The Key Successful Factors Study on Game-based Learning Design: A Study toward USA & Taiwan

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Abstract. A new way of learning has been introduced and it is here to stay: game-based joyful learning. Game-based joyful learning stands for electronic learning and involves m-learning (mobile learning), u-learning (ubiquitous learning), computer-based learning and web-b5ased learning. The aim of this paper is to study the key factors differences of Game-based joyful learning in Taiwan and USA through junior high school education, and explore the fundamental differences between these countries. The most important ambition is to reach collaborative learning, or providing an environment where both teachers and students can debate and achieve synergy so that it is necessary to stimulate interest, improve children's performance and increase efficiency through games, problem solving and teamwork. This new learning paradigm seems to be vastly popular because it completely integrates people into learning, no matter what socioeconomic status or urban/rural area; the only two things that are significant are the willingness to learn and the teacher's effort. The paper is divided into the follows sections, including the section covers the purpose and relevance of this study supported by a review of recent e-learning and cloud-game-based joyful learning research; the section contains the analysis of cloud-game-based joyful learning in junior high school schools in Taiwan; the section examines cloud-game-based joyful learning in junior high school schools in the USA; the section compares cloud-game-based joyful learning in junior high school schools in Taiwan and USA. Finally, the last section covers the conclusion and suggestions.

Keywords: e-learning, Ubiquitous learning, cloud-game-based joyful learning, comparative study, junior high school schools.

1 Introduction

A new learning paradigm has emerged, it is called e-learning and it is student centered. The main objectives are increase motivation, effectiveness and fun in learning activities. The purpose of this paper is to study cloud-game-based joyful learning in Taiwan and the United States of America through primary and secondary education and explore the fundamental differences between these countries. The research methodology will be a review of a set of e-learning and cloud-game-based joyful learning in the US and Taiwan. The first step is to define a game, its qualities and elements, relation to learning theory and advantages of cloud-game-based joyful learning. Various new internet technologies also deeply encourage the end user to employ the mobile learning with sharing the content each other, such as the p2p-based mobile navigation system with location service[1], the on decentralized group key management mechanism for vehicalar Ad Hoc networks [2], the enhanced binary exponential backoff algorithm for multi-hop wireless Adhoc networks [3], the dynamic multi-service load balancing in cloud-based multimedia system [4], the novel joint problem of routing, scheduling [5], and the real-time data delivery using prediction mechanism in mobile environments and variable-width channel allocation in WMNs [6], etc.

In the second step, it is going to be explained four games designed in Taiwan for junior high school schools: (1). 3D role play for learning anti-Japanese war during Qing dynasty and geography of Southern Taiwan; (2). Communicative language teaching for English learning; (3). Chinese language learning and (4). Gjun system. In third place, five games are famous in the USA for teaching primary and secondary students: (1). Making history about World War II; (2). Massive multiplayer online game (MMOG) for Mathematics, Language Arts, Science and Social Studies; 3. Dimension MTM for Mathematics; (4). Immune Attack for Science and (5). Survival Master for STEM (Science, Technology, Engineering and Mathematics).

In section four, a summary is presented through a table where it is compared the target, design, hardware and software, objectives and improvements obtained by using cloud-game-based joyful learning in Taiwan and USA. Finally, in section five, the conclusion and suggestions for Taiwan.

2 Literatures Reviews of Joyful Learning

In 2003, a movement was started for using video games in teaching and training. This initiative, known as serious games, has changed the way that educators viewed instruction to meet the needs of the Net generation. The perceived change in learning needs of the "Games Generation" [7] or "Next Generation" [8] coupled with the ongoing growth in use and acceptability of a range of communications technology that has precipitated a growing interest in the potential of games and computer games for learning.

There are some elements that define an activity as a game: (1). Competition: the score-keeping element and/or winning conditions which motivate the players and provide an assessment of their performance. (2). Engagement: or intrinsic motivation means that once the learner starts, he or she does not want to stop before the game is over and the four sources are challenge, curiosity, control and fantasy[9][10]. (3). Immediate Rewards: Players receive victory, points or descriptive feedback, as soon as goals are accomplished.

Games fulfill a number of educational purposes. Some games are explicitly designed with educational purposes, while others may have incidental or secondary educational value. All types of games might be used in an educational environment. Educational games are games that are designed to teach people about certain subjects, expand concepts, reinforce development, understand an historical event or culture or assist them in learning a skill as they play[11] [12] [13] [14].

However, a game is educational when it makes learning integral to scoring and winning. It is not enough to simply incorporate course material into a game and if it is possible to score and win without learning, students are likely to do so. There are different kinds of games [15]: (1). Video Games: These are played over the Internet, on personal computers or on specific game consoles hooked up to televisions. (2). Role-Playing Games: These are generally cooperative and highly engaging with a subtle way of handling scoring. (3). Board and Card Games: These tend to emphasize strategy elements rather than being completely random games of chance. Some of board and miniature games take hours or even days to play. (4). Sports: Students do not need to be physically fit to enjoy running around chasing things. (5). Scavenger Hunts, Raffles, etc.: When these events are organized as fundraisers for students and they tend to be quite popular with students.

