

Corona Laron: A 2.5D Mobile Game Advocating COVID-19 Safety Protocols and Mitigation Strategies

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Abstract—Governments and health agencies around the world have been at the forefront of managing the COVID-19 pandemic. To control the spread of the outbreak, mandatory safety protocols have been put into effect. Despite the continuous development and strict enforcement of these preventive guidelines, non-compliance with these mandatory safety protocols has been reported. Getting the message to the public is one of the key challenges in convincing people to follow mitigation policies. In this study, we employed the media of video games to advocate for COVID-19 safety protocols. We developed a video game called “Corona Laron” that features microgames with action gameplay playable on a mobile platform. Our video game concentrated on several preventive measures such as physical distancing, hand washing, wearing face masks as well as basic knowledge about the virus using in-game multiple choice questions. To our knowledge, this is the first video game dedicated to the COVID-19 outbreak and the mandatory safety protocols. In a time when many people play video games to survive their current situation, the Corona Laron game is a strategic example of using and maximizing this form of media for a more noble purpose.

Keywords—COVID-19, Mobile Game, Microgame,

I. INTRODUCTION

The novel coronavirus disease (COVID-19) has been a topic of interest since it arrived in 2019 [1-3]. With its lethal effect on human health, many people have experienced existential anxiety and trauma. This distressing situation has manifested well in the rapid escalation of hospital visits [4], disruption of business [5], a decline in tourism demand [6], mandatory school closures [7], economic crises [8], and other similar issues. Most importantly, the unstoppable growing number of COVID-19 cases demanded governments and health departments devise safety measures and mitigation policies (e.g., frequent hand washing, wearing of face masks, nationwide lockdowns, physical distancing, and others). Inevitably, the consequential extensive changes to the daily lives of many people have likewise triggered a wave of mental health issues that should be addressed [9-11]. In addition, the isolation that has arisen from preventive measures resulted in unpleasant and unfamiliar experiences that entails a withdrawal from usual everyday routines. It is evident from what people share on social media that have negative sentiments regarding these changes as well as mixed emotions (sadness, fear, anger, and surprise) that exacerbated the impacts of the COVID-19 pandemic [12].

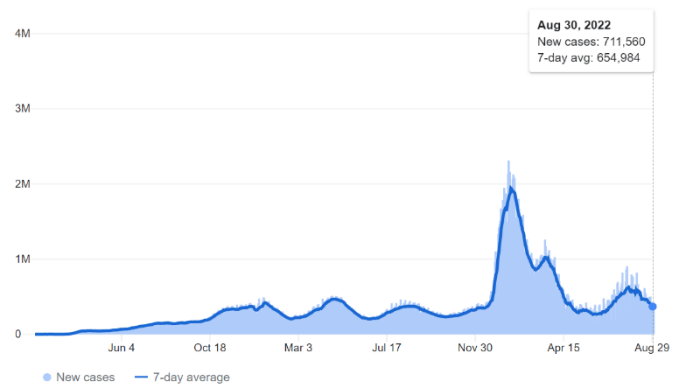


Fig. 1. Daily new confirmed cases of COVID-19 worldwide.

Despite the continuous development and strict enforcement of preventive guidelines, there is still a large part of society that does not comply with the mandatory safety protocols [13-16]. It has become a crucial mission to convince people to follow these guidelines that help in protecting everyone. Getting the message to the public is one of the major challenges in persuading people to adhere to mitigation policies. In this study, we used the media of video games to advocate for COVID-19 safety protocols and mitigation strategies. We developed a series of microgames and packaged them into a single mobile game to immerse players in a game world with a single narrative. The COVID-19 pandemic is still ravaging and continues to spread (see Figure 1), which is why people must continue to follow the guidelines provided by health agencies and governments. Our video game concentrated on numerous preventive measures such as wearing face masks, physical distancing, hand washing, and basic knowledge about the coronavirus using in-game multiple-choice questions. To our knowledge, this is the first video game dedicated to the COVID-19 outbreak and the mandatory safety protocols and policies. We believe that video game has the potential in distributing essential information and connecting with more people since gaming has been reported as a coping mechanism during the pandemic [17]. The educational benefits of video games are also expected to aid in educating people about COVID-19-related information [18]. This study contributes to the video game research and COVID-19 literature by intertwining both concepts in one study.

