

# A VISUALIZED SCENARIO LEARNING SYSTEM FOR CHILDREN WITH HIGH-FUNCTIONING AUTISM

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## ABSTRACT

*In this paper, a visualized scenario learning system is developed for children with high-functioning autism. The system differs from the traditional communication aids available for autistic children in that, as well as assisting communication; this system assists autistic children in learning how to use objects or context-appropriate physical conduct in specific scenarios. Furthermore, this system employs a cloud server that enables parents of autistic children to upload and share their self-produced communication picture cards with other parents who have similar needs. Additionally, users of this software are not required to possess a specific level of computer knowledge; instead, they can simply select the download function in the software to obtain the learning scenarios shared by other parents.*

## INTRODUCTION

The learning development of children with ASDs (hereafter referred to as autistic children) is the primary concern of their parents. According to statistical data from the Executive Yuan, Taiwan, an average of approximately 1,000 children are diagnosed with ASDs every year [1]. Between 1 and 3 years of age, these children begin to exhibit behaviors that differ conspicuously from those of other children, including difficulty interacting with family members, fixation on certain objects, unusual play, inappropriate responses (e.g., unexpected laughing or continually crying), and delayed reactions to pain, etc.

To improve the communication skills of autistic children, numerous relevant learning materials have been developed and employed [2]-[4]. The two most commonly employed communication-related educational materials are briefly described below. One is paper keyboard, another is communication picture cards. However, despite the convenience and portability of the two educational materials, they possess multiple deficiencies. For example, when autistic children press several the *zhuyin* symbols on the paper keyboard, their fingers can easily shift then causing disruptions in communication. In addition, the paper keyboard and communication picture cards can be easily damaged or lost. Another disadvantage of picture cards is that their

content is restricted to common life objects and, thus, cannot satisfy demands regarding newer objects or specific uses. Updating the content of these cards is always limited by the manufacturer's production schedule. Consequently, parents of autistic children are typically required to self-produce relevant picture cards to satisfy various daily needs.

Based on the above analysis, using a tablet computer, we endeavored to design a visualized communication learning system suitable for children with high-functioning autism. The system provides autistic children for learning how to use object or context-appropriate physical conduct in specific scenarios. Furthermore, this system employs a cloud server that enables parents of autistic children to upload and share their self-produced communication picture cards with other parents who have similar needs. Additionally, users of this software are not required to possess a specific level of computer knowledge; instead, they can simply select the download function in the software to obtain the communication picture cards shared by other parents.

## THE VISUALIZED SCENARIO LEARNING PROGRAM

Generally, visualized learning is the most effective learning method for autistic children. In this study, we designed a visualized scenario learning program performing on a tablet computer and integrating the technique of cloud server. Figure 1 shows a usage scenario for this software, which connects learning objectives and space. In this scenario, we assumed that the iPad displays a realistic scene of a home bathroom. Subsequently, parents set three learning objects in the software: the toilet, the sink, and the bathtub, and embed the corresponding videos or pictures for learning targets. When the autistic child clicks on the bathtub, a shower sign or a learning video of showering appears. This software links the bathtub to the learning objective (i.e., shower), thereby enhancing the autistic child's learning outcome. With this software, parents can easily use a tablet computer to construct spatially realistic scenes and provide corresponding pictures and teaching videos without using personal computers or digital cameras. Consequently, our program provide a simple and intuitive

function to help parents finish their learning content, and no other computer or image-capturing equipment is required.

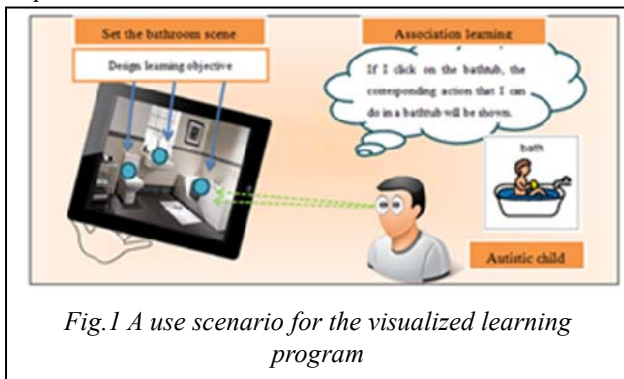


Fig.1 A use scenario for the visualized learning program

## THE PROCEDURE OF CONDUCTING LEARNING CONTENT

The purpose of the visualized scenario learning program was to assist autistic children in learning how to use objects or context-appropriate physical conduct in specific scenarios (e.g., showering and tooth brushing). Because autistic children have limited linguistic comprehension, we endeavored to improve their learning outcomes through a visualized learning method using pictures or videos. When an autistic child selects a specific scenario (e.g., the bathroom), the system displays learning objects in that scenario. When the child then selects these objects, the system shows pictures or videos that correspond to the object and provide an explanation. For example, selection of the toothbrush on the sink triggers a video of tooth brushing or several pictures of the actions involved in tooth brushing (e.g., a series of pictures of toothpaste being dispensed, tooth brushing, and mouth washing). By employing pictures and video imagery, autistic children can easily and directly practice and learn object use and relevant behaviors.

To achieve the objectives mentioned previously, this system provides parents of autistic children with the function to set scenarios and construct practice materials on a tablet computer (Fig. 2). In the function, the setting of scenarios is primarily based on real-life spaces, such as household scenes (e.g., the living room, bedroom, bathroom, and dining room), and other scenes (e.g., schools, parks, and public locations). Using a tablet, parents capture an image of environments that are familiar to their autistic children as the scenario background, and they could also capture photographs or videos to be embedded into the learning object. As shown in Fig. 2, the learning objects for this scenario are selected and the actions corresponding to an object can be designed easily on tablet computer. Explanations with incorporate pictures and videos enable autistic children to understand each learning contents through the visualized learning method.

## CONCLUSION

This paper develops a visualized scenario learning system for autistic children. This system assists autistic children in learning how to use objects or context-appropriate physical conduct in specific scenarios; and employs a cloud server that enables parents of autistic children to upload and share their self-produced communication picture cards with other parents who have similar needs. Additionally, users of this software are not required to possess a specific level of computer knowledge; they can simply obtain the learning scenarios shared by other parents.



Fig.2 Set scenario function and construct practice materials on a tablet computer

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