Chapter 6
The Role of Information and Computer Technology for Children with Autism Spectrum Disorder and the Facial Expression Wonderland (FEW)

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ABSTRACT
Autism Spectrum Disorder (ASD) is one of the Pervasive Developmental Disorders (PDDs). Significant deficits in the children with ASD include lack of social communication skills and cognitive dysfunction. This paper reviews and evaluates the influence of different kinds of Information and Computer Technology (ICT) applications that facilitate intervention and training for children with ASD. This paper also presents a novel design prototype, Facial Expression Wonderland (FEW), to train the children with ASD based on the progressive levels of training under a given background context. This prototype is designed to improve the ability of the ASD children in facial expression recognition.

INTRODUCTION
Autism Spectrum Disorder (ASD) is one of the Pervasive Developmental Disorders (PDDs). Currently, the major cause of ASD is still unknown. ASD is commonly characterized by the lack of social skills, cognition deficits in facial expression recognition and Theory of Mind (ToM), language delay and rigid behaviors (American Psychiatric Association, 1994). In addition, most ASD children have certain extent of mental retardation. Typically, in daily life these children lack social communication skills to interact with others and are often seen as social outcasts. For instance,
ASD children, like most children, might not have eye contact with others during an inter-person conversation. Others could misinterpret this manner as rude behavior when meeting these children for the first time. Additionally, they are highly intolerable to slight change of their surrounding environment. These children do not know how to vary with situations even though it may be common and normal thing for ordinary people. For all the reasons above, the life of ASD children as well as the people around them remains a challenge, problem or even struggle.

ASD is a disorder with wide spectrum of symptoms. Currently, there are several approaches that are helpful in understanding the mystery of ASD. Figure 1 diagrams the major approaches in recent ASD research. The overlapped region indicates that different approaches can cooperate with each other when investigating ASD. Researchers from the fields of genetics, psychology or neuroscience have conducted various experiments and observations to identify the cause of ASD (Happe & Frith, 1996; Lamb, Parr, Bailey, & Manoco, 2002; Spence et al., 1985). Noninvasive techniques, such as Electroencephalograph (EEG), Positron Emission Tomography (PET) and functional Magnetic Resonance Imaging (fMRI) have been used as tools to investigate ASD (Brambilla et al., 2004; Koshino et al., 2005; Schultz, 2005). These methods are dedicated to provide prevention and treatment for children with ASD but they could not support ASD children to bypass their disorder in daily life.

However, there exist some forms of solution. Information and Computer Technology (ICT) can accomplish many tasks autonomously, quickly and efficiently. Meanwhile, it is common to make use of ICT in healthcare delivery and management.

**Figure 1. Major methods to investigate ASD**
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