(*GARY*) GAME-LIBRARY: DIGITAL LIBRARY GAME BASED ON AUGMENTED REALITY TO REALIZE THE GOLDEN INDONESIAN GENERATION IN 2045

Nurul Aini*

English Department, State Islamic Institute of Kediri, Indonesia
e-mail: florida_aini@iainkediri.ac.id

Griselda Gian Heris Herdina

English Education, State Islamic Institute of Kediri, Indonesia
e-mail: griseldagian285@gmail.com

Naufal Siddiqi Nasrullah

English Education, State Islamic Institute of Kediri, Indonesia
e-mail: nasrullahnaufalsiddiqi@gmail.com

*Correspondence e-mail: florida_aini@iainkediri.ac.id

A b s t r a c t s
The problem in lack of reading literacy in Indonesia has become a crucial challenge. In the era of 5.0, this problem must be solved to realize the better future of Indonesian Golden Age in 2045. Therefore, the purpose of this article was to address the problem in reading literacy by utilizing Augmented Reality (AR) in creating Digital Library (DL), and how *GARY* as a new concept can be used. The present article used conceptual research design particularly in conceptual models and specifically using conceptual description. This article signified for academics to support the literature review as references for their empirical researches. The findings showed that *GARY* became a new concept of AR-based library game application to increase students' interest in reading literacy. Moreover, the present article provided a gateway to the empirical study of DL by integrating AR. Future research could examine on the impact of DL by integrating AR.

Keyword:
Augmented Reality, Digital Library, GARY, Reading Literacy

Introduction

Indonesia is one of the countries with a great interest in reading low. According to UNESCO, Indonesia is in the second rank from the bottom interest in reading with a percentage of 0.001%. This is very concerning because the most of the information we get is obtained from reading. Proficiency Reading is a condition sine quanon (absolute requirement) for a country to gain progress (Hartono, et al., 2015). Results performed by Center for Educational Research (Puspendik) Ministry of Education and Culture from the Indonesia National Assessment reveals data that average ability reading of students in Indonesia in the distribution of literacy in the national scope is 46.83% are in the less category, 47% are in the sufficient category, and 6.06% in the good category. This is because students will read if there is practice given by the teacher or teacher (Hadiapurwa, et al., 2021).

The changing of the society in interacting towards technology makes innovations in creating new approaches and designs become important issues that has been widely discussed among researchers in many fields of study, including educational field. In addition, the development of computer science particularly on Augmented Reality has been a focus of interest among researchers to be discussed. (Li et al., 2014) reported that the research on Augmented Reality has become one of the most important directions in recent information technology field. Moreover, Since Mark Zuckerberg purchased Oculus for $2 billion, virtual reality (VR) and augmented reality (AR) have gained popularity among the general public. (Luckerson, V., 2014 as cited in Cipresso et al., 2018). Furthermore, various empirical studies have been conducted on Augmented Reality for educational fields. Literature review research conducted by (Quintero et al., 2019) reported that many studies on the use of AR in inclusive education in the sciences has been widely discussed among researchers. (Quintero et al., 2019) conducted literature review of 50 studies about Augmented reality. Moreover, several studies on Augmented Reality that focus on intellectual disabilities have been discussed among researchers. (Cihak et al., 2016) carried out the research on evaluating Augmented Reality for elementary students with autism in completing a chain task. The findings reported that when 98% monomer lapping data was added to augmented reality, students' independent performance improved right away. Moreover, a study by (Bjekić et al., 2020) more focus on Augmented Reality for students with dyslexia. Thus, Augmented Reality can serve as a technology tool to solve problems in public policies, including education policy for the better education in the future.

