Design and Implementation of Motion Expression Activity Program Applying LMA to Children with Intellectual Disabilities Using ICT

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Abstract

The purpose of this study is to design and implement a movement expression activity program through ICT using Laban's LMA in recognizing movements of children with intellectual disabilities. Kinect and Laban's movements were used to construct a motion expression activity program. In this research method, screen image screen and theme music were used as contents of musical work <Les Miserable>. The motions of randomly set to 40 kinds, and when the movement of the one coincided with each other, the score was displayed with the ringing tone. The experimental design was conducted for 13 children with disabilities for 4 days (12. 21 ~ 12. 25. 2016). In addition the willingness to match the motion of the screen in kinetic expression activities using Kinect, repetitive exercises gradually improved the completeness of the movements and the final score of the game. This study, it has been observed that curiosity, interest, and immersion in movement expression activity are designed and implemented by using Kinect for the movement expression activity program with a new education game approach that can eliminate the fear of physical activity it was tried.

Keywords: Movement Expression Activity, Laban Movement Analysis (LMA), Kinect, Children with Intellectual Disabilities

1. Introduction

1.1. Characteristics of Children with Intellectual Disabilities

Children with intellectual disabilities are less likely to undergo physical changes such as height and weight compared to non-disabled children, but they become similar when they are fully mature, or the difference is relatively small [1]. However, children with mild intellectual disabilities have physical differences with non-disabled children and may be delayed for 1-4 years [2]. These children with intellectual disabilities tend to have more physical differences because they tend not to have leisure activities or physical activities [3].

The purpose of movement activities of the body is to promote healthy growth and development of body and soul, social development, improvement of physical ability, leisure, interest in own health and body, improvement of confidence in social life, relieving stress, it is a major guideline for conducting a happy life [4]. Physical activity includes all the elements of the emotional, social, and physical aspects, and these factors can help to learn the interactions. In addition, physical activity during childhood promotes physical, emotional, and social development through repeated use of multiple sensory organs [5, 6]. Most of the disabilities of children with intellectual disabilities have complex disorders (developmental disorders, autism, etc.) caused by a lack of sensory and perceptual abilities.

In particular, when students fail to perform tasks due to their inadequate intellectual abilities in school life, they also hinder social and psychological development [7, 8, 9, and 10]. This physical development requires a sense integration movement for children, and this effect is more effective at an early stage [11].

In the case of children with intellectual disabilities, hyperactivity appears in the creative expression activities of behavior when performing unfamiliar behavior [12], and it is evaluated as excessive motivation, excitement, and tension [13]. But because they do not know the sequence of action and how to enforce it, they are seen to be hyperactive behaviors due to impulsive and accidental lack of action [13, 14]. This hyperactivity is a simple behavior due to cognitive cause, but is due to a lack of clarity on how to perform the action for low cognitive abilities. They do not know the order of actions and practices rather than psychological burden [14]. Hyperactivity is assessed as excessive motivation, excitement, and tension during exercise [13]. It is because of the cognitive cause view rather than the mental cause. It is a simple operation but it is not clear how to perform the action due to low cognitive ability [14]. In the case of lack of experience in expressive activity, it is claimed that repetitive learning about various forms improves expressiveness [15].

1.2. Laban Movement Analysis (LMA) theory

Rudolf von Laban[16, 17] who describes the movement as the source of creation, was interested in how all the movements of the human being seen in dance, theater, sports, etc. are expressed in the space in which we live, then he observed and analyzed the movement that were performed by us. It has been very comprehensive and universal about the movements of the body from the actual habitual movement to the artistically creative movement. Laban Movement Analysis (LMA) [18] is an analysis system of motion based on Laban's theory. It is used for human and animal movements and movement of objects as well as various move-
ments expressed in virtual space. And all natural and artificial movements of the human body. The application of LMA which emphasizes the ability of body to recognize the movement, is to help the recognition of the body part that is the basic means of movement for the subjects who have restriction on the natural motion due to lack of recognition of the body part. Laban movement analysis helps to assert the psychological state and assertion in the body's unconscious or conscious movements such as BESS, body, effort, space, shape, and weight (e.g. Figure 1). In each of the four categories, Body refers to what moves, Effort moves, and Shape refers to how it relates to the environment. And the space is the question' where does it move? 'Each of the four elements of Body, Effort (qualitative or dynamic), Shape, and Space are equally important in human motion [18, 19, and 20].

2. Main body

2.1. Kinect Camera

Fig. 2 the Kinect, developed by Microsoft, is a peripheral device connected to the XBox360. It is equipped with a camera module and recognizes the motion of the user with motion capture. The Kinect camera supports not only real time depth information but also provide RGB image and joint tracking information [21].

2.2. Principle Kinect Camera

The principle of the Kinect camera is to use infrared rays to scan the user, and the infrared rays that reach the body are reflected and transmitted to the Kinect. The equipped sensor then captures the distance per pixel according to the reflected infrared rays, and the image processing software recognizes the play in real time. When the user in the recognized state moves, the software displays the screen according to user’s movement [22].

3. Design and Implementation

3.1. Target and Design

The educational sports games designed in this study were used for 4 days (12. 21~12. 24. 2016), for the intellectual disability education program of the local government in South Korea and participated in ages 8 to 18 years. The subjects were selected from 13 children with mild handicaps among the 32 children with intellectual disabilities and they were able to recognize the words for 20 hours a day for 5 hours.

In this study, we used Mat Lab to recognize the user's joints and display them on the screen using the Kinect camera (e.g. Figure 4).
3.2. Musical ‘Les Miserable’ Choreography and Image Production for Kinect Game Production

Fig. 5: Choreography and image creation for Kinect game creation

These motions appear to be self-confident behavior for children with intellectual disabilities and this study suggests that ICT program should be developed continuously through body movements.

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References