# Programmed Instruction to teach pointing with a computer mouse in preschoolers with developmental disabilities

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## Abstract

Programmed Instruction combined with experimenter-provided prompts (physical, verbal, and gesturing) was used to teach pointing with a computer mouse. Three preschoolers who scored at least 1 year below their chronological age levels participated. During the pre-assessment, none of the participants demonstrated pointing. However, they could press and release the mouse button. Programmed Instruction consisted of three stages, based on an analysis of the behavioral pre-requisites for pointing. Stage 1 was designed to teach participants to move the mouse. Stage 2 was designed to teach participants to move the on-screen cursor onto specific items on the screen. Stage 3 was designed to teach participants to click on specific items on the screen. Experimenter-provided prompts were used to facilitate skill acquisition at each stage. The post-assessment showed that all participants learned pointing after intervention. The intervention package consisting of Programmed Instruction and experimenter-provided prompts was effective for teaching the hand–eye coordination required for pointing.
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Computer-based instruction is widely used in special education (e.g., Lancioni & Boelens, 1996; Leung, 1994; Mastropieri, Scruggs, & Shiah, 1997; Merzenich et al., 1996; Tallal et al., 1996), including the field of Applied Behavior Analysis (e.g., Dube, Iennaco, Rocco, Kledaras, & McIlvane, 1992; Dube, McDonald, & McIlvane, 1991; Lane & Critchfield, 1998; Neef, Bicard, & Endo, 2001; Saunders, Johnston, Tompkins, Dutcher, & Williams, 1997; Stromer, Mackay, Howell, & McVay, 1996). In the previous reports, many researchers have used a touch panel as a computer-input device. Although there might be other reasons for researchers to use a touch panel (e.g., automated data collection for selection-based response classes), special education teachers may sometimes encounter difficulty teaching their students to use a mouse. For such students, unless a computer is equipped with a specialized alternative input device such as a touch panel, their access to the growing number of well-designed educational programs available to computer users is limited.

A mouse is one of the most familiar input devices. This device can be used for almost all computers. The movement of an arrow-shaped cursor on the computer screen is achieved by moving the mouse. People can interact with a computer by pressing and releasing the button of the mouse. The two basic mouse actions most commonly used are *pointing* and *dragging*. For pointing, people move the mouse in order to move a cursor on the computer screen. When the cursor is pointed at a specific item such as an icon, picture, or text, they press and release the mouse button to send functional commands to the computer. Pressing and releasing the mouse button to send functional commands is often called *click* or *clicking*. In dragging, the mouse button is pressed and held down when the cursor is on a specific item on the screen and then the mouse is moved while the button remains held down. When the cursor reaches another specific item the mouse button is released sending a command to the computer. Dragging is often used to draw, move, or highlight objects. Previous studies have shown that normal four-year-old preschoolers demonstrate pointing and dragging (e.g., King, 1992). Even three-year-old children show the ability to use a mouse (e.g., Stronmen, Revelle, Medoff, & Razavi, 1996). Pointing is easier than dragging for both children (e.g., Joiner, Messer, Light, & Littleton, 1998) and adults (e.g., Mackenzie, 1992).

Some studies have indicated that children with developmental disabilities have the ability to learn pointing (e.g., Durfee & Billingsley, 1998; Missiuna, 1994; Shimizu & Yamamoto, 2000). For example, Durfee and Billingsley (1998) reported that a mouse was a more effective interface device than a touch panel for a boy with spastic quadriplegic cerebral palsy. Shimizu and Yamamoto (2000) assessed the pointing skill of 16 students with severe and moderate mental retardation ranging in age from 7 to 12 years old. Eight students demonstrated pointing without any problems, four students demonstrated gradual improvement throughout the assessment and four students could not use a mouse. In addition to these findings, we have found in our laboratory that many preschoolers who are identified as ''preschoolers with disabilities'' demonstrate the ability to use a mouse. However, some do not. The number of children who are able to use a mouse might increase if the teaching process is highly controlled with the application of behavioral technology.

The purpose of the present study was to develop and evaluate an instructional sequence (intervention) to teach pointing with a computer mouse to three preschoolers with developmental disabilities. The strategy had three characteristics: (a) breaking the terminal