II. BACKGROUND OF THE STUDY

A. Gaming as a Coping Mechanism

During the COVID-19 pandemic, people employed different strategies to cope with anxiety and stress [7, 19]. Typically, the coping mechanisms employed by people are classified into two types: problem-focused and emotion-focused coping. Problem-focused coping entails performing an action that alters a stressful event while emotion-focused involves formulating a strategy to regulate one's emotional state. In recent years, video games have been explored as a lifeline and positive outlet during difficult life experiences [20]. For instance, gaming-related studies revealed potential emotional benefits of playing video games, particularly in dealing with stress and promoting recovery [21-23]. In the age of the COVID-19 pandemic, gaming has also been reported as a major coping mechanism for people who were isolated at home [17]. Thus, video games can be a useful tool in educating people concerning the needed compliance with safety measures.

B. Practical Applications of Video Games

Early research on video games has concentrated on gaming as a resource of entertainment and leisure. Playing video games was stereotypically viewed as a pastime rather than a pragmatic tool [24]. As the industry and research go forward, the practical applications of video games have started to emerge. Numerous sectors recalibrated video games and instituted new media that can elicit meaningful experiences. For instance, an action role-playing video game was purposely designed and developed to propagate awareness of various societal issues [25]. Each issue is represented by a monster (poverty = stray dog) and the beast chaser (playable character) must defeat it using techniques that are applicable as a solution in real life. Another example is the environmental video game to encourage recycling and inculcate waste segregation behavior [26]. These video games are proof that this form of media can be utilized for practical purposes.

C. Mobile Gaming in the Modern Era

Applications purposely developed for mobile devices are an exceptional example of how electronic communications and the entertainment industries converge. In this new domain, mobile gaming has become part of modern culture and a popular form of entertainment and leisure [27]. In the era of smartphones, the revenue share of mobile gaming has developed uninterruptedly and become the largest fragment of the video game industry by 2018 [28]. Since then, researchers have been interested in how mobile games fit into the continuously evolving society and the various sectors within it [29, 30]. The continuous rise of mobile technologies has consequently transformed video games into a burgeoning medium that has various functional applications. In the pandemic era, video games were fused into mobile learning to form a mobile game-based learning product [31]. Following this example, it was realized that this game variation is an ideal educational tool during the COVID-19 outbreak. Nevertheless, there has been no video game yet devoted to advocating safety protocols and mitigation strategies to lessen the transmission of the virus. This deficiency opens an opportunity to develop such a mobile game to further advance the video game literature.

III. MATERIALS AND METHODS

A. Requirement Analysis

With the mobile game proposed to be implemented only on the Android platform, one operational issue that is considered is its compatibility with different mobile brands because there are possibilities of players having an outdated operating system that may cause failure to launch the mobile game. Another potential issue that may arise is the incompatibility issue. Mobile phones these days come in various screen sizes and the resolution may be considered to be the problem and may not launch the game.

The target platform for this game project is mobile since the majority of gamers own a smartphone. Mobile games can easily be accessible to download and play anytime, anywhere. In terms of the game engine and assets, we selected *Unity* and *Autodesk Maya*. We also used *Adobe Illustrator* and *Adobe Photoshop* for the sprite models and game interface. For sound assets, we used *Audacity*. All technical requirements are presented in Table 1.

TABLE I. TECHNICAL REQUIREMENTS FOR DEVELOPMENT

Components	Minimum Requirements
Hardware	
Processor	Intel i5 2.1 GHz
Memory	8 Gigabytes (GB)
Storage	At least 100 GB HDD
Graphics Card	Intel UHD Graphics or Higher
Display Size	Greater than 24 inches
Software	
3D Modeling	Autodesk Maya 2020
2D Concept Art	Adobe Photoshop
Game Engine	Unity
IDE	Microsoft Visual Studio
PC Operating System	Windows 10
Mobile	
Operating System	Android 8.0 Oreo or Higher
Memory	At least 1 GB RAM
Storage	At least 100 MB
CPU Speed	Quad-Core 1.6 GHz or Higher
Screen Size	Greater than 5 inches

B. Project Design

Corona Laron is a 3D casual game for mobile devices that disseminates basic information about COVID-19 and promotes awareness of mitigation strategies and safety protocols. Players take control of a fictional character of a healthcare professional who heals patients through COVID-related minigames. In terms of game genre, Corona Laron is categorized as a casual, single-player, microgame with a combination of various sub-genres for the minigames. The idea behind the application of a microgame concept is that the game has minigames with different themes to engage players (e.g., adventure and platformer genres). With our review of mobile games, we decided that our video game is only playable on a mobile platform. Finally, according to the ESRB's rating guide, Corona Laron is categorized as "Everyone 10+", which means it has content that is suitable for ages 10 and older. The game contents may portray cartoons, mild language, fantasy or mild violence, and minimal expressive themes.

