Article 3

Development and Evaluation of Mandarin Language Exploration Game for Non-native Speakers

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Abstract
This paper discusses the development and evaluation of an exploration game for Mandarin language. The game focuses on mastering basic vocabularies in Mandarin for non-native speakers. Emphasis is given on word recall and pronunciation of Chinese characters. The evaluation consisted of testing session with students to discover the effects of the game towards the students' confidence in word recall and pronunciation of Chinese characters. The target audience of the project is students in UiTMPerlis Branch, who undertake Level 1 Mandarin language course. The research methodology that was used in this project is spiral model. There are four phases in the spiral model which are game idea specification, game design prototype, playtesting and evaluation. Game interface was designed by using Unity 3D software. The exploration game was constructed by integrating two elements from Octalysis' game framework into the exploration game which are ownership and avoidance. Ownership is the element where players are inspired to complete the game when they have sense of owning something. Avoidance element is based on the avoidance of negative circumstances. Testing phase employs user testing which was conducted with 19 bachelor degree students from Level 1 Mandarin language class. From the results, it was discovered that generally, the exploration game has positively influenced the students' confidence to recall and to pronounce Chinese characters. This could signify that exploration game is a promising tool in elevating confidence among language learners.

Keywords: *Exploration game, Mandarin language, Non-native speakers, Unity 3D, Gamification framework*

Introductıon

Gamification is a process of employing game-thinking and game mechanics to engage users and solve problems (Nah, Telaprolu, Rallapalli&Venkata, 2016). Gamification is apparently a trend in many areas, including business, authoritative management, in-service training, health, interpersonal set up, and education (Caponetto, Earp & Michela, 2014). Many students play (computer) games in their relaxation time, thus acquiring abilities which can easily be utilized when it comes to showing more advanced knowledge (Erenli, 2013). Gamification has drawn the attention of academics, practitioners and business experts in spaces as various as training, information studies, human–computer interaction, and wellbeing (Seaborn&Fels, 2014). Gamification has been demonstrated as a significant idea and has given confirmation of its effectiveness as a tool for motivating and connecting with users in non-entertainment contexts (Seaborn&Fels, 2014).

Currently, in UiTM, students learn Mandarin using textbooks and workbooks. Unfortunately, learning a foreign language could be very difficult for non-native speakers, especially to recall and to pronounce the Mandarin characters. This could be due to the nature of Mandarin language that uses characters, thus resulting in difficulties to learn to read as compared to language that uses alphabets (Cao, Khalid, Lee, Brennan, Yang, Li, Bolger & Booth, 2010).

Therefore, in this study, an exploration game about basic vocabulary in Mandarin was developed and tested to evaluate its effectiveness in enhancing recall and pronunciation of Chinese characters.

Development Methodology

Spiral model is a suitable methodology for design-oriented project (Wheelwright and Clark, 1992; Shenhar, 1988) and each cycle helps someone to understand the phases better and refines certain requirements as well as project development. Four noteworthy phases which are game idea specification, game design prototype, playtesting and evaluation has been adapted in this spiral model. The spiral model begins with the Game Idea Specification document, in view of which the Prototyping activity is directed to deliver Game Design Prototype. In the following phase which is Playtesting, potential players of the game try different things with the model under recreated conditions with discovering design flaws, giving knowledge, and giving criticism. The Evaluation activity involves assessing the game score calculation and accuracy.

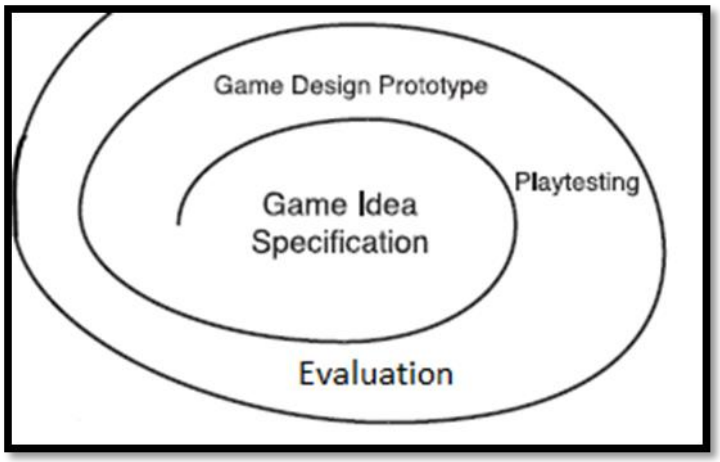

Figure 1. An adapted Spiral Model (Wheelwright and Clark, 1992; Shenhar, 1988)

The game was developed by using a software called Unity 3D. The target audiences of the game are students in UiTMPerlis Branch, who undertake Level 1 Mandarin language course. The game focuses on word recall and pronunciation of Chinese characters in the Mandarin language.

