HERITAGE
Journal of Social Studies
OJS: http://heritage.iain-jember.ac.id
|ISSN (Online) 2723-0759|ISSN (Print) 2723-0635|

Pengembangan Model Augmented Reality (DISMUS) sebagai Media Pembelajaran Digital IPS

Development of the Augmented Reality Model (DISMUS) as Social Studies Digital Learning Media

Ade Budhi Salira[1], Dina Siti Logayah[2], Rizal Akbar Darmawan[3], Kirani[4], Tri Tianti[5]

Email: budhisalira@upi.edu, dina.logayah@upi.edu, rizalakbardarmawan@upi.edu, kirani81@upi.edu, tritianti@upi.edu

[1, 2, 3, 4, 5] Departement of Social Studies Education, FPIPS UPI, Bandung

INFORMASI ARTIKEL

Submission: November 23, 2022
Revision: December 28, 2022
Publish: December 30, 2022

KATA KUNCI

Augmented Reality, Learning Media, Social Studies

ABSTRACT

Development of augmented reality as a learning medium that can present real but virtual-based visuals. Augmented reality gives students a sense of embodiment, enabling them to recall experiences in the real and virtual worlds. Based on this, the literature the initiative to develop an augmented reality-based application called dismus by working with virtual objects such as 3D models combined with audio. However, in the development that has been carried out, it is necessary to have discussion sessions through focus group discussions so that the applications that have been developed can reach the trial stage. The result of this focus group discussion is that the dismus application has successfully entered the innovation stage as a learning medium that can be used in the classroom with some inputs to keep the user's comfort in mind.

A B S T R A K

Pengembangan augmented reality sebagai media pembelajaran yang mampu menghadirkan visual yang nyata namun berbasis maya. Augmented reality memberi siswa rasa perwujudan, memungkinkan mereka untuk mengingat pengalaman di dunia nyata dan virtual. Berdasarkan hal tersebut peneliti berinisiatif untuk mengembangkan aplikasi berbasis augmented reality bernama dismus dengan cara kerja yaitu memuat objek virtual seperti model 3D yang digabungkan dengan audio. Namun, dalam pengembangan yang telah dilakukan perlu adanya sesi diskusi melalui focus group discussion agar aplikasi yang telah dikembangkan dapat sampai ke tahap uji coba. Hasil diadakannya focus group discussion adalah aplikasi dismus ini sudah berhasil memasuki tahap inovasi sebagai media pembelajaran yang dapat digunakan di kelas dengan beberapa masukan untuk tetap memerhatikan kenyaman pengguna. Berdasarkan hasil literatur diketahui bahwa metode penelitian ini menggunakan pengembangan (R&D) model Borg dan Gall memiliki sepuluh tahap penelitian. Dimana berdasarkan penelitian penelitian terdahulu

diketahui bahwa sepuluh tahapan penelitian tersebut dapat dimodifikasi sesuai kebutuhan dan tujuan penelitian itu sendiri.

https://doi.org/10.35719/hrtg.v3i2.96

Introduction

Learning media is an intermediary tool between educators and students in learning that can connect, inform, and disseminate messages to create an effective and efficient learning process. Learning media causes communication between teachers and students in the learning process (Natiqotul, Khoiri, & Supriyono, 2022). If the learning process does not use media, then the learning process will not occur. The learning process is the process of sending messages/material from the sender of the message (teacher) to the recipient of the message (students). The process of converting messages/material into verbal and nonverbal communication symbols is called encoding. Students' interpretation of communication symbols [dp1] is called decoding. When conveying messages/materials, sometimes it works and sometimes it doesn't. Barriers in the communication process are called noise/barriers. In the learning process cannot be separated from the learning media that are currently diverse. Especially with the balance of technology, learning media must be able to develop according to the times and their needs. Material that can only be imagined by the mind can be seen thanks to the help of digital learning media. Good learning media must be interactive, fun, challenging, can motivate students to develop creativity and most importantly can convey good material or messages or visuals for students. Student achievement, learning outcomes, and critical thinking skills (Hasanah, 2021).

