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Research paper



User Experience Improvement with Learning Media using Dance Pads for Mentally Challenged Children

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Abstract

User experience is accentuated to ensure that the learning media suit the students. Six students with disabilities were engaged in compiling this paper. They were diagnosed with mild mental retardation. These students were learning how to concentrate and move their fingers and footstepf in order to be able to reach a certain place. The visualization of the street, fence, and house make this learning media more fascinating to be used. User experience was established by the interaction of the users and the learning media. The interaction was built by the movements of the students' fingers and footstep. The movements of the fingers were facilitated by arrow keys from keyboard, while the movements of the footstep were facilitated by dance pads. The results show that learning media using dance pads provide the average time improvement of 27% faster and more accurate than the motions of the fingers using keyboard. In terms of the attractiveness and interests of children against learning media, 71% of the students expressed this media interesting, 14% of them found it difficult to use, and the rests did not provide any feedbacks. Learning media designed using dance pads can be explore, entertain and make effective learning. Dance pads can be used not only for playing popular game, but also for helping students with special needs to learn.

Keywords: *User experience, learning media, dance pads.*

1. Introduction

Human's interaction with computer or Human Computer Interaction (HCI) emphasizes many aspects; one of them is user experience (UX). UX is about the experiences of the users towards using a product design, application, or web-based media. The emphasis of UX on HCI has opened up people's points of views, including the way people perceive learning media (Takatalo et al., 2010). Learning media in the form of computer application along with its various devices has been widely used because digital learning media can attract the users' attention, the learners' attention in particular.

This present study explored how this media could fulfil the availability of the learning media and improve the ability of students with special needs within the process of comprehending the motions of fingers and footstep. The students with special needs that were observed were the students with mild mental retardation whose IQs range from 50-70. Mental retardation is a complex condition; it indicates low intellectual performance and adaptive behavior impairment (Halahan et al., 2012). Generally, individual with mental retardation experiences two main obstacles; cognitive development and adaptive behavior difficulties.

These predicaments hinder the learning activities that are related to cognitive development and intelligence. In learning activity, retention, comprehension, and the ability of looking for causal pattern are required. A child in general can find these bases of learning. Every child will develop his/ her own ways to memorize, comprehend, and look for the causal pattern of the things the child is learning. Unfortunately, the students with mental retardation cannot embrace these competences. They face this difficulty in processing abstract information. For them, learning should embed concrete objects (Smith et al., 2002). This condition is caused by memory impairment, especially for the short-term memory. Students with mental retardation learn by trying things out. They cannot form any learning pattern. It is difficult for them to see the overall picture of the object they are learning (Halahan et al., 2012).

Technology can help developing children's skill in moving their fingers and footstep. Mentally retarded children need stimuli materialized in the form of visualization helping them to move to their right of left. Graphic competence resulted from the learning media can stimulate the kids to move faster and more precisely. Preparation of the product planning in the form of learning media should focus on the content, presentation, functionality and interaction (Sagirani et al., 2015). Good interaction between a student and their limitations as well as with the learning media that has been well prepared is expected to provide an improvement for students with special needs, especially on their cognition, emotion, motivation, attention, perception and behavior.

Several studies explicated that the interesting components triggered by the software lasted shortly (Goodwin et al., 1986; Kerawalla et al, 2005); however, in other cases, they could last relatively longer (Rosas et al., 2003). This happens because of the situational desire ignited by the learning media. The desire can be maintained in a long-term period that it becomes a personal need (Hidi et al, 2006). Repeated

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involvement of particular contents from time to time provides positive effect on learning. In this present research, the devices used were keyboard and dance pads that can receive input in the forms of the children's movements (i.e. the movements of fingers and footstep) to the right and left, forward and backward. The application of learning media of digital game should offer challenges covering the components of fantasy and develop learners' curiosity that motivate them to learn (Lepper et al, 1987). Distinct level of challenge and immediate feedback can develop user experience. In reference to the users with special needs, students with special learning needs enjoyed games that incorporate simple fantasy along with pictures and visualization of learning materials (Ke at al, 2013), visualizations can offer an alternative way to explain concepts (Yusuf, 2016). The need of interface, ease of access and visualization on existing media also has an important role (Sagirani et al, 2013). It is important that the content of the game be matched up with the students' academic needs and their various skills (Ke et al, 2013).

