Development of Game-based learning Application for First Aid Awareness

Marjory Faye DANDO, Princess Karen DE GUZMAN, Evander TAMPOS & Francis BALAHADIA*

Laguna State Polytechnic University – Siniloan Campus, Philippines
balahadiafrancis@gmail.com

Abstract: First aid skills are highly essential and a must-learn basic ability by everyone. Accidents can happen anytime in anywhere, that's why first aid is needed. But, due to lack of knowledge, practice, courage to do basic first aid techniques, every year there could be 150,000 deaths. This study aims to develop a game-based learning focusing and incorporating application and practices of first aid for information dissemination of proper emergency first aid and proper instructions on how to handle a situation and act on the situation when they encounter minor accidents. The system also apply game based learning approach with Gale Shapley Algorithm which use to the corresponding for taking input as a preference outline and outputs a matching of different objects needed in the accident. The application will educate and instruct the users on how to perform proper first aid where it has an interaction between the user and application, while the users experience to acts like in a real world. The proposed system can apply Agile Model for the development of the system in which have a consistent user review or comments, non-stop development and the capacity to adapt incorporate changes are emphasized to significantly reducing project risk. After the developmental stage, the researchers will evaluate using experimental design to measure the effectiveness of the system to assess if the students learn from the system. This study can be possesses significant potential for increasing students learning in term of some accident occurrence and enhancing their learning effectiveness using game based learning. It can be develop and implemented as teaching material in education especially in health related units or courses.

Keywords: First Aid, Health, Mobile Application, Game-based Learning, Experimental Study, Gale Shapley Algorithm

1. Introduction

Health is important in everyone's life. It is the state in which a person is not suffering from any illness and also the condition of his body to resist illness (WHO, 1946). Health problem occur at any place and at any time, it is best for a person to have some basic knowledge on what to do, whether he himself is the person who needs treatment or somebody else that may be able to assist the victim (Lingard, 2002). First aid education and ability or practice is a personal must for in some point of everyone's life, the knowledge may be needed. It teaches a person who suffers with an illness or injury as well as other persons near or with the victim what to do to avoid the situations from getting worse until medical help arrives (IFRC, 2011).

About 20 million and 50 million individuals are injured or endured non-fatal injuries due to road accidents (WHO). The Philippine Statistics Authority report that in the year 2015 the Philippines occurs 10,012 deaths due to road traffic injuries. (WHO, 2006).

According to Guardian (2010) approximately 150,000 people per year died because first aid was not widely known. On this, Joseph (2014), asserted that the level of knowledge of first aid among majority of the students are lacking. Furthermore, hundreds of thousands of children die each year due to injuries from violence, while millions of others suffer the consequences of less or non-fatal injuries. Afar from the deaths, tens of millions of children require hospitalization for non-fatal injuries, (Branche et al., 2008).

It is better to create a First Aid Application that gives some instructions for preliminary taking care of people in Android Smartphone (Surachat, et al, 2013). Mobile Application is one of the fastest and most interesting growing fields in this modern information and communication age.

According to Semertzidis (2013) one good features of mobile application is a large accessibility of mobile devices and this trend continues to grow worldwide. Mobile Application also improves higher education lectures and gives alternatives traditional educational method.

According to Kapp (2012) games bring a digital environment and recreate a realistic situation that makes the Game-based learning enhance the motivation of every learner. These methods the students (users) learn to function in a secure environment, but with interactivity, comments and rules.

As stated in some studies, game-based learning is essential and effective especially in our generation. Instead of restraining the student from computer or mobile gaming, they must encourage them to play knowledgeable games that may help them in the real world (Van Eck, 2006). Alteration or a combination of traditional method and Game Based Learning will make the learning effective and more enjoyable (Charlier, & De Fraine, 2013). Although there are many existing application related to first aid there are some limitation and application of GBL is not applied.

This study aims to develop a "Game-Based Learning" Mobile Application for First Aid Awareness Tool to educate a user's on how to apply first aid appropriately. The application of GBL in the system is a technique in one form or another to improve the social skills of students as well as their skills to solve and to understand a problem. The system will give of the basic knowledge of first aid to the students which contain the proper instructions on how to handle a situation when they encounter minor accidents and understand a way to act unexpected scenario with the help of Game Based learning. Using the system, the user acts like that they are in the real situation where they cannot expect what kind of injury they may encounter that needs a first aid treatment.

2. Review of Related Literature

"First Aid" as for the meaning they depict, "is the initial and immediate care to a victim with an injury of illness", usually given by someone on the spot until professional help arrives (Alomari, 2011). According to Department of Health (2014) stated that knowledge in first aid is important for everyday life, work, home and community; the more people with basic knowledge of first aid the more lives will be saved.