One of the current learning media that is currently being developed with the help of technology is the development of augmented reality as a learning medium that can present real visuals but is virtual based. Augmented reality is an application that combines the real world and the virtual world in two-dimensional and three-dimensional forms which are simultaneously projected onto the real environment (Wiharto & Budihartanti, 2017). Augmented reality is also called tethered reality. This application is often used in games. Tracking and reconstruction are how augmented reality works. First, the marker is detected by the camera. Detection methods can include various algorithms such as edge detection and other image processing algorithms (Elmqaddem, 2019). Augmented reality gives students a sense of embodiment, enabling them to recall experiences in the real and virtual worlds. This method creates strong links with knowledge between theories that require clear visualization. In addition, the use of augmented reality itself in the field of education makes learning more interactive, more effective use, wider application to various media, and simpler object modeling (Subhashini, Siddiqua, Keerthana, & Pavani, 2020). The use of learning media with Augmented Reality can be very helpful in improving the learning process and student learning interest. This is because Augmented Reality itself has the potential to increase students' interest in learning and playing, make it happen, and involve the interaction of all elements including sharpening the five senses with technology (Krüger, Buchholz, & Bodemer, 2019). In addition, Augmented Reality has characteristics and abilities that are almost the same as learning media, helping convey information between recipients and senders or educators with students, we can clarify the provision of information provided by teachers and students in the learning process can communicate motivational encouragement and interest in learning (Garzón, 2021).

The effectiveness of interactive or multimedia learning media is believed to be able to improve student learning outcomes. This is shown by previous research at SMP Negeri 1

Sukasada with an average student post-test score of 86.61, including in the good category in social studies class VII subject at SMP Negeri 1 Sukasada, 2018 academic year. /2019 (Indarta, Ambiyar, Samala, & Watrianthos, 2022). Then another study stated that Android-based learning media was in the good category, and the response questionnaire result was 76.41 Beta. The average percentage of students in Test II obtained an average score of 83.07 in the "very good" category (Setiawardhana, Wasista, & Ardiansyah, 2018). Then interactive learning media such as videos can also motivate students so that they can increase learning achievement (Rahmadhan A, 2021). This is further supported after several studies regarding the effectiveness of augmented reality as a learning medium. After using social studies learning media based on augmented reality in Class IV SDN Karang Entang, students' knowledge skills on social studies material, especially Indonesian traditional clothing, increased. The results showed that 33% of students completed the pretest target trials and 100% of students completed the posttest (Wiharto & Budihartanti, 2017). Apart from social studies subjects, this augmented reality-based learning media is also applied to mathematics subjects and the results prove that the average value of the effectiveness of augmented reality-based learning media for class VIII flat building materials is 4.59 which is included in the very effective category. Students are shown based on student response data showing a positive response to augmented reality-based mobile learning media, indicating that at least 80% or more students answer in the "agree" category for each item answered increases. Overall, learning media based on augmented reality is classified as effective, with 87% of students achieving learning completeness criteria (Isron, Ayyu Faridhatul Masrura, M. Farras Aditya P. A, Dodik Arwin Dermawan, & Paramitha Nerisafitra, 2020).

Based on previous research, the researchers took the initiative to develop an augmented reality-based application called dismus in a way that works by loading virtual objects such as 3D models combined with audio and these 3D models can appear in real environments to give users the feeling that virtual objects exist in their environment. The material visualized with augmented reality is social studies class 7 with historical material, namely Hindu-Buddhist heritage. Unlike the previous applications, this application visualizes various Hindu-Buddhist relics combined with audio explanations from the temple. Other features include explanatory videos and mini games as a reflection of the explanations explained (Riurean, Olar, Ionică, & Pellegrini, 2020).

The urgency with the development of augmented reality is to help students learn and understand material easily, learning becomes more interesting and not boring. Apart from that, the existence of the Dismus application is expected to be able to visualize the temple buildings clearly to students who have never seen the temple directly so that learning becomes more real. Then the Dismus application is expected to be a reference as a source of information and for other researchers who want to make similar applications with different materials in the future. For educators, namely as a consideration for the use of learning media so that it can arouse the enthusiasm of students in the classroom.

However, the use of the Dismus application still needs further development for user convenience, therefore the researchers held a focus group discussion which was attended by several experts on augmented reality and social studies teacher representatives to assess the effectiveness and convenience of this Dismus application before conducting trials at schools. In this paper, we discuss the results of the focus group discussion on the development of Dismus applications.

