

Research Article

Personal Learning Services and Immersive Learning in Art Design to Enhance Indonesian Education

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Indonesia was one of the countries that successfully survived the COVID-19 pandemic. The pandemic has provided good lessons, especially in the education sector, and it has provided new ways of overcoming problems in education, especially in art and design. In this paper, I will share experiences related to Personal Learning Services based on gamification and the implementation of immersive learning based on Augmented Reality, which was developed at the Department of Art and Design at the State University of Malang in Indonesia. This research was developed for primary education students in Indonesia, especially in Malang City, East Java. The contribution for this article was as follows: 1) developed some research to solve the learning problem impact of COVID-19; 2) with the software, media, and game specialization group in the art design department conducted several studies in the form of Personal Learning Services and immersive learning. In the discussion of Personal Learning Services based on gamification, the study aims to improve the quality of children's characters by displaying background designs in several main locations in Malang. This research includes several minigames that attempt to increase children's discipline, routine, and consistency. Related to implementing immersive learning based on Augmented Reality, is research to introduce characters in *wayang panji* to children. This study develops Augmented Reality technology without markers to make it easier for users to learn without fear of losing the marker, which has been a problem in AR. This research, according to the survey with the statistical tests result shows that it is a feasible solution to apply to the learning process.

Keywords: learning media, personal learning services, gamification, immersive learning, augmented reality

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1. Introduction

The impact of COVID-19 on Indonesia's economic growth, raising the poverty rate from 9.2% in September 2019 to 9.7% by the end of 2020. This means that there will be 1.3 million people who will fall into poverty. According to our worst projection, the poverty rate will increase to 12.4%, implying that 8.5 million people will be poor.

According to www.aseanbriefing.com, average wage people in Indonesia not high. On 2022 the Minimum wage in Indonesia, the lowest at \$126 / 1 million 800 thousand IDR and the highest at \$310 / 4 million 400 thousand. So it means for education, the government and the educator must creatively find best method for education. Another data, 25% Indonesia people was student [1]. The Indonesian Statistic report 2021 shows that 45.21 million students in Indonesia in the 2020/2021 school year. 24.84 million students (54.95%) are elementary school students.

Covid-19 in 2020 can make all learning changes to the online model for all education level. There is some that we can consider about this situation. The point that we used consider was (1) readiness of teachers and schools for changes in the online education system; (2) The use of technology also experienced many problems among teachers and students; (3) The Indonesian government provides support for online learning, such as through internet packages.

The contribution on this article was 1) Developed some research to solve about learning problem impact of pandemic covid19.; 2) With The software, media, and game specialization group in the art design department conducted several studies in the form of Personal Learning Services and immersive learning.

With the help of personal learning services, students can grasp standards at their own rate while teachers recognize and cater to each student's needs. Some of Personal Learning Services can we describe like Auto Assessment, Auto Reply QA, Gamification Education, Teach Agent. Auto assessment was a software-based evaluation of a number of features and factors. This program often applies an evaluation paradigm based on a rubric with the items to be evaluated [2]. Auto Reply QA is a technology that aims to raise the standards of instruction on both virtual and physical platforms by guaranteeing that both academic staff and students have the same level of education comprehension [3]. The support system makes sure that students and educational staff have access to an automatic question and answer generation mechanism, which will enhance the quality of education by giving educational staff a standardized way to prepare questions and

giving students a better chance to improve their study techniques. Education through gamification: Adding game elements like badges, game points, and scoreboards makes the course more alluring. This system automates course chores, improves learning content, and personalizes instruction [4]. Teach Agent is an artificial intelligence-based application system that helps students learn by helping them with the creation of study schedules, study plans, and learning bibliographies as well as assessment reports on learning results [5], [6].

The benefit of education based gamification for Indonesia Student was An increase in engagement, greater retention, connect education to the real world, instantaneous feedback and reassurance, attracts students to learning. Increased levels of engagement, gamified e-learning programs encourage engagement by posing problems and monitoring learners' advancement [7]. Students advance to more difficult classes as they eventually demonstrate mastery of the learning materials and receive praise for their accomplishments. Studies with gamification will learn the abilities and improve retention. Gamification improves knowledge retention by about 40% when compared to e-learning modules. Because of this, gamification is a very successful method for ensuring that students retain what they learn long after their courses are over. Connects learning to the real world: The rewards and challenges of gamified learning create a risk-free environment in which students can learn how to apply the knowledge or skills they're gaining. Provides instant feedback and reinforcement: This allows wrong answers to be corrected quickly, while right answers are rewarded with positive reinforcement. With gamified learning, students never have to wait to find out how well they're doing or how they can improve. Gets students hooked on learning: Game mechanics such as rewards and competition trigger dopamine release in the brain, making the learning process far more enjoyable. Because of this, students have the opportunity to become hooked on learning and mastering new skills.

