SERIOUS VIDEO GAME TO PROMOTE EARTHQUAKE PREVENTION IN CHILDREN

ABSTRACT

In Mexico, since 1990, the National Seismological Service has reported various earthquakes, in some cases they usually imperceptible, it doesn't ensure that the population cannot be injured, therefore, it is important to keep the entire population informed and prepared in the event that is presented an actual event.
This project will present a proposal for a serious videogame with the intention of bringing the young public, between nine and twelve years old, closer to earthquake prevention in a playful way through a narrative based on the domain of earthquakes. This videogame will be developed with de Godot tool, using as the main source of information the research project "Estrategia para incentivar la cultura de prevención ante sismos en la población infantil de la Ciudad de México" developed by the students of the master's degree in Information Design and Communication [1].
The videogame will pose scenarios of a elementary school, in each of the challenges will be presented simulating real situations with the intention that the player avoid getting hurt and manage to reach to meeting point safely.
In the previous works related to the domain of information on earthquakes will be shown along with details that the game development tool has and the phases used throughout the project to achieve the objectives set and the details of the videogame. .This is part of the research project called Personal Risk Management System Based on Autonomous Agents (Key DCCD.TI. PI-64)[1]

KEYWORDS

Earthquakes, prevention, serious videogame, children

1. INTRODUCTION

1.1 Motivation

Information on earthquake prevention can be quite difficult for children to understand, as most media tend to target an adult audience. Many occasions texts and images are used to communicate the message, they are not always suitable or attractive for a younger receiver.
Before society, video games have had entertainment as their main function, so many people do not believe that they can provide some learning to those who practice it. However, because they have become popular in recent years, it is sought that from the so-called serious games, education is encouraged, the development of skills and the solution of problems are helped. Serious video games can be used as a tool designed to transmit knowledge, since through these medium activities can be carried out that allow receiving and processing information on a topic and increase the player's motivation to learn. For this reason, it has sought to implement video games that include information to promote earthquake prevention in children. This project focuses its communication premises towards a younger audience, between 9 and 12 years old, according to the research project "Strategy to encourage the culture of prevention against earthquakes in the child population of Mexico City" developed by MADIC students [1] in order to design recreational activities that meet the needs of the children in seismic situations and the necessary message is transmitted properly.
The information provided to children on earthquake prevention may be considered as little and inadequate according to what was collected by MADIC students.

1.2 Problem

Due to the little information provided to the population about prevention protocols, sometimes it is inadequate for children, causing the risk of a real event to increase. Serious games, as opposed to commercial games, aim to disseminate entertainment-mediated knowledge that stimulates a memorable experience [2]. The proposal of a serious video game aims to transform information about earthquakes

into a narrative that is attractive to children through gamification, in which critical and innovative structures can be introduced to encourage prevention of this phenomenon in a video game.

1.3 Previous work

This section will delve into the current state of the previous work related to the project Simon Sismon: serious video game to promote the prevention of earthquakes in children. Whit this you will have a greater/better understanding of how videogames have been used to knowledge. Below are some video games developed with this type of design about earthquakes and will be used as a reference for the development of the earthquake game for children in 3D. There is a limited number of video games related to disasters caused by natural phenomena, then two categories are established according to the zone of development, western and eastern by the difference in language and the difficulty of obtaining information.

1.3.1 Tanah

Tanah is an educational game aimed at a minor audience, in which fun way information is presented about evacuation plans, home preparation, protocols for an earthquake or tsunami, as well as explanations of the function of tsunami alarms, evacuation routes, location of safe spaces, among other topics. From all this information presented, questions are asked to reinforce what has been learned within each scene.

Figure 1. Tanah game against earthquakes and tsunamis.

Source: https://apps.apple.com/us/app/tanah-contra-los-terremotos-y-tsunamis/id1122919148

1.3.2 Baby Panda Earthquake Safety 1

It is a game designed for children, it is divided into two sections; The first shows what it is for to prepare a backpack of life and what objects you should carry, while describing what they are for. In the second section, they tell young children short and precise stories about how to do in the event of an earthquake to get safe. Each of these recommendations are presented in different scenarios, at home, at school, a supermarket and the street, the player must follow the instructions and respond correctly to get out unscathed.

Figure 2. Baby Panda Earthquake Safety 1.

