

Hi World: The Virtual Book Learning Integrated Augmented Reality to Increase Knowledge of Covid-19 Prevention in The Learning Process Post-Pandemic Era

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Abstract—Education is essential for future sustainability; for example, education 4.0 can change the learning system into a digital system or what is commonly called an e-learning system. The Covid-19 pandemic is a tragedy that has grieved the entire population of the earth. All segments of human life on earth are disturbed, without exception education. It turns out that stress can contribute as much as 60% to all diseases. The objectives of this research include: (1) developing Augmented Reality-based Virtual Book Learning; (2) testing the feasibility level through learning media experts; and (3) testing the feasibility level through learning material experts. This study uses the R&D method with a 4D model consisting of 4 main stages, namely Define, Design, Develop and Disseminate. The results of this study include: (1) Augmented Reality-based Virtual Book Learning, which was developed called Hi World, is divided into six chapters of coronavirus learning materials along with further explanation videos, as well as a brief exclamation about maintaining health using the local language body accompanied by translations for providing psychological support for readers; (2) the feasibility level of Augmented Reality-based Virtual book learning media experts has an average score of 95%; and (3) the level of expert eligibility for Augmented Reality-based Virtual Book Learning materials has an average score of 91%.

Keywords—disruptive media, virtual book, education 4.0, learning media, educational innovation

1 Introduction

In this era, education is essential for future sustainability; for example, education 4.0 can change the learning system into a digital system or what is commonly called an e-learning system [1]–[3]. With education 4.0, it is necessary to prepare students for maturity to face this era so that later they will be ready to face various challenges. Theorists in education integrate technology both physically and non-physically into learning methods, thus creating education 4.0. Prior to the adoption of 4.0, we first recognized education 3.0. According to Jeff Borden, education 3.0 includes a meeting

of neuroscience, cognitive psychology, and educational technology, using web-based digital and mobile technologies, including applications, hardware, and software other things like that. Education 4.0 is far above that, and in some ways, the phenomena that exist in education 4.0 create a new revolution in the fourth industry (4 IR) or (RI 4) where humans and machines are aligned to find solutions, solve problems, and of course find possibilities [4], [5].

Not yet over the hustle and bustle due to the Industrial Revolution 4.0, suddenly we were surprised by the emergence of Disruptive Society 5.0. This concept appears in the “Basic Policy on Economic and Fiscal Management and Reform 2016,” which is a core part of the strategic plan adopted by the Japanese Cabinet. Lately, the discourse on the era of disruption has been widely discussed by education experts because it has changed the paradigm of people’s thinking and acting to maintain their lives. In the world economic forum, ten skills that must be possessed are formulated to face the super virtual society [6], [7]. The three highest skills needed are the ability to solve complex problems, critical thinking, and creativity. Mastery of the three primary abilities needed in the future is the responsibility of the world of education [8]–[10].

The world of education must provide provisions for students always to be ready to face the challenges of the times [11], [12]. Learners who are now in school are the owners of the future. Therefore, appropriate learning media are needed and can support students’ knowledge, one of which is smart books. In developing books, the Ministry of Education and Culture has started to innovate through Electronic School Books (BSE). However, the development of BSE is not optimized. This can be analyzed from the BSE product, which only digitizes printed books into PDF format, with the presentation of learning content limited to writing/text and image elements only. Therefore, it is necessary to conduct an in-depth study of the benefits of technology-based innovative books and how to develop a smart book development model that follows the characteristics of the technology-based media [13]–[15].

The development of technology-based textbooks needs to be developed as a consequence of the demands of the times. Public awareness of technology for education is also increasing. Parents and teachers are increasingly aware of the benefits of digital media to support Learner’s education and learning. Computer-assisted learning media in problem-based learning effectively improves students’ critical thinking skills [16]–[18]. This means that technology can present learning content in all aspects of behavior change, namely cognitive, affective, and psychomotor. These characteristics and advantages have the potential to develop exciting and easy-to-understand textbooks for students.