The process of learning in a simulated or artificial environment is known as immersive learning. The setting gives the students the opportunity to fully immerse themselves in their studies in a way that simulates being in a real classroom [8]. Some of education learning model that based on immersive learning was Education with AR, Education with VR, Immersive games. AR in education refers to digital media that uses an interactive, multidimensional format to let users integrate virtual context into the real world. Applications for augmented reality (AR) can provide AR characteristics including improved interaction with the actual environment. Example: ARWayang [9]. Virtual reality can

enhance education by giving students access to memorable and engaging experiences that would not be available otherwise. Additionally, it can all happen in a classroom. Every student can access VR, and teachers can easily keep an eye on their use. Through complete immersion, it eliminates distractions and fosters the student's interest in learning more. Games that immerse the player in an alternate reality employ several strategies to help them feel more like the role they are playing. This is accomplished by a smooth game flow, well realized stories, and incredibly realistic graphics.

Augmented Reality was potential in education because some of reason. Due to their immersive qualities, capacity to transmit knowledge in novel and engaging ways, and potential to provide virtual experiences that can reduce barriers from cost or distance, AR/VR technologies are a promising addition to the "edtech" area. Applications span the humanities and arts as well as STEAM education [10]. AR and VR can give teachers interactive and interesting teaching tools for the classroom. These include of immersive content libraries, activities tailored to certain topics or learning goals, and resources for students who struggle with learning. In higher education, AR/VR can aid students in understanding abstract ideas and gaining practical experience in risk-free virtual environments. Courses, arts and humanities materials, and technical education can all be improved by this.

Education with Augmented Reality in Indonesia can bring some of benefit. AR learning provides a learning approach, which makes learning fun. As a result, it positively impacts students and keeps them engaged. 69% of Indonesian children and adolescents own a smartphone. Parents and teachers don't have to spend extra to buy tools for interactive learning and teaching. Students can practice without the need for physical laboratory equipment. This is very helpful for professional courses like in art design. Students do not need to buy puppets and masks for independent study. With AR applications, users can learn anytime and anywhere from their smartphones. It is the best way to replace paper books, posters, bulky physical models etc.

2. Method

In this article, will describe about 2 kinds of research, first: the development of thematic character games and local culture than the second: Immersive Tech AR: Mobile Augmented Reality (MAR) ARWayang Apps. For the first, The importance of the development of thematic character games and local culture are (1) Build fundamental character of

student: The thematic concept for improving discipline, independence, and increasing knowledge.; (2) This thematic character game design development is considered necessary because it provides input to the organizers of elementary school education [7]. Through smartphone-based digital media and local cultural nuances, we hope to help foster children's attitudes about social views, positions of independence, and increased knowledge from an early age.; (3) Growing sense of recognition, belonging, and love of local culture. The design is related to the location of the city of Malang, such as transportation, equipment, life patterns, and traditional games sourced from the local culture of the town of Malang.

The development of thematic character games and local culture is Research and Development (R & D) [11]. Phase I: Initial research Information is currently being gathered through observations, reading, and interviews with several of the primary schools in the city of Malang. Phase 2: creation of the @Kar game. The Android-based @Kar Game is currently under development. Plans are made, goals are established, content relevant to moral principles of daily life are determined, learning and association are established, the concept of asset design is determined, the game design is developed, and the viability of the @Kar game is tested. Stage III: Evaluate the performance of the @Kar gaming app for Android. Both internal and external exams were administered at the Klojen sub-district's elementary schools in addition to the UM Art and Design Lab. Guidelines for improvement are based on field tests. Then, based on the outcomes of field tests, change the product results in the form of methods or models. The outcomes can be taken into account to raise kids' moral standards.

The framework development of Immersive Tech MAR: ARWayang Apps can be describe: research & information collect, planning, develop preliminary from of product, preliminary field test, operational field test , Operational product revision, main field test, main product revision, final product revision & Dissemination & implementation. The framework can be seen in Figure 1.

