara khusus untuk meningkatkan literasi digital dan pengetahuan pengunjung, baik dari segi konten edukatif maupun integrasi dengan kurikulum sekolah. Tujuan dari penelitian ini adalah menciptakan aplikasi eduwisata berbasis virtual tour yang dikemas dengan aplikasi virtual reality. Penelitian ini merupakan penelitian pengembangan (research and development) dengan menggunakan model ADDIE. Subjek penelitian ini secara random adalah 250 guru dan siswa SMA/SMK. Metode pengumpulan data yang digunakan adalah kuesioner dengan menggunakan instrumen berupa lembar instrumen. Setelah data dikumpulkan kemudian dianalisis menggunakan metode analisis data deskriptif kuantitatif dan kualitatif. Hasil penelitian menunjukkan bahwa, desain aplikasi teknologi virtual tour mendapatkan penilaian yang sangat baik pada aspek media, materi, serta pembahasan dan tampilan. Hal ini juga sejalan dengan respon guru yang menilai aspek-aspek tersebut secara positif, dengan skor tertinggi diberikan pada aspek media, diikuti oleh materi, serta pembahasan dan tampilan. Kesimpulan dari penelitian ini yaitu, aplikasi eduwisata berbasis virtual tour yang dikemas dengan aplikasi virtual reality efektif untuk meningkatkan kemampuan literasi guru dan siswa mengenai eduwisata. Hasil penelitian ini mengindikasikan bahwa aplikasi virtual tour dapat diimplementasikan sebagai salah satu media pembelajaran interaktif yang mampu meningkatkan literasi siswa dan guru di bidang eduwisata.

A B S T R A C T

More technological innovation in the tourism sector must be integrated with educational aspects and digital literacy, especially during a pandemic that limits physical visits to tourist attractions. Although several tourism applications have been developed, only a few have been specifically designed to improve digital literacy and visitor knowledge in terms of educational content and integration with the school curriculum. This research aims to create a virtual tour-based edu-tourism application that is packaged with virtual reality applications. This research is a research and development using the ADDIE model. The subjects of this research were randomly 250 teachers and high school / vocational school students. The data collection method was a questionnaire using an instrument in the form of an instrument sheet. After the data was collected, it was analyzed using quantitative and qualitative descriptive data analysis methods. The results showed that the design of the virtual tour technology application received a very good assessment in the aspects of media, material, discussion, and display. This is also in line with the teacher's response, which assessed these aspects positively, with the highest score given to the media aspect, followed by the material, discussion, and display. This study concludes that the virtual tour-based eduwisata application packaged with virtual reality applications is effective in improving the literacy skills of teachers and students regarding eduwisata. The results of this study indicate that virtual tour applications can be implemented as interactive learning media that can improve student and teacher literacy in the field of edu-tourism.

1. INTRODUCTION

The world of tourism during the pandemic is severely affected by its existence, there are many strict rules when opening a tourist attraction, both the number of visitors and the operating hours. This happens in all tourist attractions in Indonesia and especially the province of Central Java, so far the most in-demand tourist attraction in Central Java is a tourist attraction that has a place for selfies. This is a phenomenon of young people and parents in today's digital era, therefore it is necessary to have a renewable approach and innovation for tourism object managers in Central Java, one of which is to use a renewable application based on eduwisata based on virtual tours with the help of virtual reality applications (Suprapto, 2021; Tombeng et al., 2024; Udiono, 2022). By looking at the data in PlayStore, it is obtained that the data that has made tourist applications is only the Wis Semar application made by the

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Semarang City Tourism Office, meaning that a breakthrough is needed that makes it easier for tourists to recognize the tourist attractions to be visited virtually as if they were at the intended tourist attraction. Then by making the Central Java eduwisata application will make the general public learn how to use the eduwisata application and eventually their knowledge will increase about the tourist attraction to be visited (Kinseng, 2022; Singhal, 2021). In the rapidly growing digital era, digital literacy is an important key in preparing future generations. Teachers and students need to have a strong understanding of technology to face the demands of the times. One way to improve digital literacy is through the use of virtual tour technology applications, which offer an interactive and immersive learning experience. This article will discuss the background of the development of virtual tour technology applications and their benefits in improving digital literacy among teachers and students. Currently, there are still many teachers and students who have difficulty in utilizing technology effectively in the learning process. Many of them only have a basic understanding of using digital software and applications. This lack of understanding can be an obstacle in utilizing the potential of technology to improve the quality of learning (Alturki, 2021; Haiyudi & Art-In, 2021).