LITERATURE REVIEW

Augmented Reality Learning Technology

Augmented reality is defined as a technology capable of bringing visual information to reality and has the principle of combining virtual information by bringing it into the real world after simulations such as text, images, 3D models, music, videos. In Augmented Reality itself has three main technologies namely smart display technology, 3D registration, and intelligent interaction technology. While the Augmented Reality development tools are Foreign AR SDK (a platform launched by Apple) and ARCore (Google's software platform for building AR applications, which is like Apple's ARKit) whose functions are motion capture, environmental perception, and light source perception. Apart from that, the foreign AR SDK namely Vuforia is currently the most popular SDK. Main recognition function supports iOS, Android and UWP, and SDKS. While domestic AR SDKs are not easy to meet domestic development needs. Currently, domestic AR SDKs mainly include Baidu AR, NetEase Insight AR, Vision+EasyAR, Liangfengtai HiAR, Tianyan AR, Taixu AR, and Magic AR (Chen, Liu, Cheng, & Huang, 2017). The use of this technology will be very helpful in conveying information to users, but in contrast to virtual reality which combines real objects (users) into a virtual environment, augmented reality combines virtual objects in a real environment (Kye, Han, Kim, Park, & Jo, 2021).

The advantage of augmented reality itself is that its development is more economical and easier, another advantage is that augmented reality can be widely applied in various media. It is very possible to make an application on a smartphone or in the form of print media such as newspapers, books, and magazines (Chen et al., 2017). The application of AR in education can be in the form of a research product, namely learning media for picture books based on Augmented Reality which is declared feasible and practical for use by Generation Z students in the process of learning mathematics or in developing teacher competence. This is based on the results of the feasibility assessment of media experts, linguists, and material experts. Apart from education, AR can also influence entertainment (including video games) as well as tourism, architecture, medicine, and industry (Kye et al., 2021).

Metaverse in Social Studies learning

Etymologically, metaverse comes from the word "meta" which means beyond, and "verse" means universe. The Metaverse is described as a technology that enables people to gather and communicate by entering a virtual world. In the metaverse or virtual world, everyone wouldn't flinch individually. They will have connections with other people, even autonomous NPCs, and holograms (Indarta et al., 2022). Metaverse is a digital reality that connects aspects of social media, online games, augmented reality (AR), virtual reality (VR), and cryptocurrencies to allow users to interact virtually. The metaverse has advantages in the social realm, because with the existence of the metaverse, social interaction becomes unlimited, things that are hard to reach can now be visualized.

Metaverse can now be used in various fields including education. In the realm of education, the metaverse is used as learning media, learning methods, learning resources and other technological developments. In practice, teacher competence begins to carry out the metaverse concept (Nugroho, Yudhana, & Umar, 2020).

Social studies learning is a scientific field or academic discipline, besides that Social Sciences is a science that studies social phenomena and social problems. Social studies learning processes at various levels of elementary to tertiary education do not emphasize the theoretical aspects of science, but rather emphasize the practical aspects of studying, studying, and studying social phenomena and problems, considering the weight and level of ability of students at different levels. In general, social studies learning teaches students to understand that society is a unit (system) whose problems are related, and their solutions require an interdisciplinary approach, namely a more comprehensive approach from the point of view of law, political science, economics. other social sciences, such as geography, history, anthropology, sociology, and economics.

METHOD

Making the DISMUS application began with conducting an initial survey and seeing that there was a lack of digital learning media in social studies subjects. After making the Dismus application as a solution to existing problems, the researchers held focus group discussions as Dismus evaluation material before being tested in schools by presenting experts in the field of augmented reality and social studies teachers. In this study, we are using descriptive qualitative to describe the results of the focus group discussion. FGD is a qualitative data collection method that brings together one or two researchers and several participants as a group to discuss a research topic. One researcher acted as a facilitator and guided the discussion by asking participants to answer open-ended questions, while another researcher recorded the details of the discussion (Bisjoe, 2018). The scheme of this research can be seen in the chart below.