3. RESULT & DISCUSSION

According to the Figure 2 about The @Kar Game Design Development, following the process was: (1) Main Data for this game refers to the grade 1 and grade 2 elementary school thematic learning books.; (2) This book is divided based on thematic themes, including the following table.; (3) Based on the thematic Theme shown in the table

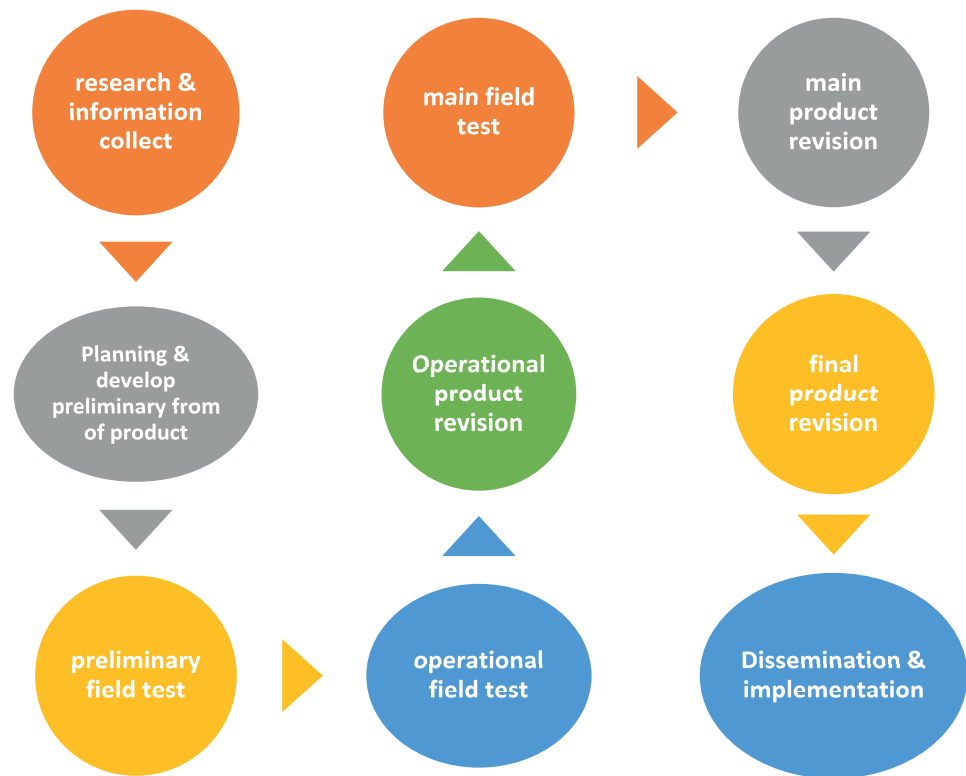


Figure 1: Immersive Tech MAR: ARWayang Apps framework [9].

above, the concepts of grouping thematic themes are formulated into three groups: environment, association, and school. This grouping is based on the suitability of applying thematic patterns and criteria for achieving thematic themes. According to thematic themes making formulation, The concept of game design. it will be divided into two procedures, first determining minigame titles based on thematic topics and second defining the concepts of minigames. (4) The next step was creating a Use case Diagram is construction to describe the relationships that occur between actors with the activities contained in the application.; (5) Determining the concept of each minigame. This concept is related to game patterns, game targets, calculation of scores, and determination of background images and interface design.; (6) The User interface design compiled a flow diagram which determines the flow of the interface from the main interface until to the minigame also, the report.

For The development of MAR ARWayang appfor the Character can be described: This character design process starts from finding reference of the character (10 character: 5 character of wayang krucil and 5 character of wayang gedek Asun from Kedah Malaysia), create a draft of a 3D character, texturing 3D model, rigging the 3D model according