The development of the lifestyle of modern society as a result of the influence of technology demands innovation in the book industry. One form of innovation in printed books is augmented reality-based books. Augmented Reality is a technology that combines two-dimensional and three-dimensional virtual objects into a real environment and then projects these virtual objects in real-time. AR can also be defined as a technology that combines virtual objects in two dimensions (2D) and three dimensions (3D) into a real environment and then projects these objects in real-time. Apart from the emergence of Disruptive Society 5.0, it is undeniable that the Covid-19 pandemic has arisen at the end of 2019 [19], [20]. The virus is transmitted through droplets (splits of saliva) that are produced when an infected person coughs, sneezes, or exhales.

These droplets are too heavy and cannot stay in the air, so they quickly fall and stick to the floor or other surface [15], [21], [22]. There are at least 179,257,412 positive cases of the Coronavirus in the world, with 3,881,928 deaths. In Indonesia alone, as of July 21, 2021, 2,983,830 positive cases of Covid-19 have been confirmed, with a total of 77,583 deaths.

The Covid-19 pandemic is a tragedy that has grieved the entire population of the earth. All segments of human life on earth are disrupted, without exception education. Many countries have decided to close schools, colleges, and universities, including Indonesia. The crisis really came suddenly. Governments in any hemisphere, including Indonesia had to take the bitter decision to close schools to reduce people's contact massively and to save lives. However, an unexpected increase in the number of corona cases occurred in a short time and infected anyone regardless of age [23]–[25]. For this reason, governments in several countries have decided to implement a lockdown or total isolation or quarantine. According to data from the Indonesian Association of Clinical Psychologists (IPK), since the pandemic in March to August 2020, there were around 14,619 cases of psychological problems. Psychological disorders are conditions that affect patterns of thinking, feeling, mood, and behavior. Psychological disorders lead to mental disorders, namely behavioral or psychological symptoms that affect various aspects of life and the emergence of stress for people who experience them [26], [27]. Psychological impacts during the pandemic include post-traumatic stress disorder (post-traumatic stress disorder), confusion, anxiety, frustration, fear of infection, insomnia, and feeling helpless. In connection with facing the Covid-19 pandemic, anxiety needs to be appropriately managed so that it continues to provide awareness but does not cause excessive panic or lead to worse mental health disorders [28]–[30].

Stress can contribute as much as 60% to all diseases. One of the efforts that can be made to maintain, maintain and improve mental health during the Covid-19 pandemic is by managing stress or stress management. Stress management is where individuals control or regulate stress. The goal is for individuals to recognize the causes of stress and know the techniques for managing stress so that the individual is better at controlling stress in life so that, in the end, mental health conditions can be achieved. In the context of patient isolation, this is an example of controlled action, one of which is reading a book. According to a study from the University of Sussex, UK, reading can reduce stress by up to 68%. It is known, listening to music and walking can also relieve stress, but not as powerful as reading a book [1], [10]. Therefore, it is necessary to have an effective and fun book to deal with stress problems for Covid-19 patients during isolation, one of which is the Hi World book.

Hi World is a book that takes the theme of learning self-protection from the COVID virus accompanied by the use of regional languages and sign languages by relying on audio augmented reality technology. Augmented Reality (AR) is a technology that can combine two-dimensional or three-dimensional virtual objects into a real environment and then project them. The Hi World learning book is based on projecting markers on books into virtual Reality. The markers in the picture book will be captured by the mobile device camera, processed, and then an illustration of the building and related figures will appear. Regional languages are intended because local languages are considered easier for learners and the elderly to understand.

2 Methods

The research model used in this study is R&D research and development with a 4D model consisting of Define, Design, Develop, and Disseminate (Bakri et al., 2018). The following is an explanation of the development carried out; 1) define stage or also known as needs analysis stage; 2) the design stage includes constructing criterion-referenced tests, media selection, format selection, initial design; 3) the development stage includes expert (a technique for validating or assessing the feasibility of a product design) and developmental testing (a product design trial activity on the real target subject); 4) the dissemination stage includes Validation testing (products that have been revised and then implemented on the real target), Packaging (Packaging of developed books and applications) and Diffusion and adoption (dissemination of products so that they can be absorbed or understood by others and used in general).