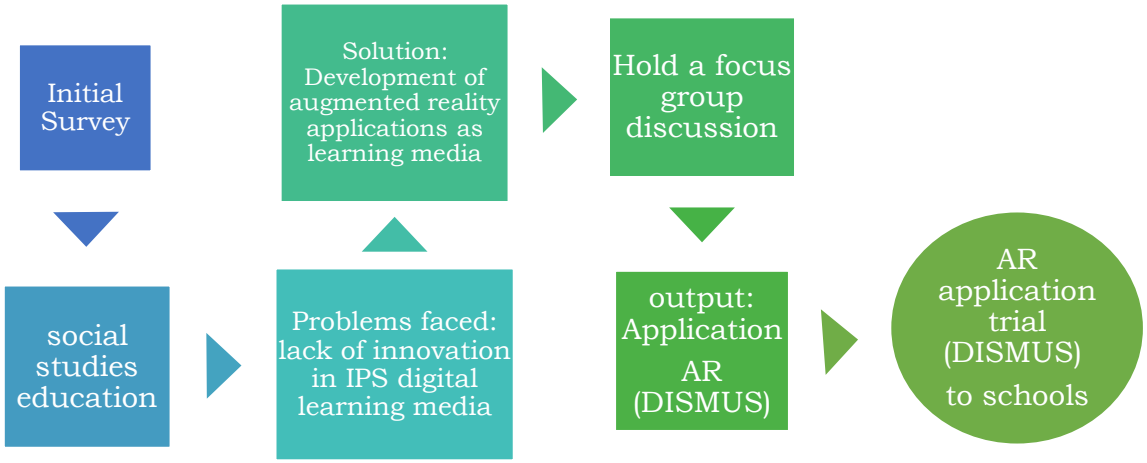


Chart 1. Research Scheme

RESULTS & DISCUSSION

Augmented Reality *Discendo discimus* (Dismus) Application

Augmented Reality (AR) is designed in the form of an application called Dismus Application which is loaded from the Latin Discendo discimus which means when we teach, we also learn. Dismus APP is a digital-based learning media application which contains material for introducing traces of the types of Hindu-Buddhist heritage in the form of an Augmented Reality effect so that children can understand learning in an interesting way with the target of junior high school aged children from 13-16 years old.

The presence of Dismus APP Augmented Reality is seen from the existence of an urgency that is needed in the education sector. The need for a digital learning media with Augmented Reality (AR) features which is the concept of merging the virtual world into the real world. The presence of the virtual world serves to evoke the user's perception in order to be able to understand information from the object to be recognized. The application of different learning models can be supported using appropriate learning media so that teachers can convey material to students appropriately as well (D. P. P. Sari et al., 2021). This media was very suitable when the pandemic ended when several learning systems switched from face-to-face to e-learning or online, but now the learning system has returned to face-to-face, this media is also available and can be used as learning media (Marifah & Amaliyah, 2022). Based on this, the purpose of making this Dismus application:

For educators, the Dismus application can help teaching activities, especially in the current section of historical material. This Dismus application can be used as a contemporary learning medium and can inspire students' enthusiasm for learning due to the existence of technology that students have never touched before through learning activities. In addition, the Dismus application can help with real visualization rather than just using photos or videos. As for students, the Dismus application was made to make it easier for students to understand what were the relics that occurred during the Hindu-Buddhist period in Indonesia in a new way, not just memorizing or viewing videos/pictures, but these three activities have been summarized in this dismus app.

Picture 1. Logo Dismus

The Dismus application is equipped not only with reflections on the forms of temples and other relics which are equipped with voice over, but there are also learning videos that can be used as an introduction when teaching, as well as learning evaluations such as quizzes or games whose content is in the form of questions related to relics. temples. The Dismus AR application is also equipped with cards as a learning medium using the flashcard method. This is because the flashcard media used as a marker in augmented reality can facilitate learning because it is simpler than textbooks or other media. Printing AR markers on flash cards makes this technology even more attractive (Wicaksana & Anistyasari, 2020). The following is the display of the dismus application:

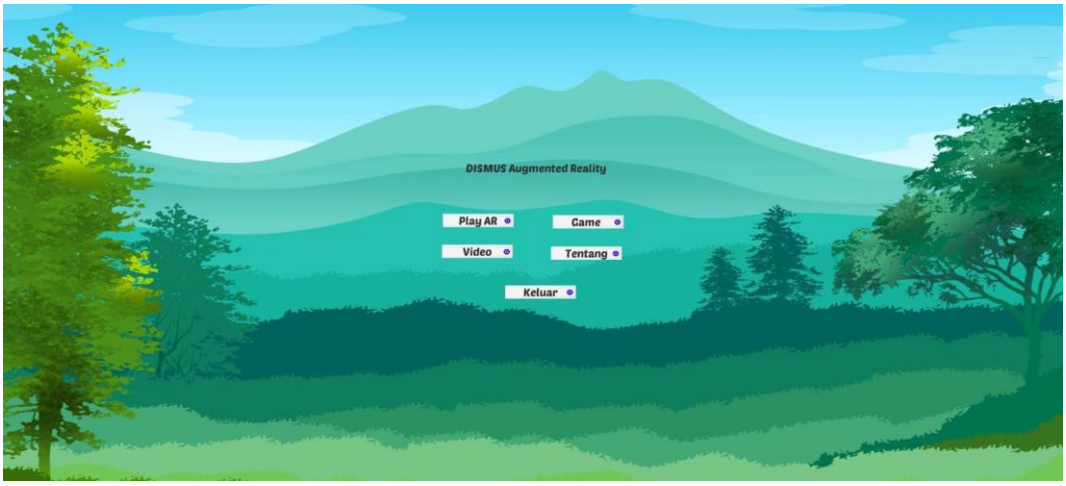


Figure 2. Display of the dimus application home

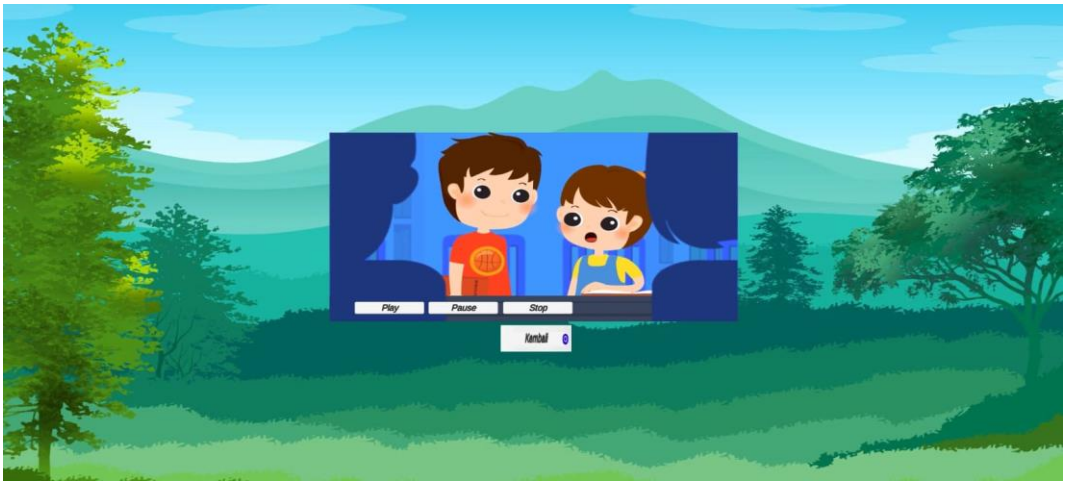


Figure 3. Display of learning videos in the dimus application

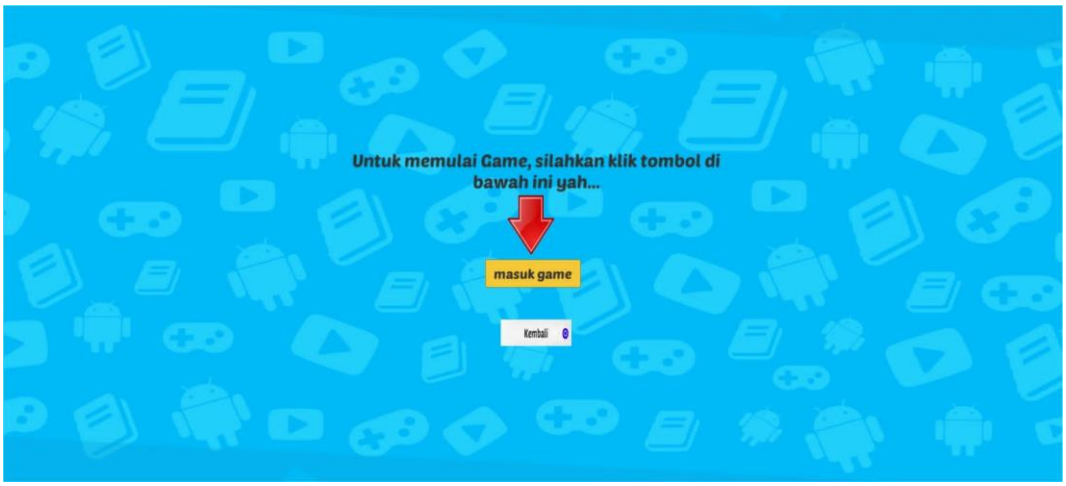


Figure 4. Game menu display

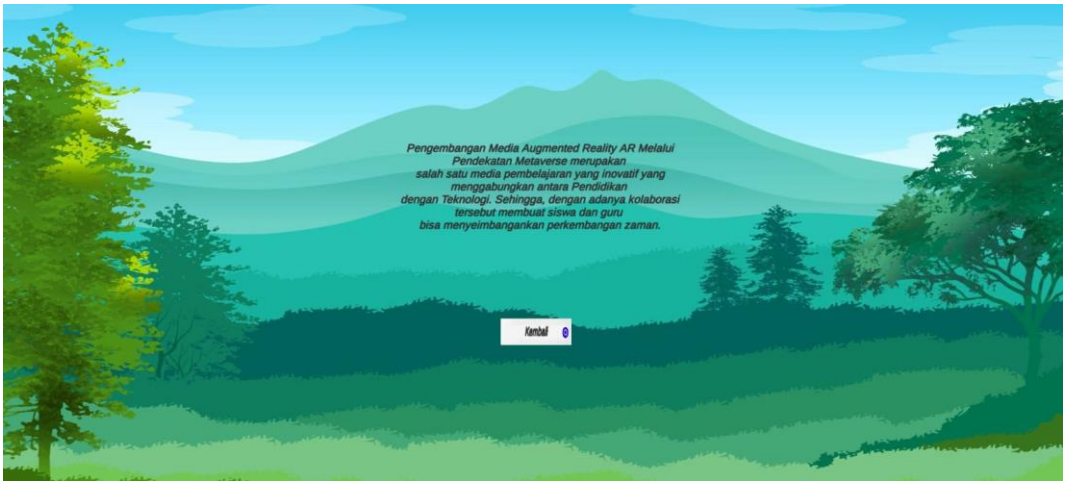


Figure 5. About menu display

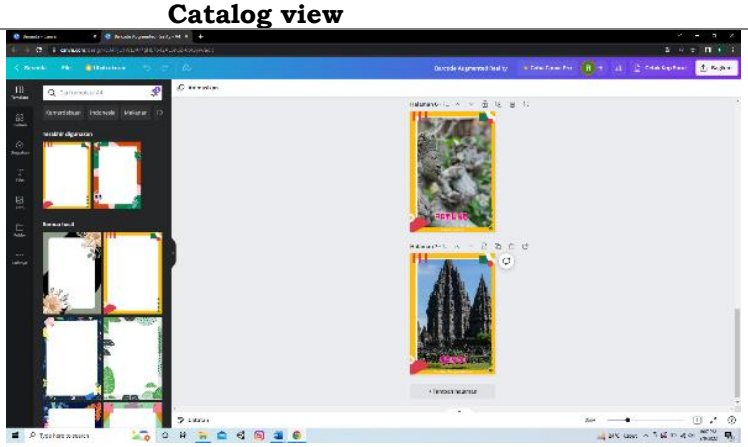
Figure 6. Display of AR play when the camera is pointed at the media card

Figure 7. Display of the DISMUS Card as AR Media

STAGES IN MAKING DISMUS

Augmented reality itself has three main technologies: smart display technology, 3D registration and intelligent interaction technology. Augmented reality development tools include the Foreign AR SDK (a platform introduced by Apple) and ARCore (Google's software platform for building AR applications, like Apple's ARKit), whose capabilities include motion capture, environmental awareness, and light source awareness. In addition, the foreign AR SDK named Vuforia is currently the most popular SDK. Our core discovery supports iOS, Android, UWP and SDKs. On the other hand, domestic AR SDK is not easy to meet domestic development needs. Currently, the domestic AR SDK mainly includes Baidu AR, NetEase Insight AR, Vision+EasyAR, Liangfengtai HiAR, Tianyan AR, Taixu AR, and Magic AR (Chen et al., 2019). The use of this technology is very useful in conveying information to users, but unlike virtual reality which combines real objects (users) in a virtual environment, augmented reality combines virtual objects in a real environment (Fajar et al., 2021). In making this Dismus application, it can be seen in the application creation table.

Table 1. Dismus application development

1. **Designing a catalog card marker design**	 **Catalog view**
2. **Designs that have been designed are made digital with the CANVA application**	 Catalog view