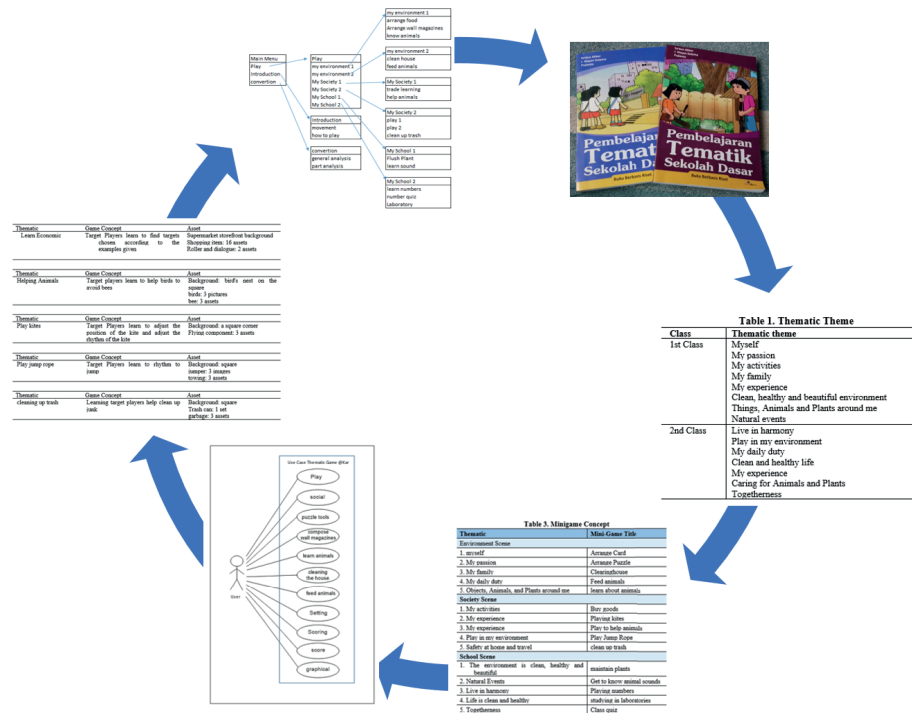


Figure 2: @Kar (Character Game) Game Design Development.

to the motion of wayang and create animation movement for all the characters. The process can be seen in Figure 3.

The interface of MAR ARWayang app from (1) The main interface: 3 part-> wayang crucial, wayang seri asun and about.; (2) For wayang crucial Interface there are 3 interfaces: history, wayang developer, and character of wayang. The character was Damarwulan, Kenconowungu, menakjinggo, layang seto and layang kumitir.; (3) wayang seri asun there are 3 interface: history, wayang developer and character of wayang. The character: Hero, Hero woman, Gergasi Man, Gergasi Woman and Entong.

The study was carried out in a district of primary schools in Malang, Indonesia. Two schools were present. Six teachers were the average number of teachers in each school. The majority of the instructors at this school are Basic Education Department graduates. Depending on the size of the institution, each class has between 30 and 35 students. One teacher may be in charge of many subjects in these schools due to the teacher shortage. As an illustration, some instructors cover two themes.

The questions for this data analysis included 5 possible answers: very less, less, enough, good, and very good. They were based on the first and last exams. It involves acquiring the control class and experimental class data based on the findings of the data analysis in the final assessment.

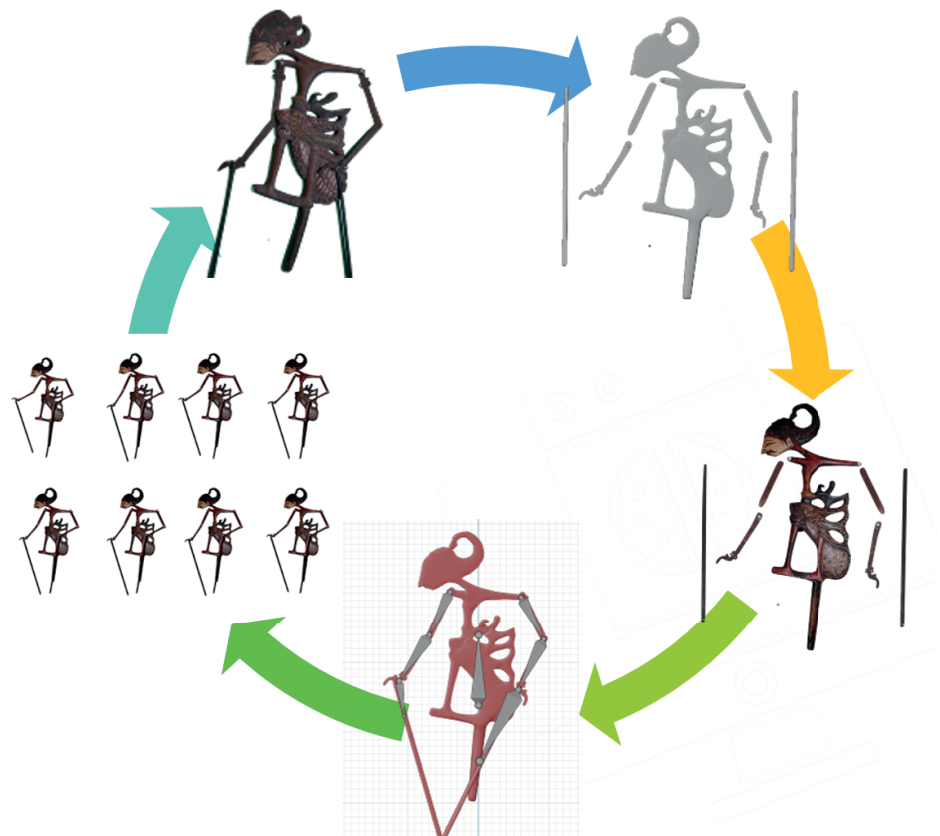


Figure 3: Character Design Development of MAR ARWayang app.

