Development of a Digital Game-Based Learning System in Music Learning

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Abstract

The purpose of this study was to explore the ways building a digital game-based music learning system with multimedia technology to provide enhanced learning environment along with different musicality of learning content and role-play game design for students. It is to escalate students' interesting in active learning and achieve learning effect in the course of gameplay. The results revealed that students are highly interested in game-based learning with positive feedback. The design model was inducted with meta-analysis through literature review and accessed through interviewing users for suggestions concerning the functions, generations, and applications of the system. Conclusion and suggestion for research and development were proposed based on design development and teaching experience for the reference of future study.

Key Worlds: Game-Based Learning、role-playing、music、musicality

Introduction

Modern information technology has considerable potential in the arts and humanities teaching of music. Researches [1] [4] [7] showed that information technology could effectively increase student's learning outcome when applying to music classes. In other words, the advantage of well utilizing information technology in music classes helped students' learning effectiveness. Cultivation of musicality is an important area in learning music and it takes time and uninterrupted practice to have significant results. It is a threshold for students who intend to learn music. With the development of modern multimedia, employing digital sound sensing becomes feasible to cultivate students' musicality. Through virtual acousto-optic effectiveness and content of games, impossible games experience in reality may become possible and thus more interesting in the learning process. Human being grows along with voice. They relied on the dialogue between surrounding and timbre and limbs before learning language. Through acoustic signals emitted from different people or things and rhythm, they tell the importance and if it's a complete message. And though different tones, they could express themselves much better. Music could be formed by integrating what have stated hereinbefore. Hence, music is a born potential that helps express feeling.

It is the era of digital games in the 21st century. Along with the rapid development of internet technology and multimedia, games in touching mobile phone gradually became popular and fond leisure entertainment. Musical games in mobile phones have gradually become a growing category of games. Player listens to the music through mobile phone and using finger to touch specific symbol on the screen along with the rhythm and thus earn points. Music is not the only element in the games; other elements were also needed to attract players for easily experiencing different but interested fun play.

Literature Review

A. Music Pedagogics

In his book "Music Teaching Technology", Huang, You-Di (1982) stated that traditional music teaching today often emphasized on music theory. Bored learning process often keeps beginners away. Music theory is important but cannot be attractive without coupling with realistic music activities. Therefore, in the process of music training, all teaching behaviors must be as attractive and close to life as possible. Musicality may affect the ability of learning music. Many believed that musicality is born with and could not be cultivated in post-natal. In fact, most of the people learned musicality through training and acquired (Sun Li-Jun, 2004) [10]. Researches revealed that childhood is the most sensitive to musicality and a golden period for learning musicality. Acoustic timbre and sensitivity to which were developed in the first stage, followed by melody and rhythm and harmony (Huang Li-Ching, 1998) [12]. The content of musicality includes Pitch, Tempo, Tone, Volume, Key, Structure and other items (Lee, Juan, 2002) [13].

B. Discussion on the Application Mobile Device as an Auxiliary to Teaching

Studies revealed significant effectiveness on digital learning to the cognition of science classes, learning attitude, learning achievement, motivated behavior, and even to higher level thinking ability including logic inference and creative thinking (Chen, Jun-Rong, 2010; Chen, Ying-Ju, 2009) [14] [17]. Digital learning in the past was centered on instructor who passed contents, mainly teaching material along with presentation, to learners. As software like acoustic motion picture became so popular, digital learning has developed reactive model that centered on learners. This made digital courses more interesting and integrated with mobile devices for learners (WU, Ming-Lung 2011; Lin, Lai, Tseng, & Jong, 2014) [19] [22].

C. Discussion on the Effectiveness of Learning Auxiliary to Diversity and Fun

Lin, Chu-Ye (2009) suggested that the first step in learning music should be playing and listening to music, which is to construct an appropriate music setting [25]. Study showed that early stage of learning is conducted through playing games. And, game play provides motivation for learners to improve learning results. The App designed in this study was presented through game levels to be passed by students who learned through playing games. Game designers Rolling and Adams

(2003) believed that a player must consider himself or herself the role he or she played so that he or she could control the role. Otherwise, the player may become the god that sees the whole picture while commanding the role without emotional feeling. The core elements in creating role play games are the story, followed by the developing curve of the role. Therefore, the APP designed in this study was centered on cartoon and provides five roles for students to pick and thus intrigue their interest in learning.

Method

Digital learning game APP was designed for learning musicality and rhythm. Subjects were 30 5th Grade elementary school students, 12 male and 18 female. The researcher instructed the subjects to play the game and observed the progress. The content of the game was illustrated and learning effectiveness was assessed with systemic grades after the test.

A. APP Game Design

The game deigned in this study was to combine information technology and digital learning. Subjects learned the basic concept of musicality and tempo through mobile device where basis of music was built in. Role play was added to make the game more interesting and Non-Player character (NPC) was added during the process. Narrative content and teaching level was described through dialogues between NPCs to help subjects learn more about the game. The element of Taiwan music, including recomposed "peach transition", "Four Seasons Red", "Mountain Spring", was added in the musical content of the game.

B. APP Game Screen



Fig. 1 provides five roles for students to pick



Fig. 2 Game Tour and Game rules

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Fig. 3 Scoreboard
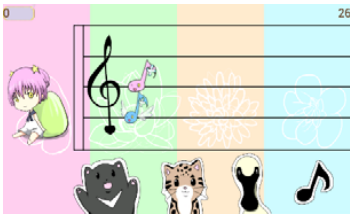


Fig. 4 Game screen and Game levels

Results

Students were given time to practice and familiarize the operation of the game before the test. It was found that role play and stage level attracted subjects in a very short period in the game. In the meanwhile, the results of the test revealed that students could not easily tell musicality as there were more musical instruments in the composition. Students were quite good in tempo followed by volume and pitch. (See Table I). The result of an independent t-test at alpha level .05 found that there was no significant difference between male and female students.

During the test, it was found that the APP needed to be amended in the following areas:

1. Practice zone may be increased and temporary stop key needed be added to make the game more flexible.
2. Musical accompaniment in the songs may be lessened to improve the training of musicality.
3. Increasing stage levels to enhance the effectiveness of training.

TABLE I
RESULTS OF THE TEST

Rate of Accuracy / Gender	Pitch	Tempo
Male	74.69%	88.53%
Female	78.11%	90.77%

Rate of Accuracy / Gender	Tone	Volume
Male	18.21%	80.79%
Female	20.01%	82.06%

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4. Extending time of hint so that students could learn to the play procedure better.

Conclusion and Suggestions

It was concluded that students' learning interest could be increased through role play, learning stage level, and content of the game. Most students could correctly answer the questions after repeatedly practice, which satisfied the purpose of stage level design. Digital leaning games increased students' interest in learning music and initiative their learning desire.

The combination of mobile device, vivid game screens, and elements with Taiwan accent did increase students' motivation and interest in learning. The design of the APP game will be amended according to the result of this study so that the game could be better and smoothly processed in the future. Students' learning effectiveness could be further improved through the design of digital learning APP game, audition and vision, and role play with stage level design to help students achieve the learning of musicality.

The training of musicality is a very important part in learning music. However, boring process would make training hard to proceed. Most of the digital games for training musicality were conducted with "listen and answer". This is quite similar to most of the games with "question and answer" in the market and questions were mostly focused on single note. The difference between the APP game designed in this study and others were acoustic accent and rhythm rather than single note. The combination of the game design in this study and elements in other digital games may create new possibility for musicality training.

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