Virtual tour technology offers a realistic and immersive learning experience through simulating the real environment. By using virtual tour applications, teachers and students can explore places that are difficult to access physically, such as museums, historical places, or even other continents, without leaving the classroom. This opens up new opportunities for engaging interactive learning and enriches students' competencies. The development of virtual tour technology applications involves the integration of various technologies such as virtual reality (VR), augmented reality (AR), and 3D simulation. This development process requires collaboration between education experts, software developers and content designers to create an engaging and informative learning experience (Buchori, ., et al., 2024; Tju & Tamatjita, 2024). In addition, this application also needs to be designed with an intuitive interface for easy use by teachers and students. The utilization of virtual tour technology applications has the potential to significantly improve the digital literacy of teachers and students (Cai, 2020; Gudmundsdottir & Hatlevik, 2018). Teachers can use the app as an aid in teaching, enriching subject matter and building their own technological skills. Meanwhile, students can develop a deeper understanding of various concepts through an interactive and fun learning experience. Thus, virtual tour apps can be an effective tool in improving digital literacy among teachers and students. The importance of student literacy to Merdeka Belajar program cannot be underestimated. This program places students as active subjects in the learning process, which requires good literacy skills to keep up with the development of information and technology (Y. Liu, 2021; Tuasikal et al., 2021; Yaelasari & Astuti, 2022).

With strong literacy, students are able to understand, assess, and process information critically, so that they can make optimal use of all the resources available in Merdeka Belajar program. Student literacy is also very relevant to the concept of lifelong learning promoted by Merdeka Belajar program. By having good literacy skills, students will find it easier to access, filter, and utilize various learning resources available, be it in the form of books, journals, online articles, or other sources of information. This will help them to continue learning and developing throughout life, in accordance with the spirit of the Merdeka Belajar program itself. Student literacy also supports the realization of learning independence. Through good literacy, students can develop the ability to learn independently, overcome complex learning challenges, and take the initiative in exploring various topics of interest. Thus, student literacy is the main foundation for the successful implementation of Merdeka Belajar program, which aims to create a smart, critical, and independent generation in the learning process (Kong, 2024; Nurwiatin, 2022; Rukiyati et al., 2023).

Although several studies have examined the development of virtual tour application designs to improve teacher and student literacy in schools, research gaps still need to be further explored. One of the glaring research gaps is the need for more research specifically exploring user preferences and needs in an educational context. In-depth research on how teachers and students interact with virtual tour apps and the design factors that influence the use of these apps in learning contexts can provide valuable insights for developing more effective apps. Therefore, the development of VR-based edu-touring applications that focus more on educational aspects and integration with the school curriculum is an important novelty to be researched. In addition, evaluating the effectiveness of virtual tour app design is also an important aspect that has not been fully covered in previous studies. While there are many apps that have been developed, research on how effective these apps are in improving the digital literacy of teachers and students in schools is limited. By deepening the research in this regard, we can gain a better understanding of the impact of virtual tour apps on learning in schools and find ways to optimize their design to suit user needs (Yusa et al., 2023; Zhao, 2023). The creation of a virtual tour application for tourism in Central Java has great potential to improve the literacy of teachers and students in schools by providing an immersive learning experience about the rich culture and history of the region. Although

there have been several initiatives in the development of similar applications in other regions, there is still a lack of emphasis on educational aspects and integration of applications with the school curriculum. Therefore, further research and collaboration between education, tourism experts, and technology developers are needed to create an app that can meet the learning needs in schools and optimize Central Java's tourism potential as a learning resource rich in historical, cultural, and environmental values. This research aims to develop eduwisata-based virtual tour applications with VR technology that can be implemented as interactive learning media. It focuses on increasing the digital literacy of teachers and students by utilizing the rich culture and history of tourist objects in Central Java Province. This application is also expected to be a reference for the development of technology-based learning media in other regions, expanding the scope of its positive impact in the world of education and tourism.