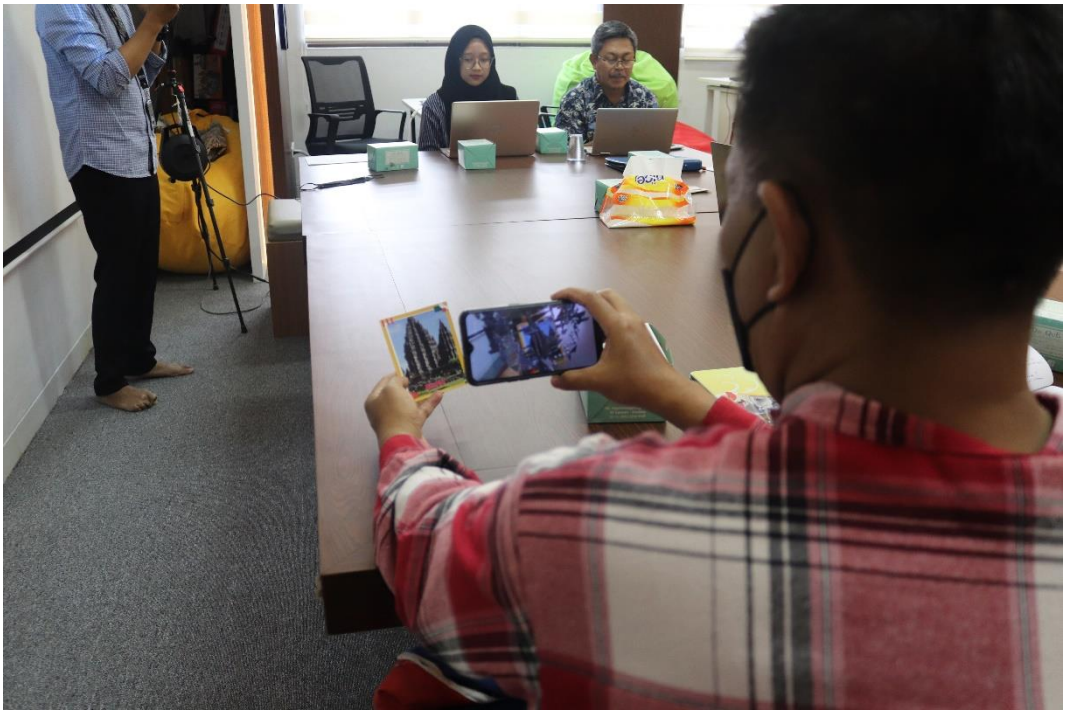
3. **The process of creating 3D objects in the Blender application and downloading blender**	 **Catalog view belnder**
4. **Entering character models in Unity Marker which has been integrated with Augmented Reality**	 The display is an AR application

Implementation of Focus Group Discussion

Focus Group Discussion is a group discussion that aims to discuss certain issues in an informal setting with various participants, under the direction of resource persons as facilitators. This focus group discussion method is also a method for reaching solutions through group discussions centered on the problem to be solved (Aini & Yuliana, 2021). The implementation of this focus group discussion was held on Friday 2 September 2022 in a hybrid manner and took place by presenting resource persons who understand the ins and outs of Augmented Reality as well as social studies teacher representatives as resource persons who understand the conditions or conditions of teaching in the field. The purpose of holding this Focus Group Discussion is to gather information to make the Dismus application better. The focus group discussion began with a brief explanation of what Dismus was by the head of the research team and then continued with a demo of using the Dismus application to the resource persons with the cards that were the media distributed and the Dismus application link already installed on their respective cellphones.

Picture 1. A brief explanation of the dimus by the head of the research team

Picture 2. Demonstration of the use of Dismus by students



Picture 3. The teacher tries the dismus AR application

Picture 4. Lecturer resource persons tried the Dismus AR application

Gambar 2. Implementation of focus group discussion discussion sessions or hearings.

The next session is a discussion and hearing session from each resource person. In this session, the input regarding Dismus is that user convenience needs to be considered, especially when waiting to enter the home view or application homepage if possible, not to wait too long in mode because students can get bored. Then, it needs to be anticipated again with the problem of applications that cannot be used because some cellphones have different memory capacities so that problems can occur. Furthermore, the interface design needs to be adjusted to the screen ratio for each use, this is because many students' cellphones have different screens so that tools or designs need to be considered for user convenience. Another thing is security when downloading the application so that it does not cause too much waste data and the memory usage required when the application is installed on students' cellphones considering the memory capacity of students' cellphones is different. In using the application, it is better if there is consistency with offline use because at one time, students may not have an internet network or a bad signal in several rooms. Another thing is the selection of content ranging from the use of videos, evaluation games and the selection of cards used as flashcards that need to be considered again, such as music or backsounds that are used using music typical of Indonesian culture or Sundanese tribe or selection of videos with animation with Indonesian characteristics, and It is necessary to conduct trials in schools so that the effectiveness of the application can be known. Apart from input, the resource person continues to provide support and appreciation for the creation of the Dismus application, this is because in social studies subjects not many digital learning media have emerged such as the creation of Augmented Reality.

CONCLUSION

The conclusion in the focus group discussion is that the development of the Dismus application has successfully entered the innovation stage as a learning medium that can be used in class, regardless of some input provided by the resource person such as interface design, use of application memory, display or tools designed and selection of content to be loaded. , the urgency of making this Dismus application must be immediately conveyed in class and a trial needs to be carried out to test its effectiveness.