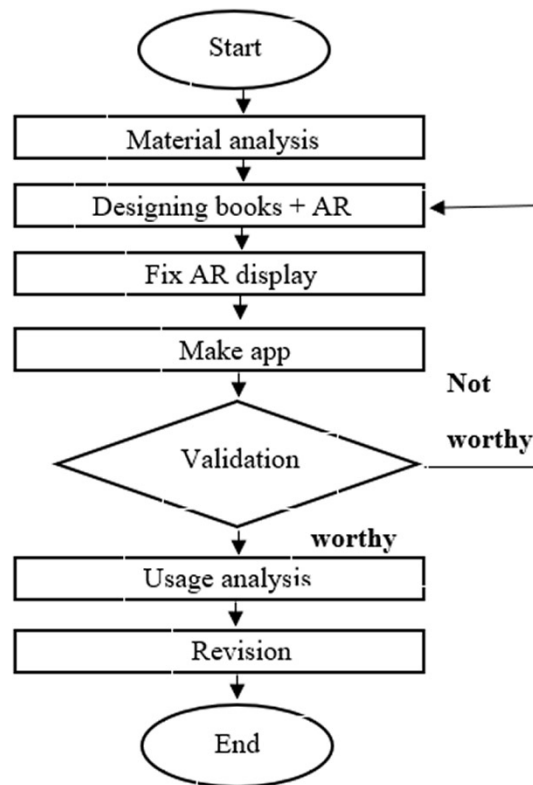


Fig. 1. Model design mindset developed for Hi World book development research

The four stages of development above are generally carried out according to the flow chart presented in Figure 1. First, this research begins by analyzing what materials are needed to accelerate the healing of Covid patients. Second, designing Augmented Reality-based textbooks, including book design, selecting markers, and creating 3D animations and simulation videos that learners want to add to the book. Third, print a

book and test the Augmented Reality display one to one. Fourth, improve the appearance of Augmented Reality. Fifth, make all the Augmented Reality design scenes into one android application with the help of Unity. If it is not feasible, then the learner has to repeat the second stage, while if it is feasible, it can be continued to the eighth stage. Eighth, revise the product and write a final report.

3 Results and discussion

3.1 Result

After going through the 4D research and development stage model, we got a product in the book *Hi World: Coronavirus Virtual Book with Integrated in Regional Languages for Child Covid Patients*. This book is generally divided into 6 chapters of coronavirus learning materials and further explanation videos. The follow-up videos are in the form of presentation videos made with PowToon and vlog videos made with the Reality application. In the video vlog, sign language makes it easier for deaf people to learn advanced videos.