The components of fantasy can augment students' involvements during learning process while using learning media of digital game. A thing to be noted when developing digital game for children is that the game should meet the students' academic competence and designing bases so that it can encourage the participants' involvements and make the learning material more interesting (Ronimus, 2014).

Many kinds of media that are being used today help disseminate concepts and facilitate people to understand and navigate the world of the users. Users can learn concepts through media and immediately apply the contents that are related to particular ideas, like teaching the students content and idea comprehension through observing narration displayed by certain media. F

or the children with IQ impairment, the implementation of media can greatly assist them during the learning process because the use of pictures, animations, and narrations help the students to understand abstract learning materials.

This paper offers an alternative learning media for children with special needs to be able to move their fingers using keyboard and footstep using dance pads. Dance pads is an interactive music video game that provides a healthy, energetic fitness workout performed to high energy music. People enjoy video games, and using video game dance programs allows to be physically active and have fun at the same time (Marzo et al., 2012). Dance pads be expected can maximize the use learning media for Mentally Challenged Children

2. Materials and Methods

2.1. Identification

The users' constraints: the constraint of the children with mild mental retardation is that, unlike their normal peers, they have no verbal and cognitive skill. Six children with mild mental retardation were observed thoroughly. Their IQs were ≤ 54. They were 9 to 12 years old and were in their primary level of special education. These children had difficulties in understanding the concepts of moving to the left or right; however, they still could move based on instructions.

Skills/Variations of Experiences: Designing digital game-based learning media becomes a different challenge to remember that these students might not own or get used to using digital games. However, appropriate design of the game can make these students follow the learning process with some degrees of accomplishment even-though they have no experience using the game beforehand. They can also spot interesting points while learning.

2.2. Designing and Developing Stages

The next stage is designing and developing learning media. In this stage, the media and software unity were designed. To identify the interaction between the children and the learning media, the media is equipped with input devices of keyboard and dance pads. Keyboard is an input device that has been widely used by people to input letters, numbers, and symbols within a computer system. In this learning media, the frequently used keys are the arrow and enter keys. They are used to provide response of either fingers movements.

The same as the keyboard, the other input device used or called dance pads is a device used to input the movement of the footstep. Dance pads is a flat controller pad of electronic that is used to input data by pushing the provided panels. The dance pad consists of a square pad that rests on the floor and which the player stands on (Nguyen et al., 2012). The pad is divided into several square areas that the player activates (usually with the feet), each area has a printed symbol (typically an arrow). Dance pads is usually utilized in popular games such as revolution dance, groove in, and pump it up (Johanne, 2006). Games designed using dance pads can be exploration, entertaining and an effective form of exercise (Nguyen et al., 2012). Particularly in this learning media, dance pads is used together with computer simulator (PC) widely recognized as stepmania by integrating a special adaptor.

By incorporating these two input devices, the next step is to develop the learning media that can train the students to move their fingers and footstep to reach a particular place visualized as a picture of a house. Following is the visualization of the environment. There are four houses and each of them depicts a place for learning. The kids are asked to visit every house by moving the arrow keys of the keyboard using their fingers and to move using dance pads by stepping on the panels of the dance pads using their soles. The design of the interaction between users (the children) and the input device as well as the learning media is explicated in Figure 1.



Fig 1: Design of the interaction

The visualization of the learning media is equipped with several supporting environments; i.e. a pictures of houses as the main destination, trees to make the visualization more alive and minimize boredom. In some corners of the houses, there are pets such as buffalos, cows, and chickens to make the game more captivating. To limit the students' room for maneuver and to help them focus on the paths they have to take, then the environments are equipped with fences that cannot be trespassed. Simply put, the students must change their routes when they strike the fences. To liven up the atmosphere, audio and sound of bird chirping and animal cries are incorporated. The visualization of the targeted house and enter the first to the fourth house as visualized in Figure 2.