Problems in educational field has taken as a consideration among policy makers. In the context of Indonesian society, one of the problems in education that has become a crucial challenge was the limited literacy of students and society. (Andas Nidaa'an Khofiyya et al., 2023) said that the curriculum was successfully designed by the government, but execution was hampered by challenges in reading, mathematics, and science, which prevented further progress. Literacy can be defined as the capability of a human to read properly. Not only reading, the capability in writing is including. In general, literacy refers to the ability to read and write well in a range of circumstances. (Jodi Pilgrim & Elda E. Martinez, 2013). The problem was most students do not have a culture of reading literacy. Some students have not applied reading techniques to enhance their comprehension. This will have an impact on academic performance. (Banat & Pierewan, 2019). (Delgadova, 2015), also said that reading literacy become one of the key academic competencies knowledge-producing skills for the

modern information society. Various studies have conducted on this topic. (Alfulaila, 2022) conducted a study about the impact of elementary school teachers' reading and writing literacy knowledge on high school students' reading and writing literacy skills. Moreover, (Muhammad, et. al., 2017) carried out a study on creating big book teaching resources for literacy in an effort to enhance the characteristics of 2nd grade kids in primary school. Thus, Reading literacy become a very crucial aspect in the future of nations.

In Indonesian context, Indonesia will experience a golden age in 2045. At that time, Indonesia will be 100 years old, or one century. It was targeted that Indonesia would become a developed country and be on par with the superpowers (Kemenko PMK, 2022). Various studies on Indonesian golden age conducted by researchers in many fields. (Shaturaev, 2021) carried out a study about the path of education and management of The library is one of the right places to develop a literacy culture. From the development of literacy culture, will achieve quality education. Quality education is wrong one of the main goals of Transforming Our World: the 2030 Agenda for Sustainable Development Goals (SDGs) which were proclaimed at the United Nations on the 2nd August 2015 (Annur, et al., 2018). Digital library programming is a solution that helps students understand the material being studied (Digital Libraries for Graduate Universities International, 2006).

Indonesia in 2025. Moreover, (Abadi et al., 2022) carried out a study on achieving the 2045 goal by securing a tipping point with political ideology and cultural knowledge. In addition, integrating sustainable technological innovation to face Indonesia golden age in 2045 is inevitable in this era. The innovations must be created as much as possible, especially in the education field. Therefore, this article introduces the Digital Library by integrating AR. Digital Library can be described as an online library, internet library, and a digital repository. Digital library includes online database of digital objects such as Book as a form of Text, Images, Audio, Video, Digital documents, that easily accessible through the internet (LIBRARYSCIENCE.IN, 2022). Various researches about Digital Library has been discussed by many researchers. As an example, a study by (Kato et al., 2021) conducted a review in the university level in developing the digital library. It reported that with the development of Digital Library's features and services, the efficiency of accessing online information by utilizing the digital library performance become an important issue that must be taken as a consideration. Thus, Digital library by integrating AR become an innovation in engaging students reading literacy. Hence, the objective of this study was to examine how Augmented Reality (AR) can make them more conducive and productive in improving students' reading quality by utilizing the digital library. By the conceptual research design, this paper discusses the innovation of digital library game based on augmented reality for realizing Indonesian golden age in 2045.

Methods

This article used conceptual research design particularly in conceptual models and specifically using conceptual description. Jaakkola, (2020) reported that conceptual research article with modal approach was designed to build a theoretical framework that predicted relationships between concepts. A conceptual model described a thing and identified issues that should be considered in its study, it described an event, an object, or a process, and explained how it works by uncovering previous models, outcomes, and possibilities related to

the principal construct. (Meredith, J., 1993 as cited in Jaakkola, 2020). Moreover, (Meredith, J., 1993) also strengthened that a conceptual model did not explain why things happened, it just discussed the relevant concepts and relations which described the phenomenon. Because this type of research is primarily descriptive in its modelling of an event or phenomenon. This conceptual model was well-structured by the diagram and chart, also the description is highly simplified.

Results and Discussion

Moving on from the above problems, the creation of a game library application (GARY): a digital library game based on augmented reality is one of the right innovations to be developed. Johnson, et al., (2013) in the New Media Consortium Horizon Project (2013 Higher Education Edition) provides a statement that games can be used to strengthen knowledge and skills in a learning environment. This is a new pedagogical technique in reaching the curriculum. Studies state that game-based learning can help students solve problems and think critically (Cozine, 2015). Interesting educational game design will increase students' desire to learn more. Studies show that gamification can influence students' attention, motivation, engagement, performance, satisfaction, and knowledge to increase (Alsawaier, 2018). GARY will later become one of the educative literacy development media so that it can help students increase their interest in reading. This game also includes learning elements such as finding librarian resources, finding articles/books and utilizing the library's text messaging service (Kozak, 2019).