Source: https://play.google.com/store/apps/details?id=com.sinyee.babybus.earthquake&hl=en_US

1.3.3 Stop Disasters

Stop Disasters is an online game created by the United Nations Office for Disaster Risk Reduction. Its main objective is to help understand that the implementation of prevention measures and the reduction of vulnerability are key to saving the population and reducing the impact of disasters. The platform shows us the different types of catastrophes. The player must select some geographical area, where children will build villages and cities with the available resources, so that these are in safe areas [3].

Figure 3. Stop Disasters.

Source: https://www.stopdisastersgame.org/#1540393337878-fb4ab577-b2c2

1.3.4 Treme-Treme

The Treme-Treme game was created jointly by the Department of Civil Engineering and the Department of Computer Science of the Higher Technical Institute, Dreamstudios and Flaidisaine are three of the institutions involved. It is part of the European project UPStrat-MAFA[2] in urban disaster prevention strategies [4]. Through the character, activities will be carried out within the different levels in order to teach the concepts and prevention measures in a fun way, in such a way that the player manages to become aware to prepare for real situations of earthquakes and tsunamis. The activities to be carried out are based on preparing an emergency kit; and differentiate the safe and dangerous places inside and outside the home, making correct use of the kit in the different scenarios.

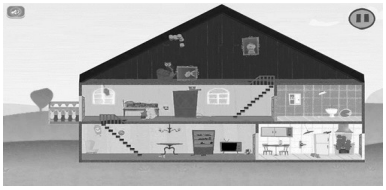

Figure 4. Tremble-Tremble.
Source: https://treme-treme.pt/en/The-Game/

1.3.5 地震逃生 (earthquake escape)

This video game aims to put the main character in a safe zone inside the house when an earthquake happens before the end of the 11-second limit to safety.

Figure 5. earthquake escape.
Source: *https://store.steampowered.com/app/1720060/_/?l=schinese*

1.3.6 震度 6 強体験シミュレーション (Seismic intensity 6 strong experience simulation)

It is a role-playing game about the preventive measures and evacuation actions that must be taken in the event of an earthquake of magnitude 6 or higher on the Richter scale.

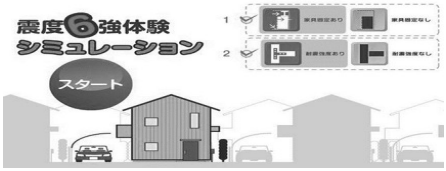

Figure 6. seismic intensy 6 strong experience simulation.
Source: https://www.bousai.go.jp/simulator/shindo6/aa_0000000.html

1.3.7 居家瓦斯安全小尖兵 (Home shockproof small "answer" person)

It is a game in which questions must be answered about what action to take to prevent earthquakes.

Figure 7. Home shockproof small “answer” person.
Source: https://www.tfdp.com.tw/earthquake_answer/

1.3.8 地震模擬 (earthquake simulation)

The game shows through a simulation how to prepare before an earthquake and what the immediate response to them should be, by organizing an emergency kit and paying attention to the indications on how to protect yourself.

Figure 8. earthquake simulation

Source: https://www.tfdp.com.tw/nfa_earthquake/index.php

1.3 Contribution

The mastery of earthquakes allows to generate a narrative for the development of a serious videogame on prevention where the interest of children about the subject can be increased and with it, in the long term, contribute to the development of a culture of prevention.

2. PROJECT DEVELOPMENT

To develop the project will be divided into four stages, which will be briefly described.

2.1 Initiation stage

In the first stage, the following activities will be carried out: research of the previous work and part of the definition of the video game. The diagram shown in Fig. 9 presents in a general way the behavior and conditions followed by the video game system. When starting the game, the main menu will be displayed, when choosing the "start" option, the characters that can be chosen will be displayed on the screen and then start the game in the first level. In case the three lives provided to the player are lost, the game will return to the beginning of the level in which it remained. If in the main menu you choose "options" you will be directed to the screen where you can modify if you want to activate or deactivate the sound, and finally if you choose the option "exit" the program will end.