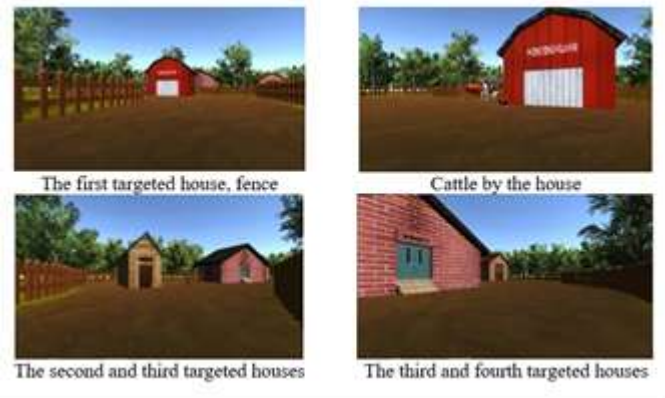


Fig 2: The Pictures of the Learning Media

Each student is asked to use the learning media to train their fingers and footstep movement as well as to focus on the mission set up. The time needed is recorded and compared. It includes the time of children's fingers movement using keyboards and footstep movement using dance pads. Then, these students are questioned how they feel while playing the game. The drawbacks that the students with mild mental retardation experienced are conveyed through their facial expressions recorded while they are playing the game using either keyboards or dance pads.

3. Result and Discussion

Each student will be given an explanation on how to use the devices and missions to complete. Each student will be assisted when they begin moving their fingers and footstep. This assistance is provided to help the students when they find it difficult to translate their tasks. Each student is given a task to use the learning media utilized to train their fingers and footstep movement as well as their concentration while doing the tasks. The main objective is to make the students move along the road until they find the visualization of the targeted house and enter the first to the fourth house.

The time for the students' movements from the first to the fourth house will be recorded. Figure 3 is the record graph of the kids' movements while using keyboard and dance pads, time differences in minutes and in percentage. The records of the use of learning media equipped with dance pads to move the footstep to the left and right as well as to turn and move forward indicated that the movement is 27% faster and more precise than the fingers movements using the arrow keys of keyboard. From the aspects of attractiveness and students' preference towards the use of dance pads, 71% of the respondents considered it more interesting than the use of keyboard, 14% of them considered it difficult, and the rest did not provide any opinions.

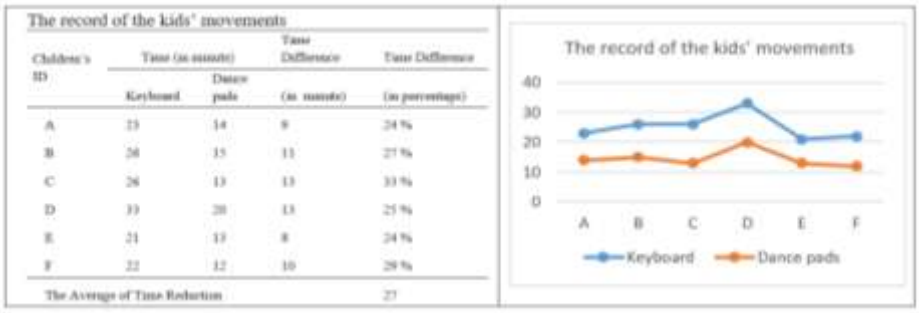


Fig 3: The record graph for the kids' movements

The data of media's attractiveness were obtained by asking the students directly, asking the teacher, and observing the students' expressions while using the learning media.

4. Conclusion

Learning media that incorporates digital game demands the establishment of direct interaction between the students with special needs and the devices used, keyboard and dance pads. These input devices are used to help the students learn how to move their fingers and footstep. The display of this learning media is made more interactive by installing supporting input devices. This media is more interactive since it provides conceptual correlations between the kids' movement and the content of the media. It cannot be separated from human computer interaction (HCI) that focuses on the conceptual interaction. Conceptual interaction is an establishment of a concept achieved through interactive experience of users to the content of media and learning. In this present research, students with special

needs were invited to get involved in learning by using learning media; they were encouraged to learn to move their fingers by focusing on the arrow keys of the keyboard and to move their footstep by focusing on tapping the dance pads. Dance pads helps them to move forward and backward as well as to move to the left and right. For students with special needs, footstep movement is relatively faster than their fingers movement. The movements of their footstep provide greater experience and interaction to the learning media. Therefore, it can be concluded that dance pads can be used not only for playing popular game, but also for helping students with special needs to learn.

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