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Learning History Using Role-Playing Game (RPG) on Mobile Platform

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Abstract. Mobile learning is one of the most convenient approaches in e-learning as it is accessible from virtually anywhere. This paper describes our experience in designing and implementing a framework for a mobile learning application that can assist students in understanding history lesson using role-playing game (RPG) approach. The implementation is based on the narrative of a Malaysian legendary warrior, *Merong Mahawangsa*. This application was developed on an iOS platform and a crowd simulation technique was used in the application in order to make it more interactive and realistic. The Dijkstra shortest path algorithm was used to search the shortest path for the avatar to move around. Initial investigations suggest that applying the RPG concept has indeed provided a much better learning environment especially in helping students in learning their history lessons.

Keywords: Mobile Learning, Role-playing Game, Mobile History Education.

1 Introduction

History is very important as it provides a cognitive process for us to recognize what had happened in the past on the planet that we are living now. It helps in inspiring values and shaping our life. We will be able to make better decisions with the knowledge that we acquired by learning history and live a better life by knowing history. However, history is a difficult subject to learn as it involves learning and memorizing of names, dates, events and so on including their significance. Sometimes history can be very interesting. However, it normally fails to attract the interest of many students. Therefore an alternative approach is needed to help these students by making the learning process to be more attractive and made available on mobile platform for better accessibility. Mobile learning and game-based learning are some of the approaches that can be used to solve such problem. Some researchers found that game-based learning can indeed motivate children [1]. Most of the current game-based learning products focus on language learning and many of them are also based on mobile platform [2].

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In this paper, we present a framework and its implementation for a mobile learning application which was designed for learning history based on Role-Playing Game (RPG) that incorporates multimedia games. The implementation is based on the narrative of a Malaysian legendary warrior, *Merong Mahawangsa*. Using narrative in teaching history is a valuable means to move beyond just acquiring fragmented facts of historical figures and events. In addition, games are also recognized as a fruitful means for narrative learning environment that allow pupils to learn in a realistic way about on a certain topic [5]. Given the changes in society, and constructivist approaches towards learning, it becomes important that students not only learn by receiving knowledge, but also by searching and making knowledge. In line with this, an approach towards learning in which pupils do things that matter to them and to the society, games seem to be an appropriate means to allow learning in a more meaningful way [6].

2 Background and Related Work

Digital games have become one of the popular e-learning preferences as they provide a multimedia learning environment that can attract the students' attention and help them improve their study. The gap between digital games and education is getting much closer. Many research works have integrated their learning content into digital games. Some of them adopted the role-playing game (RPG) in their work. RPG allows player to play the game through a point of view of a character in order to maximize the user's experience of the game. RPG presents narrative experience and storytelling to a player during game play. RPG can be single or multiple players. The multiple-player RPG is call massively multiplayer online role-playing game (MMORPG) and these MMOPRG connects all the multiple players through the internet.

Many RPG-based learning applications had been developed on various platforma. This kind of game usually focuses on language learning. "Knuckles in China Land" for example, is a console-style RPG that helps the user in learning the Japanese language. During a battle, a picture or a word is shown on the screen and the user needs to type the correct word or spelling to defeat the enemy. This game also provides a vocabulary editor that allows the user to insert new vocabulary into the game. Math Quest is an RPG-based flash game for teaching Mathematics [7]. In this game, a player is given a mission to bring back the knowledge of Mathematics in order to save the world. The player will learn mathematics skills along the journey through the battle or apply their mathematics skills in solving the quest.

"The Romance of the Three Kingdoms 2" was developed on iPhone/iPod touch platform. Its storyline is based on a historical novel, the Romance of the Three Kingdoms and it also incorporates general information and history timeline of the story. This game is a turn-base strategy game and each player can perform some commands such as attack, internal administration and strategy planning. The players are expected to learn the history of China from the characters' description and storyline or storytelling that goes with the game.

3 Proposed Framework

In this paper, an application that can help students in learning history using game approach on mobile platform (M-History) was proposed. This application will be designed and developed on iOS platform. The framework of the application as shown in Fig. 1 consists of two main components: the RPG Approach and information corner. The RPG approach also deals with mini games and quiz. The information corner is used to display historical information.

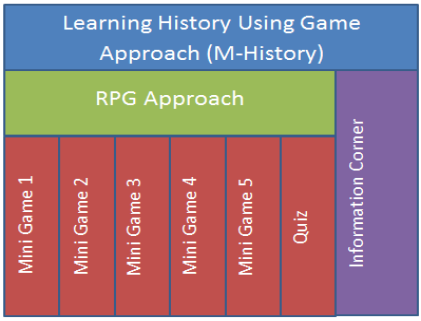

Fig. 1. The framework of M-History

4 Design and Implementation

The application is developed on iOS platform specifically for iPhone with iOS version 5 and above using Xcode 4.3.2 and Cocos2d game engine and tested on iPad mini and iOS simulator 6.0.

The application applies RPG concept that allows the user to control an avatar to complete the game. The RPG game map was designed using Tiled Map Editor. The tile map is shown in Fig. 2. The Djikstra shortest path algorithm was used to connect each turning point together to improve the routing function and avoid collision with the object on the tile map. The algorithm is used to calculate the shortest path that need to be traversed by the avatars when they move to complete the mission. Besides, crowd simulation was also applied for a more realistic movement of the avatars.