This program will later form a Trimble SketchUp 3D model so that users feel comfortable and not bored with the visual appearance of this game. The GARY app will use the Unity 3D Game engine. In the early days of development, this game was a form of integration from Kinect devices in Unity 3D. The integration process is carried out through the Microsoft Kinect SDK media which is accompanied by the Unity 3D Kinect wrapper package (Hartono, et al., 2015). This is based on the main thing from games based on Augmented Reality that can detect user movements. But on the other hand, if there is a movement that is not in accordance with the character's control, then no movement will occur because the movement is not detected (Hartono, et al., 2015). For the user framework section, will use Box Colliders as a control and use the On Trigger (Enter), On Trigger (Stay), and On Trigger (Exit) functions in different scripts and tags.

The character of the players in a game must be considered. At GARY, will use the open source software make human as a character. This character is a finished character model and will be updated regularly with the Blender 3D program. Because GARY is a literacy-based game, this game will integrate aspects of both through fantasy and educational experiences.
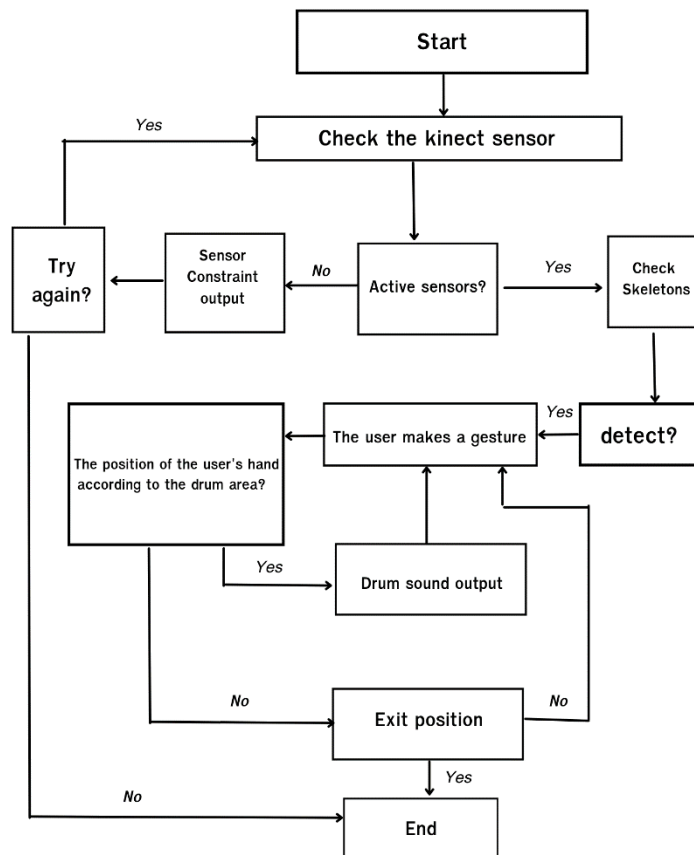
Figure 1: workflow of Wrapper as the application detector

GARY will later allow players to read and get a lot of information in accessing it. While in the game, users can access various kinds of digital books that have been provided. Games in GARY itself will be focused on the themes of history, general science, art, science, social science, and literature.

In terms of education, the players will be given a special mission to collect information scattered in various libraries in GARY. Apart from that, a game will also be provided in the form of questions related to books that the user has read where the questions will be displayed randomly and will not be repeated when in the same playing area because they have been arranged in a structured random card media.

For access from GARY, users only need to download the application that has been provided on their respective smart phones, then scan the existing QR code barcode and the application can be used according to the instructions provided. Here is a scheme of the GARY app.