SUGGESTION

For the development of augmented reality applications with different materials, it is hoped that input or notes in the Dismus application will be taken into consideration in making other augmented reality applications.

REFERENCES

Chen, P., Liu, X., Cheng, W., & Huang, R. (2017). A review of using augmented reality in education from 2011 to 2016. *Lecture Notes in Educational Technology*, (9789811024184), 13–18. https://doi.org/10.1007/978-981-10-2419-1_2

Elmqaddem, N. (2019). Augmented Reality and Virtual Reality in education. Myth or reality? *International Journal of Emerging Technologies in Learning*, *14*(3), 234–242. https://doi.org/10.3991/ijet.v14i03.9289

Garzón, J. (2021). An overview of twenty-five years of augmented reality in education. *Multimodal Technologies and Interaction*, *5*(7). https://doi.org/10.3390/mti5070037

Hasanah, F. (2021). Penggunaan Sumber Belajar Berbasis Information Technologi dalam Meningkatkan Hasil Belajar Siswa Pelajaran IPS di Kelas VIII MTs Nuris Silo This Study Examines the Use of Information Technology-Based Learning Resources, Abbreviated as IT, in Improving Student Learning Outcomes in Social Studies Class VIII at MTs Nuris Silo. *Heritage: Journal of Social Studies* |, *2*(2), 145–151. Retrieved from https://doi.org/10.xxxx/xxxx

Indarta, Y., Ambiyar, A., Samala, A. D., & Watrianthos, R. (2022). Metaverse: Tantangan dan Peluang dalam Pendidikan. *Jurnal Basicedu*, *6*(3), 3351–3363. https://doi.org/10.31004/basicedu.v6i3.2615

Isron, H., Ayyu Faridhatul Masrura, M. Farras Aditya P. A, Dodik Arwin Dermawan, & Paramitha Nerisafitra. (2020). Cubid Ec : Aplikasi Edukasi Berbasis Android Menggunakan Augmented Reality. *Explore IT! : Jurnal Keilmuan Dan Aplikasi Teknik Informatika*, *12*(1), 29–36. https://doi.org/10.35891/explorit.v12i1.2051

Krüger, J. M., Buchholz, A., & Bodemer, D. (2019). Augmented reality in education: Three unique characteristics from a user's perspective. *ICCE 2019 - 27th International Conference on Computers in Education, Proceedings*, *1*(December), 412–422.

Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of metaverse: Possibilities and limitations. *Journal of Educational Evaluation for Health Professions*, *18*, 1–13. https://doi.org/10.3352/jeehp.2021.18.32

Natiqotul, U., Khoiri, N., & Supriyono, W. (2022). *Determinant Factors in Prosocial Behavior Education in The Industrial Era 4 . 0*. *3*(1), 49–62.

Nugroho, A., Yudhana, A., & Umar, R. (2020). Aplikasi Augmented Reality Pengenalan Candi Berbasis Android. *Seri Prosiding Seminar Nasional Dinamika Informatika*, *4*(1), 218–221.

Rahmadhan A, P. A. S. A. (2021). Aplikasi Pengenalan Perangkat Keras Komputer Berbasis Android Menggunakanaugmented Reality (Ar). *Jurnal Teknologi Dan Sistem Informasi (JTSI)*, *2*(2), 24–31.

Riurean, S., Olar, M., Ionică, A., & Pellegrini, L. (2020). Visible Light Communication and Augmented Reality for Underground Positioning System. *MATEC Web of Conferences*, *305*, 00089. https://doi.org/10.1051/matecconf/202030500089

Setiawardhana, S., Wasista, S., & Ardiansyah, A. Y. (2018). Aplikasi Augmented Reality Untuk Pengenalan Perangkat Jaringan Komputer Berbasis Android Sebagai Media Pembelajaran Interaktif. *Link*, *24*(1), 28–35. https://doi.org/10.31090/link.v24i1.10

Subhashini, P., Siddiqua, R., Keerthana, A., & Pavani, P. (2020). Augmented Reality in Education. *Journal of Information Technology and Digital World*, *02*(04), 221–227. https://doi.org/10.36548/jitdw.2020.4.006

Wiharto, A., & Budihartanti, C. (2017). Aplikasi Mobile Augmented Reality sebagai Media Pembelajaran Pengenalan Hardware Komputer Berbasis Android. *Jurnal PROSISKO*, *4*(2), 17–24. Retrieved from https://e-jurnal.lppmunsera.org/index.php/PROSISKO/article/view/387