Not only does the integration of learning with gaming make science more fun; it also motivates students to learn through doing, immerses them in the material so they learn more effectively and encourages them to learn from their mistakes. Games are such a great escape from the real world because bad consequences are rarely serious or lasting, they are only a game and if students lose, they can start the game over and try again.

These findings frame the three key aspects to cloud-game-based joyful learning: motivation, skill development and immersive learning environments. The very nature of games provides three main factors for motivation: fantasy, challenge and curiosity [16]. Fantasy relates to the use of imagination and the child's inherent inclination towards play [17]. There is freedom to fail, experiment, fashion identities, freedom of effort and interpretation that create a learning space where new ideas and problem-solutions can emerge [18].

Beyond increased motivation, teachers using games in classroom have also noted improvement in several key skills areas [19]: personal skills (such as initiative, persistence, planning and data-handling), spatial and motor skills (such as coordination and speed of reflexes), social (such as teamwork, communication, negotiating skills and group decision-making) and intellectual (such as problem-solving, strategic thinking and application of numbers).

About learning environments, games allow players to enter environments that would be impossible to access in any other way; for instance, going back in history, understanding the complexity of running a major city, managing entire civilizations or nurturing families. They require engagement with complex decisions like exploring the effects of different choices and a multiplicity of variables offering ongoing and responsive feedback on choices. They also stimulate conversation and discussion; players share ideas, hints and tips in what increasingly tend to be lively and supportive learning communities [20].

According to James Paul Gee (2003) [21], digital games create 'semiotic domains' which are any set of practices that recruits one or more modalities (for example, oral or written language, images, equations, symbols, sounds, gestures, graphs, artifacts, etc.) to communicate distinctive types of meanings. The semiotic domain for a game is the world or culture it creates and is shared by those participating in the game together where they share knowledge, skills, experiences and resources. Active and successful participation in a semiotic domains demonstrated by 'active learning', where group members gain there sources and skills to solve problems within and perhaps beyond the domain as well as 'critical learning', which includes thinking about the game at a 'meta' level so that they cannot only operate within the game but within the social structure that surrounds the game as well [22].

However, teachers are also consistently found to be critical components ineffective cloud-game-based joyful learning. Where the game is just the tool, the teacher is essential to effective implementation of the game through direction of the learning approach, discussion, debrief and support in construction of the social learning culture that surrounds the game-play. Numerous researchers have stated that learning with educational video games is not likely to be effective without additional instructional support and effective strategies for implementation [23] [24] [25].

3 Research Methodology and Issues

Chih-hung Lai, Shun-Po Yang, Ai-Chiun Yen, Chen-Gjun Chou (2014) employed SMS and emails as class reminders to assist subject learning with network [26]. The results showed that there is no difference on learning achievement and technology acceptance for both groups, but distinct treatments and genders placed significant influence on their leaning behaviors. The paper aims to identify key issues and themes arising from the literature reviewed, the case studies produced and the consultation undertaken. The review comprises a meta-review that is a review of literature reviews, and literature has been grouped in relevant categories according to selected themes or issues. Literature was sourced from keyword searches of electronic databases, key journals in the field and a general search of the internet. Selected criteria include significant meta-reviews, relevance to cloud-game-based joyful learning and empirical studies of the use of games. The criteria were used to identify relevant literature for inclusion in the paper. Recommendations from experts in the field were also used to identify key articles and texts relating to examples from the practice.

In the introduction and literature review, there were a definition of game, its qualities, types and elements, relation to learning theory and advantages of cloud-game-based joyful learning. In section two, it is developed four games designed in Taiwan for junior high school schools: (1). 3D role play for learning anti-Japanese war during Qing dynasty and geography of Southern Taiwan; (2). Communicative language teaching for English learning; (3). Chinese language learning and (4). Gjun system. Toward the trend, the ubiquitous learning is feasible [27].

In section three, it is explained five games that are famous in the USA for teaching primary and secondary students: (1). Making history about World War II; (2). Massive multiplayer online game (MMOG) for Mathematics, Language Arts, Science and Social Studies; (3). Dimension MTM for Mathematics; (4). Immune Attack for Science and (5). Survival Master for STEM (Science, Technology, Engineering and Mathematics).

