Mentoring of MGMP ICT High School in East Kotawaringin to Improve Teacher Competence and Preserve Culture through AR and Metaverse Technology in Tumbang Gagu

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ABSTRACT

This community service program is the result of 2023 research aimed at developing Virtual Reality (VR) Metaverse and Augmented Reality (AR) technology to introduce the history and philosophy of the Tumbang Gagu traditional house in Central Kalimantan. This technology was tested in schools in East Kotawaringin (KOTIM) with positive responses from teachers and students. The program aims to enhance teachers' competence in utilizing modern technology for education and the preservation of local culture. The activity stages include socialization, training on the application of technology, mentoring, and continuous evaluation. The results of this program include the creation of AR-based historical storybooks, the publication of scientific articles in SINTA 4 indexed journals, and the introduction of local culture through advanced technology. The program resulted in successful training, with 85% of participants trained, competence increased by 70%, and the quality of AR products reached 60%. MGMP ICT participation increased by 50%. The outputs: posters, videos, publications, and recognition of student credits. This program successfully increased teacher competence and the quality of technology-based learning in the KOTIM region, with positive impacts recognized by mass media and scientific publications.

INTRODUCTION

This community service project is the result of a research team aimed at implementing Virtual Reality (VR) and Metaverse technologies to introduce the history and philosophy of the Tumbang Gagu Traditional House in Central Kalimantan. Through this research in 2023, we successfully developed VR and Metaverse technologies. These technologies have been tested with ICT teachers and students in one of the schools in East Kotawaringin (KOTIM) with very positive responses from teachers and students. Based on the evaluation of the test results, we found that the technology we developed sparked strong enthusiasm. Teachers not only showed great interest in applying the technology in teaching but also felt the need for further guidance and training in understanding and integrating this technology into the school curriculum.

Building on our research results, which focused on using Virtual Reality (VR) and Metaverse technology to introduce local cultural heritage, we proposed the practical implementation of these findings. In an era where technology bridges knowledge, we aim to present a solution that is not only innovative but also capable of providing a tangible impact on education, especially in East Kotawaringin (KOTIM). Through partnerships with the ICT Teachers' Forum (MGMP), we are committed to improving teacher competence in utilizing the latest technology while strengthening the preservation of local cultural heritage. In this context, the cultural richness of the region, such as the Tumbang Gagu traditional house, is not only an attractive learning subject but also a symbol of our efforts to preserve the uniqueness and authenticity of regional culture.

ICT teachers, as agents of change in the digital era, face a tough task in finding unique and engaging teaching approaches. They also realize that improving their competencies will enable them to present local cultural heritage as an integral part of learning. This is because local culture has great potential to be used as an inspiration in learning and as an ideal subject for applying the latest technology. Therefore, we strive to provide solutions that allow them to bridge the gap between local cultural wealth and innovative teaching approaches, creating something truly original in education.

MGMP ICT in KOTIM consists of 18 members who are ICT teachers from various schools in East Kotawaringin, including:

1. SMA NEGERI 1 SAMPIT
2. SMA NEGERI 2 SAMPIT
3. SMA NEGERI 3 SAMPIT
4. SMA IT DARUL MA'RIFAH
5. SMA NEGERI 1 PARENGGEAN
6. SMAN 1 MENTAYA HILIR UTARA
7. SMAN 1 CEMPAGA
8. SMAN 4 SAMPIT
9. SMA IT ARAFAH SAMPIT

Based on this data, the MGMP ICT membership in KOTIM is diverse in terms of educational backgrounds. Most members have educational backgrounds related to information technology, such as a Bachelor of Computer Science (S.Kom). However, this diversity shows a need to support and guide MGMP members in technical matters, especially for teachers with non-technical educational backgrounds.

During the mentoring activities, it was evident that the diversity in teachers' understanding required a more flexible and targeted teaching strategy. To address this, the implementing team applied an approach tailored to the needs of each MGMP ICT member, allowing them to develop technical skills gradually. As a result, the teachers were able to implement the technology more effectively in the learning process. This personal approach and hands-on practice proved to be key in improving member competence and boosting their confidence in using AR and Metaverse technology in the classroom.