2. METHOD

This research method is research and development (Research and Development). Research and development (Research and Development) is a research method used to produce certain products such as designs, models, prototypes of learning media etc., and test the effectiveness of these products. The research model uses the ADDIE model development research design model. This model, as the name implies, consists of five main phases or stages, namely (A)nalysis, (D)esign, (D)evelopment, (I)mplementation, and (E)valuation. The five phases or stages in the ADDIE model need to be carried out systemically and systematically (Buchori, Prasetyowati, et al., 2024; Sugiyono, 2017). The development of the ADDIE model involved 250 teachers and students spread across Central Java Province's Senior/Vocational High Schools. The stages of the model in this study are as follows. The first is the Analysis stage, where researchers or program developers identify problems, needs, and learning objectives to be achieved. Next, the Design stage involves detailed planning of learning materials, teaching methods, and evaluation strategies to be used. The third stage, Development, is the process of making learning materials in accordance with the design that has been made before.

After the learning materials have been developed, the Implementation stage is conducted to apply the learning program in a real context, either in the classroom or relevant learning environment. Finally, the Evaluation stage is used to evaluate the effectiveness of the learning program by collecting data, analyzing the results, and evaluating whether the learning objectives have been achieved or not. This evaluation can also be used to make improvements or refinements to the learning program for the next iteration. Evaluation in this case uses a user response questionnaire, namely teachers and students related to media, material and language and appearance. This user response describes the final results of the development of virtual tour application media in the Central Java region. The data collection method in this study was carried out through several stages that refer to the ADDIE development design model (Analysis, Design, Development, Implementation, and Evaluation). At the Analysis stage, data was collected through interviews and Focus Group Discussions (FGDs) to explore user needs, involving students and teachers as the main respondents. Furthermore, at the Design stage, the preparation of questionnaires was carried out to obtain further input from users regarding the design and features expected in the developed application. The Development stage was carried out by developing several versions of the application containing various features and content, which were then tested by students and teachers to obtain empirical data regarding the suitability and practicality of using the application. At the Implementation stage, surveys and questionnaires were used again to gather further feedback from users after the app was implemented on a limited basis. The last stage, Evaluation, was conducted through pre-test and post-test measurements to evaluate students' digital literacy levels before and after using the virtual tour-based eduwisata application. The instrument used to collect data was a user response questionnaire consisting of students and teachers, which had a validity of 87.6%. So it can be concluded that, the data collection method used is a questionnaire with an instrument in the form of a questionnaire sheet. This research uses quantitative and qualitative data analysis methods.

3. RESULT AND DISCUSSION

Result
Pemberian Results of Student Response

The results of student questionnaire data from 93 (Ninety-three) students related to the assessment of the design development of virtual tour technology applications consisting of 3 aspects, namely media aspects, material aspects, language aspects and display aspects, are presented in Table 1. Based on table 1 above, it can be explained that the results of the student response questionnaire related

to the assessment of the design development of virtual tour technology applications, in the media aspect obtained a score of 84.47%, 84.24% material aspects, 84.86% discussion and display aspects.

Table 1. Student Response Questionnaire Results

No	Aspect	Assesmen (%)
1	Media	84,47
2	Material	84.24
3	Language and display	84.86

Results of Teacher Response Questionnaire Data

The results of teacher questionnaire data from 25 (twenty five) teachers related to the assessment of the development of virtual tour technology application design consisting of 3 aspects, namely media aspects, material aspects, language aspects and display aspects are presented in Table 2.

Table 2. Results of Teacher Response Questionnaire

No	Aspect	Assesmen (%)
1	Media	92,20
2	Material	88,40
3	Language and display	89,76

Based on table 2 above, it can be explained that the results of the student response questionnaire related to the assessment of the design development of virtual tour technology applications, in the media aspect obtained a score of 92.20%, material aspects 88.40%, aspects of discussion and appearance 89.76%.

Discussion

The development of virtual tour media towards student literacy in the learning process highlights the role of technology in improving the quality of learning in the digital era. Virtual tour media is one of the innovations that allows students to conduct in-depth visual exploration of various places or concepts that are difficult to access directly. In the context of student literacy, the use of virtual tour media can help improve their understanding of various subject matter, by providing direct experience that is close to real situations. With virtual tour media, students can develop their visual literacy, which is the ability to understand, interpret and evaluate information presented in visual form. By utilizing this technology, teachers can present learning materials in a more interesting and interactive way, so as to arouse students' interest in learning more effectively (Long, 2021; Sanjaya & Mahendra, 2024; Schleiss, 2023). This is an important key in increasing the level of student participation and understanding of the subject matter. In addition, the development of virtual tour media can also help overcome accessibility constraints to limited learning resources (Junyu Lu Xiao Xiao & Zhou, 2022; Partarakis, 2024). Through this media, students can visit places or follow experiences that are difficult to reach physically, such as museums, historical sites, or natural places far from their location. This broadens the scope of student learning and provides a more thorough learning experience. The use of virtual tour media can also increase students' engagement in the learning process, as they can control their own learning experience and explore the subject matter according to their individual interests and needs. By providing this freedom, students can become more active in acquiring new knowledge and skills, thus strengthening their literacy in the learning process. In conclusion, the development of virtual tour media has great potential in improving students' literacy in the learning process. However, there needs to be sufficient support both in terms of infrastructure and teacher coaching in its use in order to have a maximum impact on student learning and literacy.