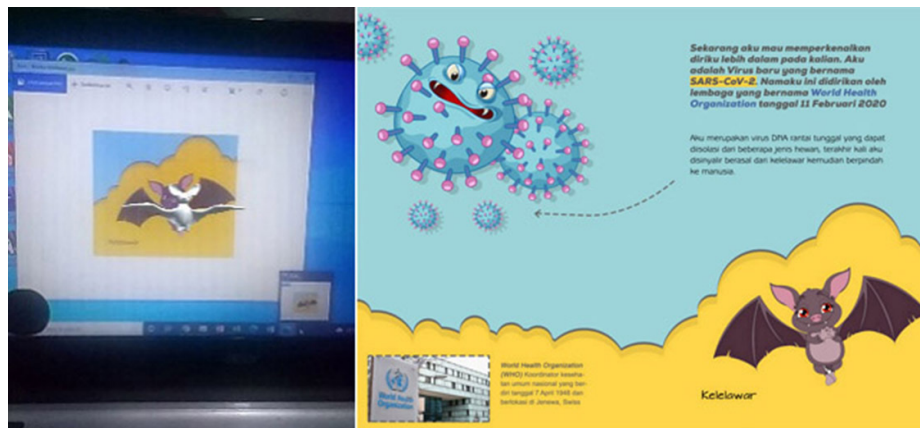


Fig. 2. Hi World book

Figure 2 shows the appearance of the developed product. The entire display of the book is made in full color to increase the level of interest of the reader. There is also a brief exhortation about maintaining health using the body of the regional language accompanied by translations to provide psychological support for reading. As for displaying AR, the learner must download the “Free Cakrawala App” application which can later be downloaded on the Playstore. Please note that in this development, not all images in the book can generate AR. Data collection for validation test and limited trial using a questionnaire instrument. A validation test was conducted on July 22, 2021, on the expert doctor. As the head of the Covid 19 task force at the State University of Malang and a lecturer in Visual Communication Design, State University of Malang. The data obtained from the results of the validation and readability test are presented in the following table.

Table 1. Material expert validation test data

No.	Aspects of Assessment	Percentage
1	Material suitability	92%
2	Material consistency	89%
3	Material writing	89%

Based on Table 1, the book developed was considered very good and followed the Coronavirus concept that was carried with an interpretation percentage reaching 92%. The book developed was considered very good and consistent in delivering the material. This consistency can be seen from the use of reference sources, appropriate images, and systematic writing, with an interpretation percentage reaching 89%. The developed book is considered very good with the use of appropriate language. The suitability of the language is seen from the ease of understanding, not multiple interpretations, and meeting the EYD rules, with the percentage of interpretation reaching 89%.

Table 2. Media expert validation test data

No.	Aspects of Assessment	Percentage
1	Book size	100%
2	Book cover layout	98%
3	Book cover typograph	93%
4	Book content layout	94%
5	Typography of book content	89%
6	Illustration of the contents of the book	95%
7	AR interfaces	93%
8	AR contents	97%

Based on Table 2, the developed book should have a larger size than B5 ISO to contain more book material with an interpretation percentage reaching 100%. The book cover layout developed is considered very good and has a proportional layout with an interpretation percentage reaching 98%. The developed book is considered very good with the use of proportional letters. The proportions of the letters in the book are assessed based on the combination of fonts used and not too much use of decorative fonts, with an interpretation percentage reaching 93%. The developed book has an appropriate composition. The suitability of the composition is seen from the placement of chapter titles. The proportional margin with the percentage of interpretation reaches 94%.

The developed book is considered very good with the use of proportional letters. The proportions of the letters in the book are assessed based on the combination of types of letters used, with the percentage of interpretation reaching 89%. The developed book is considered very good with the use of appropriate illustrations. The suitability of the illustration is seen from the ability of the illustration to reveal meaning with the percentage of interpretation reaching 95%. The developed application is considered very good with the use of a well-organized interface menu. The suitability of the language is seen from the ease of understanding, not multiple interpretations, and meeting the EYD rules, with the percentage of interpretation reaching 93%. The developed application is

considered very good with the appropriate use of AR. The suitability of AR content is seen from the suitability of AR media with the material presented with an interpretation percentage reaching 97%.

4 Discussion

Based on the data presented in the table, the average value of expert validation is obtained, which indicates that the Hi World book is worthy of being called an innovation book because it has met the criteria for an innovation book. Several aspects affect innovation: novelty, reinvention, distinctiveness, relative benefits, appropriate, complex, and observable. From this aspect, Hi World is an innovative book about the Coronavirus where. This book is an update on the previous Covid learning books. The update aspect is that this book has 16 popular regional languages in Indonesia, which has not been found in previous Coronavirus learning books. The concept of augmented Reality and barcode scanning to the explanation video that was carried was a reinvention that previously existed but was developed in the Hi World book in an interesting form [31]–[33].

