

Chapter 34

An Affective Computer–Mediated Learning for Persons with Motor Impairments

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ABSTRACT

In education, it is important to have good communication and interaction between educators and learners to promote a conducive learning environment. However, this is rather difficult for the children with motor impairments, such as children with Cerebral Palsy and Autism. Their learning problems arise due to their motor impairment coupled with speech and intellectual impairments. As a result, children with motor disabilities require more time and attention in learning. To assist the children's learning, this chapter proposes an affective computer-mediated learning model which adapts to learners' emotions where it has an educator representation (i.e. a virtual tutor) to deliver the learning materials and interact with a child in one-to-one learning. The virtual tutor communicates with the child by responding to his/her facial expressions. Post-intervention experiments were carried out to evaluate the performance of the affective computer-mediated learning model. The overall results showed that the proposed affective learning model is able to assist the children's learning.

INTRODUCTION

Communication is one of the vital skills that human beings take for granted. It is a way for people to express and share their feelings, thoughts or information to other people by speaking or performing some sorts of code that a partner can understand. Communication allows a person to socialize with other people. However, not all humans are granted with communication skills. Some people with a disability, such as people with Cerebral Palsy and Autism, find communication as one of the challenges in their life. With communication as one of the barriers, it is difficult for other people to understand their thoughts, and sometimes it causes misinterpretation.

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In this research, the motor-impaired children are referred as children with disabilities. We investigated specifically on Cerebral Palsy and Autistic children. They have difficulties in communication (Bax, Cockerill, & Carroll-Few, 2001; Rye, 1989) and cognitive development (Brighttots, 2011; Johnson, Myers & Council on Children with Disabilities, 2007) that hinders expression of their thoughts and ideas through comprehensible speech. Alternatively, these children use gestures, eye-gaze, facial expressions, or sign-language to communicate in their daily life.

The most important impact is that delays in motor development affect these children's performances in learning. Children with disabilities need more time to process the information and response to the learning content delivered to them, repetition of learning content is essential.

CHILDREN WITH DISABILITIES

We worked with children with Autism and Cerebral Palsy who have motor impairments, and addressed them as children with disabilities throughout the chapter. This section discusses the common characteristics of these children.

Cerebral Palsy (CP)

Cerebral Palsy comes from two words which are Cerebral and Palsy. The word 'cerebral' means brain, and the word 'palsy' means unable to control movement. It happens due to damage to the developing brain, especially the part associated with motor systems, which is caused during the prenatal, perinatal or postnatal period (Kriger, 2006; Miller, 2005; Werner, 1987). It is a disorder that affects movement, coordination, posture of a person.

The level of the CP disorder varies between each other (Peeters, Verhoeven, de Moor, & Balkom, 2009). Nevertheless, CP is one of the types of non-curable disabilities (Cerebral Palsy: The Spastic Centre, 2009; United Cerebral Palsy, 2010). This disorder will follow the child for his life time. More than that, it is neither progressive nor contagious, and they have the same life span as the non-disabled people (Gombash, 1998). Improvements of the disabilities are limited to the treatments regarding the impairments that the child faces. The earlier the treatment or prevention is given, the milder the dysfunction that the child will suffer (Falkman, 2005).

The difficulties with muscle control may affect both arms and legs, or mostly the legs, or one side of the body. After all, it depends on which parts of the brain are affected. Classification of CP is based on the clinical neurological signs, which are divided into three major types: spastic CP or muscle stiffness, uncontrolled movements or athetoid CP, and poor balance or ataxic CP (Rye, 1989; Werner, 1987).

Spastic CP is where children have difficulty in moving their position due to the stiffness of their muscles. Children find moving as one of the challenging things in their life. The movements of their body are very slow, or sometimes it is impossible for them to move. This type of CP can affect one side of the body or merely one part or the whole body. Spastic CP is categorized as the most common type of CP since nearly 80% of the CP children suffer from this type of disorder (Cerebral Palsy: The Spastic Centre, 2009; Werner, 1987).

Athetoid CP's behavior is characterized by uncontrollable movements in the child's feet, arms, hands, where some muscle tones are too high and others are too low. Besides, children with this type of CP experience some irregularly repetitive movements of their part of the body due to the motor function

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