The video game consists of three (3) levels consisting of two (2) phases on each level making the levels a total of six (6) stages for the player to play on. Players take control of Doctor Johnny as they guide him in treating every patient he encounters. Most players have a unique ability called “*gamer instincts*”, in which they can predict how most games are designed to be completed. To avoid this scenario, we relied on randomization following the concept used in another mobile game [32]. The core gameplay is also composed of two (2) phases: the *traversal phase* and the *operational phase* to guarantee randomization.

C. Project Development

To guide our project development, we followed an iterative approach using Agile methodology (Figure 2). In this model, we developed the project in a series of iterations called sprints. The execution of these sprints was also revised to foster cooperation and teamwork. According to the concept used in education [33], an effective cooperative environment demands the structuring of positive interdependence and individual accountability. We also distributed a product backlog, which is a list of prioritized tasks and game requirements for each member of the team. With this approach, we were able to distinguish bugs and errors and meet the output expectations as early as possible. This methodology is the most suitable model for a project with a short timeframe.

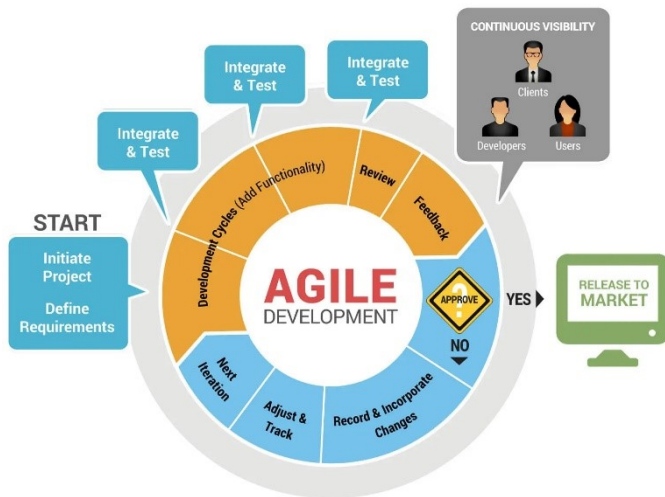


Fig. 2. Agile Development Methodology.

D. Game Evaluation

For our game evaluation, we used a quantitative technique. We set up an online survey form and posted the link on forums and other social media networks. For this phase, the main goal was to gather feedback and assigned players as co-designers. In a participatory design method, all stakeholders are involved in most of the stages of the project lifecycle. In another study, this approach was used to co-design a learning analytics dashboard and was found to be very useful in software development [34]. In the final game evaluation, we used the convenience sampling technique. Our target sample includes healthcare professionals since their expertise and experience are necessary (e.g., how to handle COVID-19 patients). It also includes determining what game aspects to consider, how to translate healthcare practices into gameplay, and the overall evaluation of the video game.

IV. GAME DEVELOPMENT AND EVALUATION

After careful deliberation with the project members and the experts we interviewed for the game development, we came up with various minigames such as the following:

Falling Through – In this minigame, the doctor visualizes a medicine going through falling platforms to cure the patient.

Disco Fever – In this minigame, the action and movement of the doctor must match the rhythm of the music. When it does not, the doctor will trip and fall. The doctor has to collect vials of medicines all over the hospital room.

Cough Drop – In this minigame, the doctor must utilize a stethoscope and search for the location of the sound.

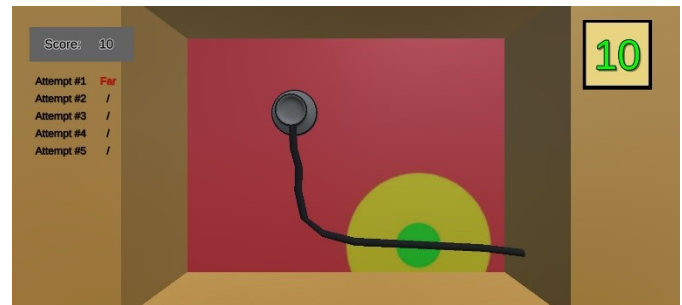


Fig. 3. Cough Drop Minigame.

Concoct a Medicine – In this minigame, the doctor solves a puzzle where there are tubes that are part of an IV bag where the liquid has to go through each tube to connect to the end of the bag and into the patient’s arm to let them heal.

Med & Seek – In this minigame, the doctor must transport medicine through a maze and hide it from other viruses present inside a patient. The medicine should be delivered safely to the *Mother Virus* to end all other viruses inside the patient’s body.

C-Virus Agony – In this minigame, the doctor is presented with a rhythm game that tells a story about the virus.

Healing Towers – In this minigame, the doctor visualizes healing towers that convert the viruses that are flowing through the patient’s body and converting them to something good so that the viruses will no longer traverse inside the patient’s body.