Accident is unexpected, unplanned occurrences which involve injury. It can occur at any time, at any place with any section of the population. According to Ozkan (2013), children are exposed most to accidents all the time no matter how old they are especially those with disabilities.

According to Oscar Palabyab, Philippine Red Cross (PRC) secretary general in the World First Aid Day, that most of the deaths involving kids were due to accidents such as drowning, animal bites, falls, burns, suffocation and bleeding in which they were not given a first aid. Due to lack of knowledge and initial practice of first aid, 150,000 people could die every year (Guardian, 2010). Therefore, it is highly essential that everyone learn the simply essential skills to stop potential dangers and to response properly as soon as unsafe or adverse situations happen.

Moreover, Toprac (2011), explained that Game-Based Learning improves students' self-efficacy while Serrano (2004) stated that it strengthens students' knowledge, skills, and attitudes towards the topic taught. According to Felicia (2010), GBL could be an alternative to traditional teaching methods. Additionally, settings that incorporate video games are often more appealing or engaging and educationally effective than settings that are do not.

Some studies in other country like Aydin (2015), video records, case studies, cartoons, games, animation and models were use in teaching. The use of video clips in lectures enhances the motivation and attention span students, provide better understanding, and help remember key points of lectures, and improve learning process.

Using experimental approach, other studies showed that lecture was significantly more effective in increasing knowledge in comparison to board games. Results show that traditional lectures are more helpful in expanding student knowledge, whereas educational games on the other hand, are more functional as an enjoyment. Thus, from this case study, alteration or combination of these teaching methods would make learning more successful and enjoyable (Charlier, & De Fraine, 2013).

Furthermore, the use of game-based learning in the creating application in teaching would promote efficient education as well as enjoyment. Woo (2014), added that this method of learning and teaching possess significant potential for greater learning motivation and enjoyment in children. Also, GBL enhances problem solving and social skills (Liu and Chen, 2013).

Table 1

Comparison of First Aid Existing Application

Features	First Aid PH App	American Red Cross First Aid App	First Aid Game	First Aid Treatment for Burning Application	Pocket First Aid & CPR	Go to aid First Aid Lite	Drops First Aid	First Aid Guide-Offline	Emergency First Aid	First Aid Red Cross Guide	Aidemania
1. Earn badges and points	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
2. Animation and Videos	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
3. Training or Tutorial	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓
4. Mission Game	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
5. Maps	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
6. Time Limit	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
7. Characters Statistics	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
8. Save their Previous game	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
9. Load their previous game	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓

Nowadays, there are different existing applications for first aid. The Philippine Red Cross (PRC) released an application "First Aid PH". This application allows the user to know the information about common injuries by just reading on it. It shows only some pictures then the step by step procedure in the text form. And also it does not show the image of the first aid tool that the user must use. There's an assessment but by choosing on the different set of procedures then by putting a check mark.

Additionally, the American Heart Association (AHA) created an application "Pocket First Aid & CPR". The navigation of this mobile application is simple, there's a search function provided that allows the user to know information on a certain incidents such as chocking, burns, CPR, bleeding and etc., then it will display the steps on how to handle the injury. Moreover, the First Aid Treatment for Burning Application is released to give some information about first aid but it focuses on immediate response and there is no training or tutorial given before the game.

Then, First Aid Game is also an application for first aid but it is more on advising and the first aid tools are not given. Furthermore, the American Red Cross (ARC) make an application "First Aid-American Red Cross" that gives instruction but without actual representation, more in assessing the user. Among these applications, there is a need for improvement because most of them does not interact between the user and the application it focus on video, textual description of accidents. These limitations of the existing application can be answer in the development of the proposed system.

AIDEMANIA is game-based learning application that train student about first aid. It was an interactive game that facilitates the learning in educational setting. It provides the first aid tool that can be used for first aid treatment but the user makes a decision on what is the proper tool. User can also see the results of those decisions right away and use that information to inform their next decision. However, before the mission, there will be a tutorial for them to learn and identify proper objected needed in first aid. The user also gain point to get badges in order to acquire object needed in his/her mission and be in the rank of best first aider.

3. Methodology

All the information needed for this study will be from different studies and literatures for game development, Health related documents, First Aid, and Game Based Learning. The collected information will be analyze and evaluate to come up with the developing and design of the application.

The study can be employing Agile Model to deliver increment esteem, continuous visibility and incorporate changes prior to the existence life cycle to reduce system trouble. The Agile model emphasized the teamwork, consistent user review or comments, non-stop development and capacity to adapt changes. This model consists of several phases.

