A Study of Early Childhood E-Learning Games for Thai Children

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Abstract— **E-learning games have become a potentially beneficial choice in educational teaching. The learner could use this kind of technology to clearly understand an academic context, particularly for children who focus on activities more than lessons. Learning through games helps children gain knowledge and have fun. This research aims to study the appropriate characteristics of e-learning games for early childhood. Lecturers and students of an early childhood education major from a faculty of education were interviewed. The data collected were analyzed using qualitative content analysis. The findings provided a picture of appropriate e-learning games for early childhood. Moreover, we presented the design and developed an alternative e-learning game prototype. This research was based on a case study. In the future, we suggest gathering information from more early childhood education experts in order to extend the prototype with additional metaphors.**

Keywords— *early childhood; e-learning games; preschool; responsive design; web application*

I. INTRODUCTION

Learning through fun is the modern trend of education for children. Parents and teachers need to take this concept into account when teaching their children. In order to achieve "learning through fun", there are several methods of implementation [1]. E-learning games are an alternative tool for this objective [2]. They can be used to encourage more learning than simply studying from texts. In Thailand, the Ministry of Education has brought about policies and strategies for early childhood development (0–5 years). The Ministry of Education They focused on achieving the full potential of early childhood development because the child's brain experiences the greatest growth at the age of 0–5 years.

Currently, there are many educational games on the Internet in both Thai and other languages. These games are based on various platforms such as, web-based applications, Windows-based applications or mobile applications. Many games were offered in Thailand and developed by Games Software Company, university or general persons. However, a study of an appropriate e-learning game in the Thai early childhood context has not yet been presented. This research aims to study the characteristics of e-learning games within the Thai context and introduces a prototype. We have analyzed the information, opinions and experiences from experts who are lecturers and students from Faculty of Education, using four motivated questions:

RQ1: What are well-known methods of early childhood teaching?
RQ2: What are children's learning interests?
RQ3: What factors or limitations have impacts on early childhood learning?
RQ4: What are the appropriate characteristics of e-learning games for early childhood?

II. MOTIVATION

A. The Development of Early Childhood Education

Learning in early childhood is very important. Parenting and teaching influences the development of children. Methods to provide lessons to children between 0-5 years, is a challenge let alone how to make children willing and happy during lessons. If children are not resistant towards learning, they learn rapidly and effectively.

Computer technology is an effective alternative approach to helping with children's education. Children can use computers under adult supervision. Computers help children with systematic and innovation thinking [3]. For example: in Srilanka, Kids Training e-Learning System was used as self-learning for preschool kids [3], there is a use of game-based language for early childhood in the classroom at Tanzania [4].

B. E-Learning Game in Thailand

E-learning games for preschool children aim to developing many aspects: physical, emotional and mental, social and intellectual. The approach in these games does not focus on learning material but concentrate on children's active learning [2]. Serious game is one type of e-learning games. The usability of serious game is for education or training [5]. This kind of game could improve learning effectiveness [6]. Our research focus on developing a serious game for children. The benefits of e-learning games are enhancing curriculum effectiveness, producing new teaching methods for instructors, creating interested visual in learning.

There are many e-learning game websites. The games are often in foreign languages, regardless of the child learning's limitations, not free of charge. For example:

Rajabhat University has provided an e-learning website for preschool children (http://edlru.dusit.ac.th). Units of learning are separated into kindergarten 1, 2 and 3 with each five main activities. All contents on the website are video presentations in Thai language. Some video takes more than 15 minutes. The advantages of website are the real story and children can follow as role playing. The disadvantage is long video does not suit for preschool children.

Learningplanet website is e-learning games website (www. http://www.learningplanet.com). They provide many interesting games. Games have been classified by level of children classes such as preschool, 1st-3rd grades, 4th-6th grades and 7th+grades. All materials are English language and have to pay for an advanced using. The benefits of the website are variety types of games and attractive graphic pictures. However, the website does not design for Thai children and needs to pay for some function.

By above sample websites, it is obvious that there is limited choice for Thai early childhood education in terms of using e-learning games, particularly games that have been designed and developed by educational experts. To solve this problem, we study the games' requirement from Education professionals and build an alternative prototype for Thai people.

III. RESEARCH METHODOLOGY

A. Study Participants

Five expert lecturers in early childhood education and ten bachelor students in faculty of education (early childhood education major) were involved in our interviews.

B. Interview Questions and Data Collection Methods

Individual face-to-face interviews lasting between one and two hours were arranged in advance and conducted on site. We prepared questions based on our motivation about early childhood learning. The questions were sent to interviewees one week before interviewing. The sample questions were *what subject are suitable for early childhood*, *how is the teaching plan*, *how many activities the children need to study*, *what is nature of the child's learning behavior*, *how long do they focus in lesson* and *what are the concern point in children learning about e-learning games*.

C. Data Analysis Methods

Content Analysis [5] which is well known method in social science and software engineering study , was used to analyze the interview transcripts by adopting the process from [6] [7]. Grounded Theory was used. Themes and categories were coded and explained. To avoid the misunderstanding, we discussed about the findings and summarized as a final result.