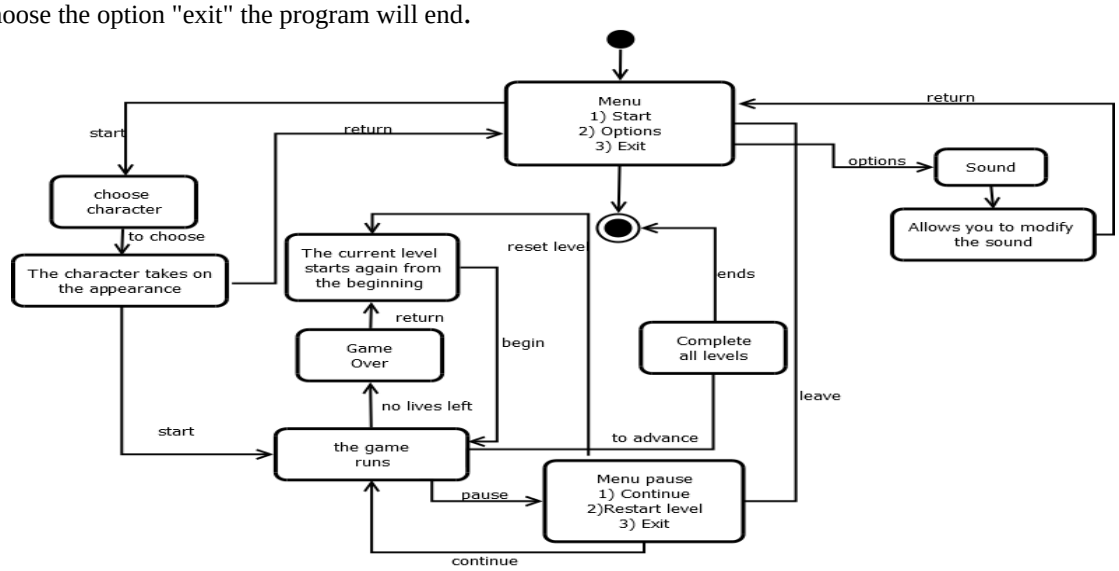

Figure 9. *State diagram of the video game Simon Sismon*

2.2 Elaboration stage

In the second stage the basis for the development of the video game will be made. The activities that are planned in this stage are: develop the narrative, design the interaction diagrams, design the scenarios for the different levels and specify the functions of the characters.

2.3 Construction stage

The implementation of the video game on the chosen platform will be developed during this same phase, with the elaboration stage the activities of the interactions between the characters and scenarios will begin. It will help create each of the levels that the game will have. In the development of the algorithm, each of the

functions previously assigned to each character will be implemented, and the different parts that make up the video game will be tested.

2.4 Transition stage

Finally, in the transition stage, an update of the previous work will be carried out, final tests of the video game will be carried out, in addition to the drafting of the final document. In Fig.11 each of the stages mentioned above is observed to illustrate the time intervals in which each of the activities will be carried out.

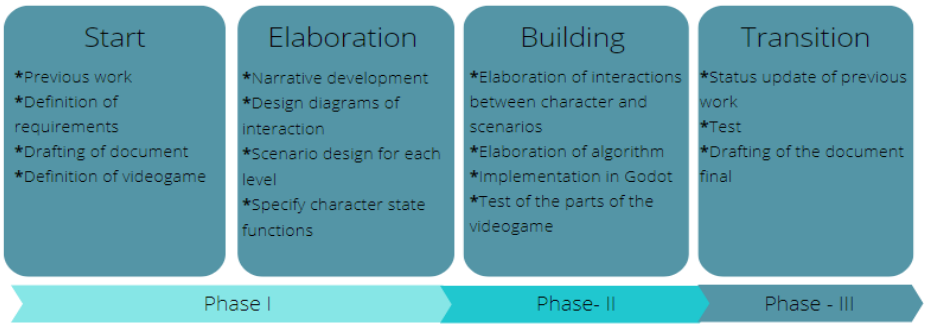

Figure 10. Stages of project development.

2.4 Advances

Now it has been possible to make advances on the narrative of each level, the functions that each character will perform, the design of some levels and the design of the characters. Figure 11 shows the character and a scene within a level. On the other hand, figure 12 shows the information about the signal when it encounters it.

Figure 11. Main tutorial scene

Figure 12. Videogame signage

3. CONCLUSION

The population is vulnerable to the natural phenomenon of earthquakes, so it is sought that with the help of a serious video game facilitate the recognition of prevention protocols from an early age. Only in this way will it be possible to deal with this type of emergency while reducing the vulnerability of the population, and above all, of children.

The development of a serious videogame on prevention where you can increase the interest of children about the subject and contribute to the development of a culture of prevention, considering that one of the limitations of the videogame does not address all issues related to prevention against other natural phenomena.

However, the project is still in the process of development and as future work is to finish implementing scenarios and functions on the last two levels, solve details about the animations of the character and the functions of the pause menu of the video game.

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