Many previous studies have highlighted the positive effect of using digital learning media on students' literacy in the learning process. The use of digital learning media can improve students' literacy skills, especially in terms of text comprehension, information interpretation and critical thinking. These findings suggest that digital media can facilitate student-centered learning and help them develop literacy skills that are important in facing intellectual challenges. The use of digital learning media can positively influence students' literacy. They found that students' interaction with digital media such as educational games and learning apps can improve their literacy skills, including reading, writing and critical thinking. This research provides additional evidence that the integration of digital learning media in the learning process can be an effective tool in improving students' literacy at various levels of education. Previous studies have shown that the use of digital learning media provides great benefits for teachers in the

learning process. Digital learning media provides flexibility and variety in the delivery of learning materials, allowing teachers to present content in a more interesting and interactive manner. This can increase student engagement in learning and assist teachers in creating a motivating learning environment (Drivas, 2022; Memarian, 2024; Swaid, 2019).

The use of digital learning media can improve teachers' teaching effectiveness. By utilizing technology, teachers can access various learning support resources, adopt innovative teaching methods, and provide direct feedback to students (Suwardika et al., 2024; Valor, 2020). Thus, digital learning media can assist teachers in strengthening their teaching skills and improving the overall efficiency of the learning process. Technology-based learning applications have shown significant potential in improving student learning outcomes. Previous research has shown that the use of educational technology can improve student academic achievement, especially in math and science subjects. This study found that students who used interactive learning applications experienced a better increase in concept understanding compared to students who only relied on traditional learning methods. In addition, previous research shows states that well-designed learning apps can provide a more personalized learning experience, allowing students to learn according to their own pace and learning style (Finansyah et al., 2022; Sudana et al., 2024). This contributes to improved learning outcomes as students more easily understand the material presented. Besides improving learning outcomes, learning apps also play an important role in increasing students' interest in learning. Gamification elements in learning apps can increase students' intrinsic motivation. Gamification, which involves the use of game elements such as points, badges and leaderboards, has been shown to increase student engagement and interest in the learning process. Learning apps that integrate social elements, such as discussion forums and group collaboration, can increase interest in learning through social interaction and support between students. Thus, the use of learning apps not only contributes to better academic achievement, but also encourages students to be more enthusiastic in learning (Akugizibwe, 2020; Listyorini et al., 2022). Having conducted a literacy enhancement app development study that focused on teacher and student responses, it is recommended that future research involve broader participation from various education stakeholders, such as parents, school administrators and education policy makers. By involving these groups, researchers can gain a more comprehensive insight into how the app can be integrated into the curriculum effectively and sustainably. In addition, the views of various parties can help identify potential obstacles in large-scale implementation and provide valuable input for further development. Future research should also explore the long-term impact of using the app on students' literacy improvement. Longitudinal studies that monitor students' literacy development over several years could provide a clearer picture of the app's effectiveness in improving literacy skills on an ongoing basis (Bouwer, 2018; T. Liu, 2023). In addition, this research could broaden the focus by assessing the app's impact on various aspects of literacy, including digital literacy, critical literacy and analytical thinking, to provide a deeper understanding of the app's contribution in shaping students' literacy competencies in the digital era.

4. CONCLUSION

The conclusion of this research shows that the development of 3D-based virtual tour technology applications can provide innovative solutions in increasing student literacy related to edu-tourism. This application not only meets user needs regarding media design, material, and appearance but can also facilitate interactive and interesting learning for students and teachers. The implementation of this application has been proven to increase user engagement and student understanding of edu-tourism content significantly. By integrating modern technology in an educational context, this application has the potential to be an effective alternative learning media to be adopted by schools to enrich the learning experience and strengthen students' digital literacy.

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