Fig. 4. Healing Tower Minigame.

Down the dark hatch – In this minigame, the doctor must traverse a dark maze room. The medicine should be given to a patient for them to be treated temporarily without vaccination.

Good ol' Fashioned - The visualization of Antibiotics that are killing the bacteria inside the patient's body in a good old-fashioned way of Hacking and Slashing. The antibiotics hack and slash their way through hordes of viruses to cure the patient.



Fig. 5. Good Ol' Fashioned Minigame.

Seek the hidden C-Virus – In this minigame, a hospital is presented that is full of sick patients. The doctor must locate the hidden patients who are COVID-19 positive, and isolate them to avoid spreading the infection to other patients.

Catch the Meds! – In this minigame, the doctor must catch the falling pills and medicine to acquire points.

Do you know the 'Rona? – In this minigame, the doctor is tasked with asking patients about basic COVID-19 information and the corresponding safety practices. A multiple choice type of assessment is inbuilt into the video game.

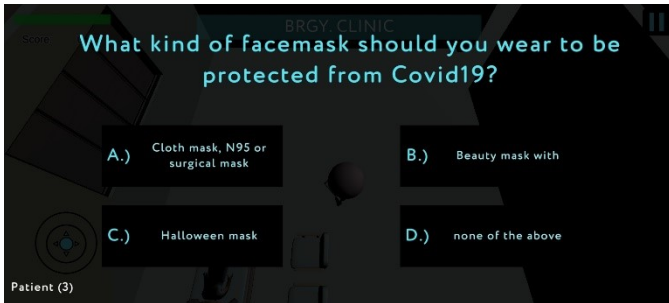


Fig. 6. Inbuilt Multiple Choice Assessment.

After co-designing the first game version with experts, we then asked players to evaluate our video game. We participated in a virtual open house event where people attended to play new video games. In this event, we demonstrated and discussed our prototype and then asked attendees to play it before evaluation. This event was held on October 28, 2021, using Discord.

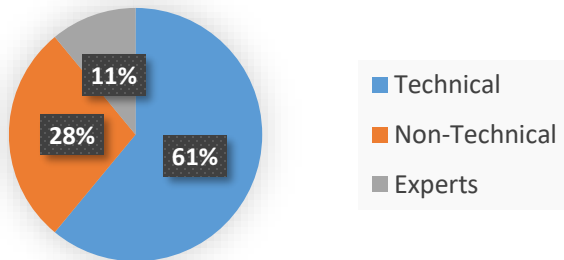


Fig. 7. Frequency Distribution of the Respondents

The majority of the respondents of the survey whose ages ranged from 19 to 28 years old were information technology students ($n = 22$, 61.11%). These respondents are classified as players. Meanwhile, the non-technical respondents were from outside the academic institution and classified as non-players ($n = 10$, 27.78%). Finally, the remaining respondents were the project clients who are classified as subject experts in the field of medicine ($n = 4$, 11.11%). The questionnaire they answered was composed of 20 questions divided into five criteria.

TABLE II. GAME EVALUATION SCORES

Criteria	Mean	Interpretation
COVID-19 Related Questions	4.49	Strongly Agree
Gameplay	3.95	Agree
Aesthetics And Graphics	4.33	Agree
Audio	3.71	Agree
General Feedback	4.19	Agree
Total	4.13	Agree

Table 2 shows the summary of the overall results of all game criteria. The first criterion evaluated the players' perception of the COVID-19 era. This criterion received the highest and the only rating with a 'strongly agree' interpretation. The rules and mechanics were judged through the gameplay criterion. Players agreed that the gameplay used in the study was acceptable. The aesthetic and graphics also received an agreeable response. This rating was attained through the constant revision of 3D models. Although it obtained the same interpretation, the audio criterion received the lowest rating. One potential reason for this score was that we only utilized free music files. Finally, in the general feedback criterion, players agreed that the response they were looking for while playing was easily available.

V. CONCLUSION

In this study, we developed a mobile game that advocates compliance with COVID-19 safety and mitigation procedures. The conception of this video game was driven by a large part of society that does not comply with the safety protocols necessary to avoid the spread of the virus. In a time when people look for techniques to cope, the availability of video games that combine entertainment with the information needed by the public makes this study significant. In turn, this study likewise contributed to the evidence of practical applications of video games. Likewise, it points the spotlight to video games as a tool for achieving the goals and missions attached to the gameplay mechanics. Lastly, our study participates in the growing literature of video games that go beyond the core purpose of entertainment rather than a niche activity. We conclude that the video games can be utilized as a creative tool for a variety of positive purposes.

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