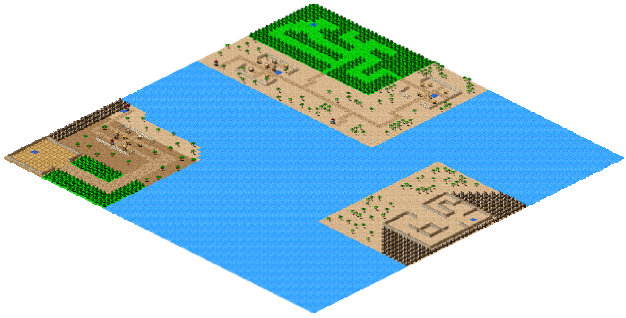

Fig. 2. RPG tile map

A summary of the game flow is given in Table 1. The game consists of five stages with a mini game for each stage. The game plot is based on the narrative history of *Merong Mahawangsa*. The mini games are used to attract the user's attention to focus on the specific topics that he/she is supposed to learn. For example, the mini game 3 of this application requires the user to find the differences between two pictures in a certain time limit. The system matches the coordinates touched by the user with the coordinates of the differences in the database. Fig. 3 shows the sequence diagram of this mini game. If the coordinates are correct then a red circle will be displayed at the location on the picture. Fig. 4 shows the corresponding storyboard for this mini game.

Table 1. Summary of the game flow

Stage	Description	Mini Games
1	The King of Rome orders Merong Mahawangsa to find the Prince of Rome, Marcus and bring him to the peninsula to meet a princess of the Han Dynasty, Meng Li Hua.	Scissor paper stone
2	Marcus and Merong Mahawangsa reach the peninsula and search for the location of the Han Dynasty army camp. They reach the camp and meet the princess.	Swap the picture
3	The princess runs away from the camp. Marcus and Merong Mahawangsa search for her in the jungle.	Spot the differences
4	The pirate, Garuda attacks them and kidnaps the princess. Merong Mahawangsa helps the Han army in defeating the enemy.	Defend the tower
5	Merong Mahawangsa goes to the Garuda's base to save the princess and fights with Taji. Finally, Merong Mahawangsa stays on this land and creates an empire.	Whack-a-mole

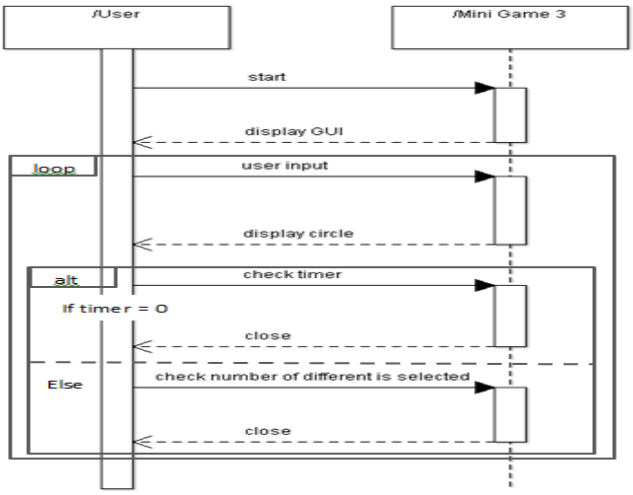

Fig. 3. Sequence diagram of mini game 3

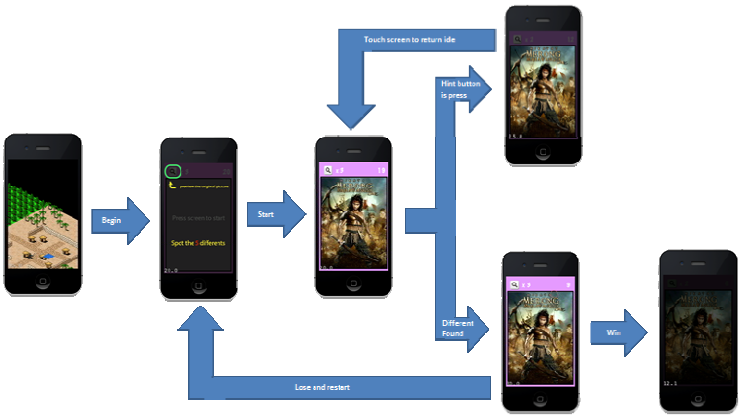

Fig. 4. Example of the proposed storyboard for mini game 3

The quiz module will pop out a question after each mini game was completed. The question is randomly picked from the database. All questions are related to the Merong Mahawangsa history. The last module of this application is the information corner. This module is an info sharing corner to help the users to acquire some knowledge the history of Merong Mahawangsa. All the information will be stored inside a SQLite database.

5 Evaluation and Discussion +

Evaluation of this application was gathered through a questionnaire from 13 participants, and by conducting semi-structured interview and analyzing the storyboards. The findings reveal that the perception of students about history has changed. The application is also believed to be able to help students to develop communication and interpersonal skills. The students and teachers also realized the potential of Mobile phones as one of the teaching and learning tools. Such activities engage students in thinking, reflecting and researching about ways of taking teaching of history beyond the pages of textbooks. The result of the evaluation has shown that by participating in the game, student interactivity can be increased which can eventually lead to motivation and greater interest in what is being learnt.

6 Conclusion

We have developed M-history which uses RPG concept that allows the user to learn and understand history in a more interesting manner. M-History was developed with nice graphical user interface and high user interactivity. Each stage contains a mini game and quiz to attract the user's attention on the subjects that are being learnt.

For future research it is would be appropriate to explore more on whether it is possible to further combine the usual learning processes with mobile games in order to allow students to access education from virtually anywhere.

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