

# Training Software of Input Device Operation of Personal Computers for The children with physical and intellectual disabilities

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**Abstract**— In special education schools, students with disabilities are learning by using personal computers to overcome their disabilities in life and in study. However, existing learning software in the real world might not be always proper for the students. Especially, children with physical and intellectual disabilities are difficult to understand how to operate input devices of personal computers, so typically they cannot use the devices without problems.

In this paper, we propose a step-by-step training procedure for them to learn operations of input devices of personal computers and the training software for this procedure. Two students with physical and intellectual disabilities have used the proposed software. As the result, at present, one student has understood how to use the one-button switch and the “auto scanning function” for several selectable objects, while the other has understood only how to use the one-button switch.

**Keywords**— children with disabilities, children with physical and intellectual disabilities, special education, training procedure, training software

## I. INTRODUCTION

In the special education schools, students with disabilities are learning by using personal computers to overcome their disabilities in life and in study, and eventually to be able to live as independently as possible. However, existing learning software in the real world might not be always proper for the students, because their disabilities are very different for each one. Especially, children with physical and intellectual disabilities are difficult to understand how to operate input devices of personal computers, so typically they cannot use the devices without problems.

## II. OBSERVATION OF USING PERSONAL COMPUTERS

At the begging of our project, we have observed actual situation where two students with physically and intellectual disabilities whose mental ages were about 2 or 3 were using personal computers at Hokusei Kirara Gakuen special school for the physically handicapped as one of special

education schools in Mie prefecture. We have found that they have been interested to operate personal computers, but they didn't understand how to use them properly, especially how to use input devices, so, they operated the computers randomly.

We have decided to carry on our project with the following two steps and have asked the above two students as the examinees.

### (1) *Selecting the proper input device*

First, we have been selecting the proper input device for each student. They cannot use keyboard and mouse suitably, because they cannot control their muscles smoothly. We should decide which input device is proper for each.

### (2) *Training of input device operation*

Next, we have been developing and improving the training procedure and training software to understand how to use the selected input devices.

## III. SELECTING PROPER INPUT DEVICES

### A. *One-button switches*

From the above observation, we found that both students should use one-button switches as the input device. Touch displays are improper for them, because they cannot touch proper positions on the screen of displays. We have selected the touch switch shown in Fig.1 (a) for one student, and the big switch shown in Fig.1 (b) for the other. We have considered that the children would be able to operate the switches without physically efforts.



(a) Touch switch (b) Big switch

Fig.1 One-button switches

### B. Auto scanning function

Using the only one-button switches, they cannot select any objects on a computer screen. In this case, it is need to assist input operations by input assisting software. We decided to adopt the “auto scanning function” so that the children can select more than one objects on a computer screen with only one-button switch.

The “auto scanning function” is the most popular method as the input assisting function of software. This function scans objects on the screen successively at regular time intervals, shown in Fig.2.

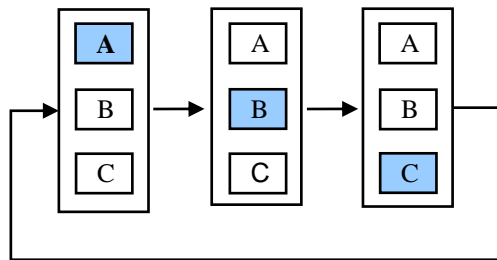


Fig.2 Auto scanning function

## IV. TRAINING PROCEDURE OF INPUT DEVICE OPERATION

We propose a step-by-step training procedure for children with physical and intellectual disabilities to learn operations of the input devices of personal computers and the training software for this procedure.

### (Step 1) Operating the one-button switch at appropriate timing

At the first step, children will learn to operate one-button switch appropriate timing as ready to understand the “auto scanning function”.

The leaning content of this step is simple. By operating the one-button switch at the appropriate timing, they can play an animation they are favorite. If they operate the switch at not appropriate timing, the animation will stop and they cannot watch the animation several seconds.

### (Step 2) Understanding the “auto scanning function”

At the second step, they will learn to use the “auto scanning function” for several selectable objects on a computer screen.

By using the training software, among several animations, they can choose the favorite one with only one-button switch. This training makes the children understand the “auto scanning function”.

### (Step 3) Choosing a object from many selectable objects

At the final step, they will learn to use the “auto scanning function” for many selectable objects hierarchically placed.

The children will select one category of animations from three and then choose one title of animation they are favorite from three in the selected category. After the selected animation will play for some constant time, it will stop automatically. The children should choose the animation using by the one-button switch again. The state transition diagram of this software is shown in Fig.3.

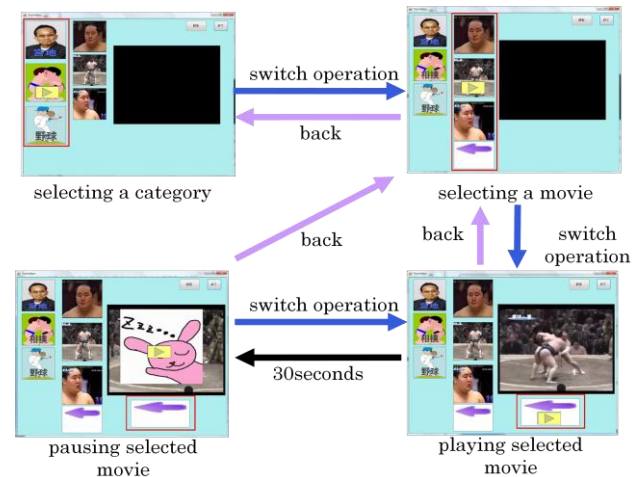


Fig.3 State transition diagram of training software for step 3

## V. CONCLUSIONS

At the first step, the both student have been able to operate the one-button switches without failure. At the second step, one of them has been able to select any object using the “auto scanning function”. The results show the possibilities that, by using the step-by-step training procedure and training software for this procedure, children with physical and intellectual disabilities can understand and operate one-button switches and the “auto scanning function”. We are developing the training procedure and the training software continuously, and, in the future, we will provide them for the above children and the others.

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