The analysis result about the average insight of the students about the theme content was -1,779 (SD = 2,298), according to the results of the Paired Sample t-Test analysis for the control class, with a value of $t = -7,180$ and a p value of 0.000. This indicates that the control group's students' understanding of the subject rose dramatically. The Paired Sample t-Test analysis for the experimental class revealed that the students' average understanding into the theme was -6,916 (SD = 2,485), with a t value of -25,353 and a p value of 0.000. This indicates that the experimental group's students' understanding of the result-related material also greatly improved.

4. Conclusion

Based on these findings, the R&D model was effectively used to build and create the Personal Learning Services based on gamification @Kar and Immersive Tech AR: MAR ARWayang Apps. It is possible to apply to the learning process, according to survey data and validation tests. According to the findings of the evaluation of the content and media, personal learning services based on gamification @Kar and immersive tech AR:

MAR ARWayang Apps are suitable for use as alternative learning media in addressing issues with online learning, particularly during the covid19 pandemic.

References

- [1] Pramono A. Algoritma pathfinding a* pada game RPG Tanaman Higienis, *Jurnal Edukasi dan Penelitian Informatika (JEPIN)*. 2015;1(2):76-80. <https://doi.org/10.26418/jp.v1i2.12517>
- [2] Skalka J, Drlik M, Obonya J. Automated assessment in learning and teaching programming languages using virtual learning environment. *IEEE Global Engineering Education Conference, EDUCON, IEEE Computer Society*. 2019:689-697.
- [3] Ahmed W, Anto B. AN AUTOMATIC WEB-BASED QUESTION ANSWERING SYSTEM FOR E-LEARNING. *Information Technologies and Learning Tools*. 2017 Apr;58(2):1.
- [4] Pramono A, Rahayuningtyas W, Dewi Puspasari B, Idzwan Hj A. Ismail, "Development Educational Material Topeng Malang with the Augmented Reality for Supporting Character,". *KnE Social Sciences*. 2020;(Sep): <https://doi.org/10.18502/kss.v4i12.7637>
- [5] Omidshafiei S, et al. Learning to teach in cooperative multiagent reinforcement learning. *The Thirty-Third AAAI Conference on Artificial Intelligence*. 2018;(May):6128-6136.
- [6] Puspasari BD, Damayanti LL, Pramono A, Darmawan AK. Implementation K-means clustering method in job recommendation system. *7th International Conference on Electrical, Electronics and Information Engineering: Technological Breakthrough for Greater New Life, ICEEIE 2021, Institute of Electrical and Electronics Engineers Inc*. 2021 <https://doi.org/10.1109/ICEEIE52663.2021.9616654>
- [7] Pramono A, Pujiyanto P. Improved Asset Design for Educational Asynchronous Games @KAR with Visual Concept of Malang City. *KnE Social Sciences*. 2019 Mar;3(10):435.
- [8] Carroll JM. *Immersive learning. Innovative Practices in Teaching Information Sciences and Technology: Experience Reports and Reflections*. Springer International Publishing; 2014. pp. 157–66.
- [9] Pramono A, Wardhana MI, Rahayuningtyas W, Iriaji I, Hidajat R, Puspasari BD. Markerless mobile augmented reality (mar) development of wayang krucil figures as an effort to increase knowledge and character learning. *7th International Conference on Electrical, Electronics and Information Engineering: Technological Breakthrough*

for Greater New Life, ICEEIE 2021, Institute of Electrical and Electronics Engineers Inc.202<https://doi.org/10.1109/ICEEIE52663.2021.9616797>

[10] Eriza MH, Pramono A, Novica DR. Augmented reality character topeng malang dewi as an effort to improve the quality of student learning media. International Seminar on Language, Education, and Culture, Knowledge E. 2021;(Mar):258–26<https://doi.org/10.18502/kss.v5i3.8548>

[11] Borg WR, Gall MD. Educational research. An introduction. 5th ed. White Plains (NY): Longman; 1989.