In section four, a summary is presented through a table where it is compared the target, design, hardware and software, objectives and improvements obtained by using cloud-game-based joyful learning in Taiwan and USA. Finally, in section five, the conclusion and suggestions for Taiwan. The following figure shows briefly section four mentioned above:
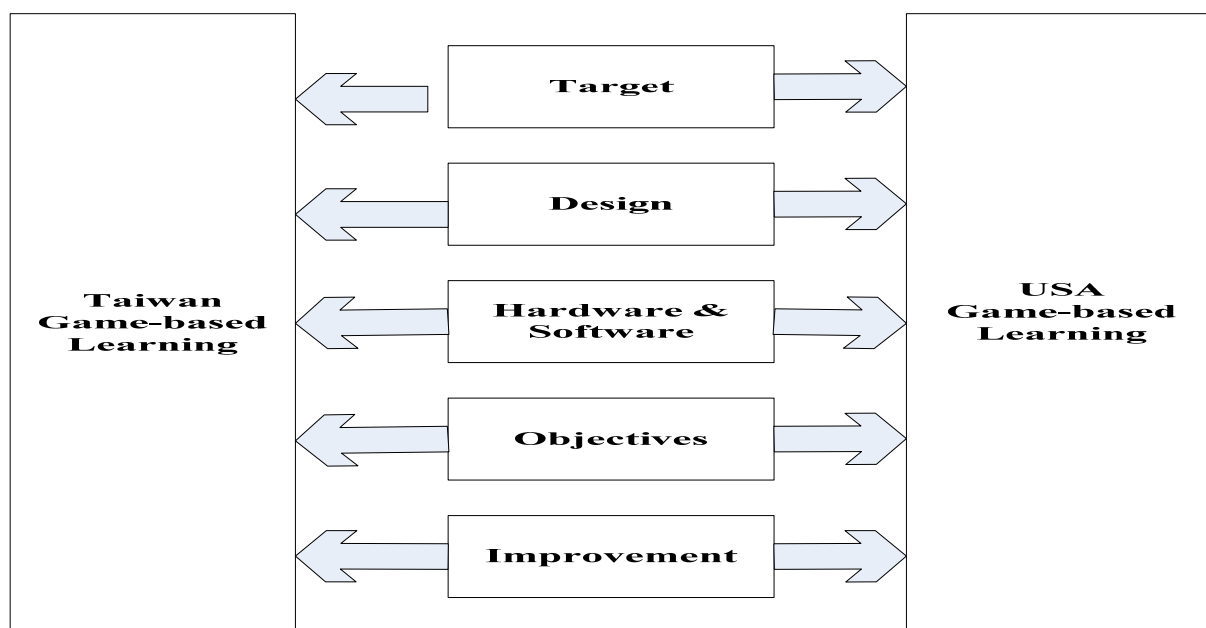

Fig. 1. The research structure of our framework.

4 Comparison between Cloud-Game-Based Joyful Learning in Junior High School Schools in Taiwan and USA

When looking for papers for the USA about cloud-game-based joyful learning in primary and secondary school, most of them were orientated to college and university applications. While in Taiwan, most of the research papers are based on cloud-game-based joyful learning for primary and secondary education. One reason for this is that Taiwan wants their student to get accustomed to information technology and computing devices so that it is increased the competitiveness of the students and their clerical skills. However, as part of its Connected Educator Month, the U.S. Department of Education notes that cloud-game-based joyful learning is gaining considerable attention as more and more young people are learning from games outside of school, and more and more teachers are leveraging the power of games to engage students in school. Well-designed games can motivate students to actively engage in meaningful and challenging tasks, and through this process to learn content and sharpen critical-thinking and problem-solving skills.

Most of the games found for the USA were focus on one specific lesson instead of the complete subject in primary and secondary education. In Taiwan, the games that were analyzed include exercises and answers for the students as well as test and record graphics. However, these functions need more equipment and requirements i.e. while teaching only one lesson needs only one software (that can be saved with other programs), in order to teach a complete subject in junior high school schools, it is necessary a hardware or electronic device for the software or video game.

On one hand, cloud-game-based joyful learning in the USA mainly pays attention to the achievement of higher grades in the students' subjects and the improvement of skills like problem solving, team working and strategic planning. On the other hand, in Taiwan is important to increase motivation in students and develop a deep understanding, an enjoyable experience and cultural immersion inside and outside the classrooms.

Table 1. Comparison between cloud-game-based joyful learning in junior high school schools in Taiwan and the USA

	USA	Taiwan
Target	Universities	Junior high school schools
Design	Only one lesson	Subject and exams
Hardware & software	Software	Software and hardware
Objectives	Achievement	Motivation
Improvement	Problem solving Team working Strategic planning	Deep understanding Enjoyable experience Cultural immersion

5 Conclusions and Suggestions

It is clear from the data that cloud-game-based joyful learning presents an opportunity to engage students in activities, which can enhance their learning. Like any successful pedagogy, outcomes need to be well planned and classrooms carefully organized to enable all students to engage in learning[28]. What is notable about using games for learning is the potential they have for allowing many children to bring their existing interests, skills and knowledge into the classroom and then use games as a hook or stimulus to build the activities for learning around them[29]. In many ways these findings reflect those of earlier media education programs, which sought to capitalize on children's own interest in television and film and build activities around them [30].

Although, it is good to have cloud-game-based joyful learning in junior high school schools in Taiwan, it would be convenient to extend cloud-game-based joyful learning to college and kindergarten too as well as develop games in different languages. So that different countries can take advantage of them because students perceived a range of educational benefits as a result of participating in the cloud-game-based joyful learning approaches, including increased collaboration, creativity and communication [31].

For future research, it would be valuable to investigate how to cultivate more interpersonal relationships, how to improve privacy and security in using online video games and integrate cloud-game-based joyful learning with u-learning and m-learning.

Acknowledgement

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