FIGURE 1. Assistance in Training Activities

In the implementation of the evaluation of information technology infrastructure in schools under the MGMP TIK (Subject Teachers' Association for Information and Communication Technology) in East Kotawaringin (KOTIM), it was revealed that the existing facilities are still inadequate. Limited internet access, a lack of sufficient hardware and software, and inadequate technology-based teaching support facilities are the main obstacles (Mutohhar & Anwar, 2023). Through this community service program, steps have been taken to assist MGMP TIK in providing investment in facilities for innovative learning, including the provision of VR and AR hardware. By distributing devices such as VR and AR glasses, this program has successfully introduced a more interactive and immersive learning experience for ICT teachers in KOTIM (Akbar Endarto, 2022). These improvements have positively impacted teachers' competencies and the quality of student learning in schools. In addition, efforts were made to overcome the limitations of access to quality learning resources regarding AR and Metaverse technology, enabling teachers to gain a deeper and more comprehensive understanding of these technologies.

This community service emphasizes the urgency of mastering AR and Metaverse technology to support education and the preservation of local culture in the current digital era (Fayiz et al., 2020). By enhancing ICT teachers' competencies in applying the latest technologies, this program aims to enrich innovative and engaging teaching methods. Beyond practical applications, this service is also a strategic step in supporting the Sustainable Development Goals, particularly related to Quality Education (SDG 4). Through these efforts, it is expected to significantly contribute to improving the quality of education in East Kotawaringin.

METHOD

The method used in this community service program is participatory (Farichan et al., 2022), involving all parties, especially MGMP TIK members, at every stage. This approach is expected to enhance their understanding, skills, and commitment to the program.
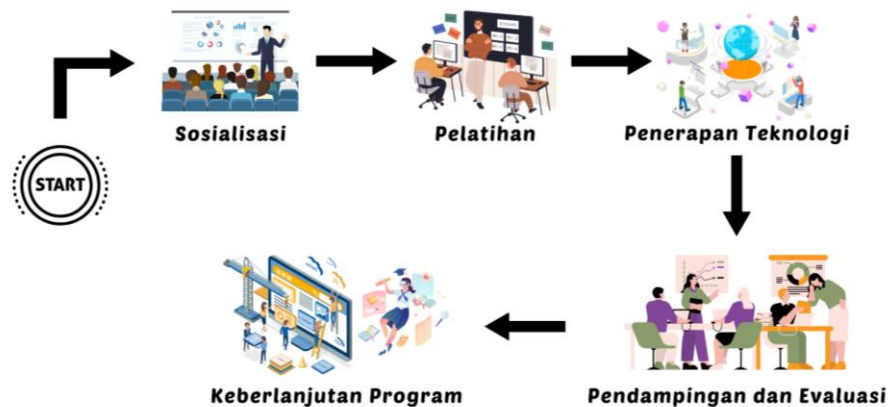
FIGURE 2. Stages of Community Service Implementation

Five Stages of Community Service Implementation (Sutanta et al., 2024)

1. Socialization (Gumala et al., 2023)
   - Initial Meeting: Conduct a special meeting with MGMP TIK members to introduce the solutions to be implemented.
   - Presentation of the Plan: Convey the objectives, benefits, and detailed steps for implementing the solutions.
   - Feedback: Gather input from members to ensure the plan aligns with their expectations and needs.

2. Training (Sutriyani et al., 2023)
   - Intensive Training: Organize training on AR and Metaverse technology for members.
   - Practical Workshops: Hold hands-on sessions to reinforce understanding and skills.
   - Structured Materials: Provide relevant and structured learning modules to facilitate technology mastery.

3. Technology Implementation
   - Program Identification: Assist members in designing learning programs that utilize AR and Metaverse technologies.
   - Equipment Procurement: Facilitate the procurement of hardware and software required for technology implementation in the learning environment.

4. Guidance and Evaluation
   - Regular Assistance: Provide ongoing guidance throughout the implementation of the learning programs.
   - Evaluation Sessions: Conduct periodic evaluations to assess program effectiveness and identify challenges.
   - Additional Support: Offer technical support as needed to overcome obstacles.

5. Program Sustainability
   - Sustainability Plan: Develop a plan to ensure the program continues and grows.
   - Continuous Development: Encourage members to further develop the use of AR and Metaverse technologies.
   - Resource Identification: Seek additional support required to maintain the program's sustainability.