To spark interest of players, the game was designed to resemble Chinese look and feel. Therefore, the background image of its main menu screen comprised of an ancient Chinese palace, and the background music used traditional Chinese song. There is a button that user can click to start the game. Players would be given instructions and description of the mission of the game. The game was set with time limit and equipped with a scoreboard. Since the game was developed to mimic an exploration, a recreation park scene was chosen as the basis of its game environment. Along the journey, players are required to answer questions pertaining to Mandarin language. There are also hints and tips that could assist them in improving their vocabulary while playing.

Players are required to find 10 objects in the park. When an object is hit, its corresponding quiz questions would be displayed on the screen. The quiz contents encompass topics such as family member, numbers, days and telling time. For every correct answer, player would get 5 points that add up to the total score. In contrast, for every incorrect answer, 5 points will be deducted

from the total score. When a player gave incorrect answer, the correct answer would be shown on the screen, which helped them learn from their mistakes.

Game Evaluatıon and Fındıngs

A total of 19 students in a Mandarin Level 1 class at the university voluntarily participated in the evaluation session to play with the game and measure the game's effectiveness in enhancing self-efficacy belief in language learning. It was followed by game evaluation of fun. Subjects were given briefing about the main contents of the game and the purpose of the testing session. In the beginning, subjects were given five minutes to navigate around the game to familiarise themselves with the environment. Then, as the session started, they were allocated roughly around 20 minutes to play with the game. All of them had successfully played the exploration game until the end.

An instrument for self-efficacy belief evaluation and fun evaluation was developed by the researchers. It was administered immediately to the subjects after they underwent the treatment via the exploration game. The instrument has two sections, where the first section focuses on self-efficacy belief and the second section focuses on fun evaluation. The answer to each item was in the form of a Likert scale, with range specified from 1 to 5 where 1 holds the lowest value which is strongly disagree while 5 holds the highest value that is strongly agree. Subjects were requested to choose the most suitable answers that represented their opinions or feelings after having exposure to the game.

There were five items that need to be rated in the first section of the instrument which is about self-efficacy belief evaluation. This is related to subjects' confidence in practising Mandarin language. The purpose is to discover whether respondents have confidence to recall and to pronounce Chinese characters in Mandarin language after playing the game. Another five items in the second section revolves around game fun evaluation. The purpose is to reveal the subjects' sense of enjoyment in playing the exploration game while also learning.Based on Table 1, all mean scores indicated that the exploration game generally received positive feedback from participants with regards to their confidence in mastering the language. It indicated that they gained more confidence to recall and to pronounce Chinese characters in Mandarin language after having exposure to the game. In addition, the exploration game has also made them more confident to read Mandarin sentences and would be able to use the knowledge gain for their Mandarin test.

Table 1. Mean Score Self-Efficacy Belief Evaluation

	I feel more confident to recall Chinese characters after playing the game.	I feel more confident to pronounce Chinese characters after playing the game.	I feel more confident to read Mandarin in sentences.	The game met my Mandarin educational needs.	I can apply the Mandarin knowledge in my Mandarin test.
Mean	4.11	4.00	4.21	4.37	4.32
N	19	19	19	19	19
Std. Deviation	.737	.667	.631	.496	.582

Mean scores in Table 2 indicates that subjects had enjoyful experience with the game in which they understood the rules and mission of the game, and were also able to manouvre while completing the game within its time limit. From this finding, it can be concluded that the exploration game had successfully fulfilled fun and enjoyment elements to the players.

Table 2. Mean Score of Game Fun Evaluation

Report

	I understand the rules and mission of this game.	I can move and control this game by using keyboard and mouse.	I enjoy playing the game while learning.	The time limit of this game was about right.	I can adapt with the game environment after entering it.
Mean	4.11	4.53	4.37	4.21	4.21
N	19	19	19	19	19
Std. Deviation	.737	.513	.831	.976	.855

Conclusions

Exploration Game of Mandarin Language for Non-native Speakers is a digital game-based learning that can be used as supplemental learning materials for students who undertake Mandarin language course at university level. Two elements from the Octalysis game framework which are ownership and avoidance were successfully integrated into the game. Ownership element influenced the players to complete the game since they had sense of owning something. Avoidance element is based on avoidance of negative circumstances; for example, in this game, players would carefully give their answers to all questions along the journey to avoid losing scores. The game has been evaluated for its effectiveness in enhancing confidence to recall and to pronounce Chinese characters among non-native speakers. It has also been evaluated for fun measurement. It was discovered that while playing educational game, subjects also enjoyed themselves and this has helped them to finish the game, thus indirectly boost their confidence in practising Mandarin language.

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