Applying the Design of a Single Mouse with Multiple Cursors to Effectively Integrate Special Students with Comprehensive Learning Environment to Promote Their Curriculum Participation and Happiness

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Abstract. Through adjusting the curriculum, comprehensive learning environment design, and information technology aids to effectively integrate disabled students with learning, in order to assist them to control environment or communicate with people, and to improve their ability of independent living. Orange technology is the current trend to advocate that high-tech should be emphasized on human and social care, and to create happiness technology. However, whether these various assistive devices, and the blueprint of living and teaching can bring the true happiness to disabled students needs to be considered.

Therefore, this project proposes a design of single mouse with multiple cursors to assist these disabled students who have poor control of hand movements or poor hand-eye coordination, and who have difficult to move the cursor to click or enter commands and data. This design is able disabled students to shorten the computer operating time through quickly moving the mouse cursor to the position, and the experimental teaching is also carried out. Not only to analyze the effectiveness of the proposed design, but also to realize whether the design is effectively integrated into the comprehensive learning environment of special students under the experimental teaching process, and whether the design is able to improve disabled students’ successful learning experience and to enhance their curriculum participation and happiness.

The research program brings forward innovative technology and application with matching experimental teaching design, evaluation and feedback-modified system. The result of the experiment shows that the implement of the method which help to raise interest of learning could been expanded to other type of disabilities.

Introduction and Literature

Pointing is the most often input function for mouse, lots of tools invented for assisting disabilities to move their mouse’s cursors to position the target rapidly, correctly and easily [1-6]. Park et al. (2006) proposed a project which set an activate area surrounding the target. When we move the mouse into the activate area, the cursor would move to the target automatically, which could move by jumping and gravity two ways [5]. The project indeed could improve the moving efficiency, but when there is more than one target on the screen, the cursor might be disturbed by other targets. Fortunately, Shih et al. (2009) came up with an idea about rewriting the way to drive mouse with software technology to redefine the mouse’s functions and by the collocation of Automatic Pointing Assistive Program, the idea had solved the predication [7].

To some disabilities who couldn’t do computer input with mouse, the switch is also widely been regarded as substitutable device [8]. Equipped the MouseKeys in Microsoft Windows provides disabilities be able to control the cursor moving up, down, left and right with number buttons on the keyboard. What’s more, they can also adjust the cursor’s moving speed with function buttons. However, MouseKeys, which provided by Microsoft, moves progressively. It makes the cursor arrive to the appointed site correctly, but would take lots of time when long-distance movements.
These designs are not convenient for disabilities in practice, including the speed of movement, stability and the problem that buttons are too small [9, 10].

In order to provide disabilities with more functional input method, Shih et al. (2007) invented a two-section-moving input system to assist them to move their cursors. After experiment, the result proved that the device moves more rapidly and stably than Microsoft’s MouseKeys. But the device required additional cost of hardware and repair and maintenance. Later, Shih et al. (2010) proposed a device which applied matrix cutting and screen-assisting-windows. The device enables users to use the pointer (number buttons) bought from retail shops that could save the expense for hardware and repair and maintenance [11]. Though the method proposed by Shih et al. (2010) improved the efficiency of input, there were still some limits while using. For example, when the screen resolution is too high or the target is smaller than the split windows, user is unable to move the cursor. If the user wants the cursor to move accurately, he has to increase the times of cutting windows or the number of buttons. That’s it, the complicated steps would cause the user inconvenient and inefficient while operating.

Further, to help disabilities to operate their computers with input devices they bought from retail shops and to make their mouse cursors move more correctly and efficiently, this program comes up with a design of single mouse with several cursors, which can assist disabilities to use their mouse more efficiently. Due to the big difference among disabilities, the test objects of this experiment are disabilities whose hands are unable to do a wide range of movement and it is difficult for them to make cursor do long distance movement with general computer monitor equipped with only one cursor. On the other hand, this research sets the monitor to produce several virtual cursors and those virtual cursors would become moving while the mouse moves. And that the user could choose the nearest cursor to move to the target. This design make a computer with only single cursor expand to multiple virtual cursors so that it could shorten the moving distance and time, and then raises the efficiency of moving. The research program brings forward innovative technology and application with matching experimental teaching design, evaluation and feedback-modified system. The result of the experiment shows that the implement of the method which help to raise interest of learning could been expanded to other type of disabilities.

Methodology

Participants

This research develops the Game-Based animation and combines them into lessons to evaluate if disabilities children could increase the number of correct times of operating the mouse by the way of cooperation partnership. Take Mr. Chen and Mr. Lin as example, the following are the related information about three objects:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Mr. Chen</th>
<th>Mr. Li</th>
<th>Mr. Hsu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>19</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Common</td>
<td>1. Able to follow simple instructions, verbally communicable</td>
<td>2. Have difficulties executing fine actions, such as writing or delicate finger movements</td>
<td></td>
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</tbody>
</table>

Training

Step 1. Let three students play the game which is developed by this project and they are required to operate the mouse individually. Then ask them to record the frequency of hits in the Life Curriculum every twice a week.

Step 2. Three students play the game again but this time they are required to operate the mouse at the same time. (Figure 1) Then ask them to record the frequency of hits in the Life Curriculum every twice a week.
Results

The result from the experiment shows that three objects indeed raise their learning efficiency with the application of a single mouse with multiple cursors. At the first part, we conduct information analysis with vision analysis, which demonstrates the change of rising with information drawn on the line graph and uses vision analysis to conduct the analysis of changing in stages; next, at the second part, add up information of the exam stage with C and find out if they are all able to reach the standard of statistics. The last section, investigate the actual impact about raising learning effects with the aid of a single mouse with multiple cursors.

Discussion

The project gets benefits from three aspects, the following are:

On the social oriented: By the production of game animation, it could stimulate Autism’s learning motivation and interest and that helps them to increase their social interacting skills and living quality. What’s more, the result even cut down the expense of health and care and social cost.
On the academic oriented: Based on the concept of comprehensive learning environment and considering modern learning type for special education students, we have to re-examine comprehensively. Following the process of the system developing and conforming with technologic supplementary to design a new academic program with sense of happiness and technologic. Besides, develop teaching strategy and combine them with supporting software tools and websites to improve the common problem which is more and more serious that multi-physical-disabilities students are often lack of interest of learning in the class which leads to the outcome of ineffective teaching recently.

On the economic oriented: To popularize the technologic subsidiary to entire country and make those people who need the assistance could enjoy the benefits that the subsidiary brings.

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Reference