By following these stages, the community service program has been effectively implemented, yielding positive impacts for MGMP TIK members and the community in East Kotawaringin.

RESULT AND DISCUSSION

The assistance activities for the Subject Teachers' Association (MGMP) of Information and Communication Technology (ICT), which were carried out in East Kotawaringin, led by Minarni, S.Kom., M.M., a lecturer from Darwan Ali University, went smoothly and achieved very satisfying results. With an innovative approach that combines Augmented Reality (AR) and Metaverse technologies, this activity not only succeeded in enhancing teacher competencies but also had a positive impact on preserving local culture through modern technology-based teaching.

During the implementation, ICT teachers at senior high schools (SMA) in Kotim received intensive assistance focused on the application of AR and Metaverse technologies in teaching. The training was designed so that teachers could understand, master, and effectively apply the technology in the classroom. As a result, each teacher successfully created more interactive learning materials that enhanced student enthusiasm, particularly in history and local culture subjects.

One concrete result of this activity is the creation of a flagship product, an AR-based historical storybook titled The Wonders of Tumbang Gagu. This book allows students to interact with 3D representations of the Tumbang Gagu Traditional House, offering an engaging and immersive learning experience. The participating teachers felt that this training not only broadened their understanding of technology but also provided practical tools to enrich the teaching and learning process in schools.

FIGURE 3. Storybook Product Created by Participants

This program has resulted in successful training, with 85% of participating teachers being successfully trained, a 70% increase in competency, and the quality of AR products produced reaching 60%. The active participation of MGMP TIK members also saw a significant increase of 50%. The outputs of this program included the creation of posters, video documentation of activities, publications in electronic mass media, and the recognition of course credits (SKS) for students participating as part of the Merdeka Belajar Kampus Merdeka (MBKM) program. This program not only successfully improved the teachers' competencies in utilizing AR and Metaverse-based technologies, but also directly enhanced the quality of education in the East Kotawaringin area. The positive impact of this program has been recognized through various mass media and scientific publications, further solidifying the significance of this community service in supporting

technology-based educational transformation in KOTIM. Additionally, awareness of the importance of preserving local culture through modern technology has become deeply ingrained in the minds of the participants.

Overall, this assistance program demonstrates that technological innovation can not only enhance the quality of education but also serve as a bridge connecting the younger generation with valuable local cultural heritage. As such, this activity has proven that East Kotawaringin, through the role of ICT teachers and Minarni, is at the forefront of integrating AR and Metaverse technology in the education sector.

FIGURE 4. Training Participants and Organizing Committee

FIGURE 5. Training Activities

FIGURE 6. Delivery of Training Materials

FIGURE 7. Training Implementation

FIGURE 8. Training Participants and Organizing Committee

CONCLUSION AND RECOMMENDATION

The community service activity carried out by the Information Systems Study Program at Universitas Darwan Ali, particularly under the guidance of Mrs. Minarni, S.Kom., M.M., has successfully made a significant contribution to improving the competencies of ICT teachers in East Kotawaringin. By introducing Augmented Reality (AR) and Metaverse technologies for the preservation of local culture, this training not only focused on theoretical aspects but also produced tangible outcomes that impact education. One of its flagship products is the AR-based historical storybook titled The Wonders of Tumbang Gagu, which presents local history in an interactive and engaging form.

This activity also successfully sparked greater interest among participants in AR and Metaverse technology training, indicating that this program has great potential for further development. With upcoming stages like copyright application, scientific publications, and the completion of the final report, this initiative has the potential to become a model for other regions seeking to integrate modern technology in education and cultural preservation.

Recommendations

1. Sustainable Development

   To ensure the continuity of this program, it is suggested that similar training activities be conducted regularly, with the goal of expanding participant coverage from teachers at various education levels to the general public.

2. Collaboration with Government and Other Institutions

    Collaboration with local governments, educational institutions, and cultural communities is essential to extend the impact of using AR and Metaverse technologies for local cultural preservation.

3. Infrastructure Support

    Given the technological infrastructure limitations in some schools, it is hoped that more attention will be paid to providing adequate facilities, such as hardware and internet access, so that programs like this can be more widely and evenly implemented.

4. Utilization of Technology in Schools

    ICT teachers who have participated in this training are expected to become agents of change by utilizing AR and Metaverse not only for cultural preservation but also for learning innovation across various fields.

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