The steps of our analysis process were reading the interview's transcripts and coding the theme and category. We coded the theme manually for two main reasons; firstly, there were a small number of participants in our study and secondly, we had a limited budget for qualitative software investing.

IV. STUDY FINDINGS

The definition age of early childhood is 0-6 years or 5 years 11 months and 29 days. Teaching this age year is very importance because children could learn and memorize fast. Family and teacher must understand the nature of their children. The objective of childhood lesson is not a formal education, but for their daily life. By analyzing of the transcripts, *Suitability E-learning game for Early Childhood* was coded as the main category. The categories, and sub categories were presented in Table I.

TABLE I. EARLY CHILDHOOD LEARNING THEME AND CATEGORY

Sub Category	Category	Main Category
Learning Unit Perceived Skill Activities Child Perception	Teaching Method	Suitability E-learning Games for Early Childhood
Learning Time Alternative Way of Learning Learning Media	Awareness and Limitation	

A. Suitability E-learning Games for Early Childhood

1) Teaching Method

Early childhood teaching does not focus on formal learning. Teacher should concentrate on children's interest. Normally, the study units are around the daily life for example *teaching about body, environment, vocabulary, color, shape, animal etc.* The perceived skills which are expected to be an outcome of the study have been grouped into four topics namely: *physical, emotion and mental, social, and intellectual thinking.* The obvious activities that prefer to conduct with children are *role play, art, outdoor activity, music, question and answer, picture matching and etc.* In addition, teachers must know how to generate interest in children and should know popular children's demands such as large and colorful pictures, variety of sounds and loudness of sounds.

2) Awareness and Limitation

Early children cannot concentrate on one topic for longer periods of time. Therefore the learning activities should be time restricted to no more than 15 minutes if possible. Children have learned in various ways such as *social learning by imitation, experiential learning by doing it themselves and educational learning by lesson teaching.* Consequently in the class, a teacher should only prepare lessons and then let children choose it by themselves. Talking about Learning Medias, interviewees have stressed about three issues: *time, color* and *playing style.* Since children mostly focus on activities about the first 15 minutes the Medias should be limited at that time. The game directions are significantly important because children cannot decide how to play games. Having answer is preferred because small children might not be able to win the game. Colors such as blue, green, sky blue, yellow, orange, red or purple are recommended for early childhood. Bright, dark or reflective colors are not proper such as black, bright yellow, bright green.

B. An Alternative Prototype of E-Learning Game

We designed and developed a prototype by using responsive web application framework. Adobe Captivate Program was

selected as a media producing tool and PHP Language was used in creating website. Following the expert recommendations, we provided an e-learning game with proper colors, time restriction, instruction with sound, and answer key. Fig 1 presents the homepage of this prototype.

Fig. 1.   Homepage of e-learning games

The first prototype was separated by three levels and each level had two learning units.

Level 1
 Unit 1.1 Learning Mathematics
 Unit 1.2 Learning Geometry
Level 2
 Unit 2.1 Learning Colors
 Unit 2.2 Learning Food and Sweets
Level 3
 Unit 3.1 Learning Fruit
 Unit 3.2 Learning Comparison

The level 1, 2 and 3 of e-learning games are shown in fig 2, fig 3 and fig 4 respectively. We drew the game and its content from the interview results. The example of game details is shown by fig 5.

Fig. 2.   Level 1 of e-learning game

Fig. 3.   Level 2 of e-learning game

Fig. 4.   Level 3 of e-learning game

Fig 5 illustrated the increase of levels of *Learning Fruit* games, from matching one picture to four pictures. It can be seen that the game was more complicated from bottom to top level. We designed the first mission by pairing one fruit, for example bananas. Children must drag the correct fruit from left hand side to the shadow picture on the right hand side. If player matches incorrect fruit, the system will not allow player to drop an object

on the shadow. The level 2 of the Learning Fruit game were pairing two fruits and followed by paring three and four fruits in the level 3 and 4. We provided the answer for helping the player.

Fig. 5. Increasing level of *Learning Fruit*

However, during the game construction we had question for example: whether children were confused about fruits shape such as watermelon and orange were sphere. To resolve the problem, we asked expert about this issue. The answer was what we draw was a natural object. Children already known about fruits. Children can learn and find the difference.

V. CONCLUSION

This research presented the suitable e-learning games for early childhood and a prototype of e-learning games. The finding makes an alternative of learning games by analyzing the expert recommendation during game developing. The categories and sub-categories can assist future research about e-learning games creation in general and in Thai context in specific. For example, the awareness and limitation about appropriated time learning for children, proper color, and the game style could lead developer as a guideline. However, this study is a case study of Thailand. The findings and prototype are based on the interview results from a few experts.

In the next step, we have planned to evaluate our result by asking the feedbacks from our users. Moreover, it would be more realistic if we extend the result by increasing interviewees. We also have three suggestions about e-learning games. Firstly, parents and teachers must take on account with children closely when playing the games. Secondly, the games would be more attractive if we can increase the local cultural information through game learning. Thirdly, English as a second language in games is the trend of study and work. Including language choices will increase knowledge of languages and this is a competitive advantage and future work.

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