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┌──────────────────────────────────────────┐
│   Download the application on the smartphone │
└──────────────────────────────────────────┘
                      │
                      ▼
┌──────────────────────────────────────────┐
│         Scan the QR code from GARY          │
└──────────────────────────────────────────┘
                      │
                      ▼
┌──────────────────────────────────────────┐
│              Play games and                 │
│   follow the instructions on the smartphone │
└──────────────────────────────────────────┘
          │                        │
          ▼                        ▼
┌────────────────────┐   ┌─────────────────────────────┐
│ Task 1: Solve a     │   │ Task 2: Solve unique puzzles │
│ puzzle on one of    │   │ each in the computer lab,    │
│ the floors in the   │   │ reference desk, Media lab    │
│ library             │   │ and study room in the library│
└────────────────────┘   └─────────────────────────────┘
          │                        │
          ▼                        ▼
┌────────────────────┐   ┌─────────────────────────────┐
│ Receive a digital   │   │ Receive another key (mail)   │
│ key (mail) on the   │   │ on the phone                 │
│ phone               │   │                              │
└────────────────────┘   └─────────────────────────────┘
          │                        │
          └───────────┬────────────┘
                      ▼
┌──────────────────────────────────────────┐
│  Arrange the keys that have been received   │
│  so that form words and allow players       │
│            win the puzzle                    │
└──────────────────────────────────────────┘
                      │
                      ▼
┌──────────────────────────────────────────┐
│               Receive gifts                 │
└──────────────────────────────────────────┘
                      │
                      ▼
┌──────────────────────────────────────────┐
│          Please rate the GARY app           │
└──────────────────────────────────────────┘
```
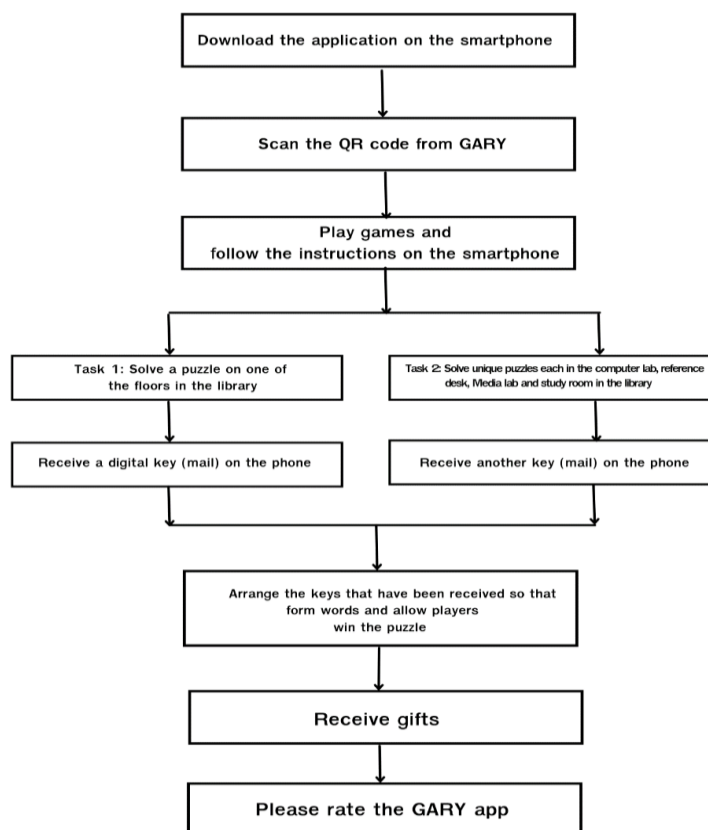
Figure 2: GARY app scheme

If all parties support this idea, methods will be further developed which will help increase the efficiency of GARY himself. If this idea is implemented, it is estimated that it will be able to help the nation in its efforts to develop a literacy culture in Indonesia with fun media. This is also relevant to previous studies from Cihak (2016) on evaluating Augmented Reality for elementary students with autism in completing a chain task and Bjekić et al (2020) who talk to solve problems in public policies, including education policy for the better education in the future.

Conclusion

From the explanations above, it can be concluded that GARY is an Augmented Reality-based library game application aimed to increase students' interest in reading literacy. GARY offered as an effective way in the process of developing reading literacy because this application is packaged in the form of an educational game. Moreover, to contribute on Indonesian Golden Age in 2045, the findings provide an opportunity to conduct a research and development of GARY and an experimental research on the impact of utilizing Augmented Reality for Digital Library in improving the reading literacy of students in Indonesia. Furthermore, in order to forge ahead to the empirical research, a myriad range of literatures need to be explored to obtain an insightful knowledge. Even though the present article is a conceptual article, it is expected that the effort helps in giving the supplement literatures for the reference of scholars as well as a significant impact to the policy makers in the field of education and teachers. This is also in line with previous studies.

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