Hi World is a book that has been validated so that it is suitable for use for Covid-19 patients. Several things exacerbate the spread of this virus. Understanding public literacy in receiving hoax news about Covid-19 is one of them. Many people believe and share in circulating hoax information, causing efforts to break the chain of Covid-19 spread cannot be carried out properly because people are easily influenced by hoax news that causes violations of the Covid-19 health protocol. On this basis, Hi World presents the latest material by the government's recommendation, namely 7M, which has been officially validated by an expert doctor. What 7M means are wearing masks, washing hands, maintaining distance, avoiding crowds, limiting mobility, limiting interactions, and giving vaccines to the public to control the Covid-19 pandemic [14], [28], [34].

The Hi World book consists of 6 main chapters containing covid-19 education starting from the basics. These chapters contain various things, including (1) Definition of Covid-19; (2) Causes of Covid-19; (3) the symptoms that arise in the patient; (4) Enforcement of diagnosis and supporting examinations; (5) Treatment; (6) Prevention in the form of 7M. There are also fun facts related to the world of health and interactive games in the book to reduce stress and depression levels. An imbalance in the performance of both sides of the brain can trigger depression. Furthermore, he stated that playing games could reduce stress levels, improve mood, and balance the right brain and left brain [35]–[37].

The Hi World book has a full-color display with various colors on each page to increase interest in reading and meditation. Decades of research show that color affects our thoughts, actions, health, and even our relationships with other people. Ancient cultures in Egypt, China, and India, built large rooms where patients are bathed with light filtered through several stained-glass panels or windows and has been shown to restore tired and diseased bodies. While some of the theories behind color therapy remain scientifically proven, research has shown that colors can profoundly affect mood and often have measurable effects on human emotional and physical behavior [38]–[40].

In addition, the remarkable thing that happens to the heart rate and brain waves when coloring is a good sign that therapy can help to get benefits like meditation.

From a psychological perspective, the psychological impacts during the pandemic include post-traumatic stress disorder, confusion, anxiety, frustration, fear of infection, insomnia, and feeling helpless [41]. It is a form of self-defense mechanism or a sign that there is a threat that we face. However, if it is excessive, it will negatively impact a person's physical condition. The relationship between Covid-19 infection and symptoms of psychological disorders is quite complex. Covid-19 patients commonly experience anxiety, insomnia, depression, and post-traumatic stress disorder (PTSD). However, this assumption is still being studied further about the impact of coronavirus infection on physical and brain function. The Coronavirus can cause delirium, anxiety, depression, mania, insomnia, and memory problems. Any virus that attacks the central nervous system causes hypoxic brain injury or affects physical function as well as mental health [23], [42], [43].

Stress can contribute as much as 60% to all diseases. In terms of social interaction, stigma causes patients and families to experience isolation, rejection, bullying from people offline and online (social media). Stigma can also have an impact on discriminatory behavior from others. Therefore, it is proper to stop the stigma against Covid-19 survivors. Simple support for Covid-19 survivors means a lot. All parties, from the government to elements of society, can work hand in hand to overcome this complicated problem [44], [45]. Appropriate support will significantly help individuals to meet their needs when experiencing challenging conditions. Individuals can find effective ways to get out of problems and feel valued and loved, which will increase confidence in themselves to live a better life. Social support for patients, Covid-19 survivors, and families can reduce the impact of negative stigma given by the community and accelerate the recovery process for patients. As for the Hi World book contains calls for the spirit of maintaining health, which can be a patient support system where individuals really need this to help reduce the effects of loneliness during the pandemic because isolation affects mental health and can improve the quality of individuals during the Covid-19 pandemic.

5 Conclusion

In this development research, several conclusions were drawn. First, Augmented Reality-based Virtual Book Learning, which was developed called Hi World, is divided into 6 chapters of coronavirus learning materials, further explanation videos, and a brief exhortation about maintaining health using the body in regional languages with translations to provide psychological support for readers. Second, the feasibility level of Augmented Reality-based Virtual Book Learning media experts has an average score of 95%. Third, the feasibility level of Augmented Reality-based Virtual Book Learning material experts has an average score of 91%.

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