Phase1: The researchers will gather data by reading related literature and articles about some application on first aid. The researchers will test some existing application to compare each feature and know its differences. Phase2: All gathered data will be finalized to come up with the plans, objectives, target clients/users and the concept of the application. It is also important to seek advice of the expert regarding first aid, interview and demonstration must be considered in data collection. Phase3: After assessing all the data, it is now being identified all necessary requirements needed in the study. The researchers will use some hardware such android phones and laptop software such as Game Maker Studio, Chibi Maker, Adobe Photoshop and RPG maker for the development of the system and application of game based learning. Phase4: The researchers will analyses the flow of the application and design for its layout. Determining the appropriate contents and module of the application, and integrate best features for interaction of users and application. Phase5: After the developmental stage, the application will go through the testing stage to determine the possible errors or bugs, modification, and feedbacks from the users. Phase6: The researchers will conduct an experimental method for the evaluation of the performance and effectiveness of the system and assess its acceptability in terms of functionality, reliability, maintainability and efficiently of the application. Phase7: After the evaluation, the researchers will plan again to improve the maintenance of the application according to the evaluation and implementation of the users.

4. Proposed System
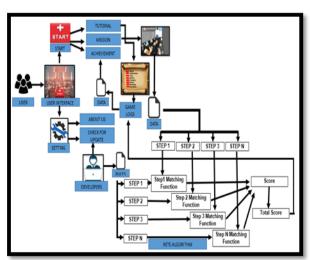
4.1 System Architecture

Figure 1: System Architecture

The System Architecture depicts in figure 1 in which the different interactions between the user and the mobile application is shown. In starting the game, the user can go to the tutorial session to know how the game works along with the instructions for each category that the user will play. The different categories contain lists of first aid awareness and guidelines and their application. After the tutorial session the user can go to mission phase, this is where the user performs the

instructions from the tutorial session and the Gale Shapley Algorithm does the work to check. The user has to clear and accomplish missions and receive rewards such as star and badges.

4.2 System Features

AIDEMANIA game-based mobile application in Android platform allows the user to understand the proper first aid awareness and guidelines through playing the game. The application consists of three major modules: 1) Tutorial, 2) Mission, and 3) Achievements.

In the Tutorial Module, the proposed system has different categories or scenario regarding on how to apply the proper first aid such as burns, suffocation, cuts, sprain, fracture, strain, bleeding and dog bites Each category shows the step by step and proper guidelines on how to be aware in a current scenario and the right time to apply first aid.

In the mission module, this is where the user performs the instructions from the tutorial session. A random quest will appear based on different categories need to find in the community in a certain time. After the user found the victim, the user needs to find the appropriate first aid kit or tools in the environment to apply the first aid on the victim. The user will perform the proper first aid awareness in a different scenario without guidelines to the test effectiveness of having the first aid game in mobile application. Each quest has a different rewards star based on the difficulty on how to aid the victim.

In AIDEMANIA, Gale-Shapley use to get the most preferred first aid item among all the choices matched. There will be a three different items per procedure of first aid, through Gale-Shapley Algorithm it can easily identify if the users choose the correct first aid item. Every step to treat injuries have different preference list.

Gale Shapley Algorithm will used in the system to match the preferences of the users selected item into the preferences of the first aid items of the specific steps. This algorithm will serve as the scoring or pointing system of the game. Each steps have their set of preferences and when the user apply the item the he wants to used base on his preferences, the algorithm works by matching or checking it if the preferences of the steps is much more prefer. Much more prefer in its preferences have a higher score and vice versa.

5. Conclusion and Future Works

Accidents will continually happen in spite of any degree of precautionary procedure and care. Due to this, people who are well trained and knowledgeable about proper first aid tool to be use are massive help in making sure higher safety for anyone. A simple injury could end up excessive and in a few cases fatalities can arise because of lack of immediate clinical remedy. It doesn't simply promote quicker recovery, it assist to save lives which worthwhile for both individual and community.

AIDEMANIA app offers the ability to help users know steps to take in an emergency situation through first aid utilizes game based learning method that gives users to remember proper responses to situations. It allows you to help persons who emerge as injured in the location of the accident until emergency response arrives. The application gives you knowledge and tools to prevent the situation from becoming worse. AIDEMANIA, it gives you the step-by-step procedure about the different injury. The application will help the user to broadening their knowledge and to train them in lifesaving techniques which can be perform with minimal equipment. It triggers the awareness of the user and giving the right information. Information is supplemented with animations in order to give a clear understanding of what to do as quickly as possible if emergency happens. But the application only provides information about the common injuries such as burns, cuts, suffocation, sprain, fracture, strain and bleeding. It can be able to run only on smartphone and one player can play at a time. It must be develop as a tool to educate children, students, and community. It can serve as teaching material in some related courses, which can engage for student to learn and motivate. Adding for special effects, 3D characters or objects, engaging sounds, and flexibility in different mobile devices gives additional performance of the system. Any emergency can be handled easily with adequate preparation, including the medical one. Knowing

the various aspects of basic and proper first aid can mitigate the severe effects of the certain accidents.

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