Keyboard Training and Hotkey Macros for an Operational Support Person with Cerebral Palsy in a "Paperless" Office

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The employee

Joan's disability is cerebral palsy. She has good control over her left arm, but moves it slowly within a slightly restricted range of motion. She types with her left index finger and thumb. With her right arm, she has slightly less control and range of motion than with her left. Although she can type with her right hand, she prefers not to. Her speech is only slightly affected; she speaks clearly but somewhat slowly. Joan uses a powered wheelchair for mobility.

For many years Joan worked in a government call centre. After it closed, she transferred to another department to work as an operational support person in a "paperless" office.

The job

Joan verifies scanned documents against information stored in databases; issues certificates; and prepares correspondence.

To facilitate the comparing of documents, Joan and her co-workers have side-by-side monitors. The two monitors function as a single desktop; employees routinely drag documents from one monitor to the other, and resize documents to fit the screen. They use seven Windows-based applications, four of which were developed in-house.

Factors affecting job performance

Software problems

The four proprietary applications were not designed with accessibility or usability in mind. Screens tend to be visually busy, keyboard support is spotty, and functional irregularities are common.

Physical access

Joan accesses her PC with a Cherry mini-keyboard and numeric keypad (G84-4100 and -4700). She places the keypad to the left of the keyboard to give her easy access to **Enter**, **backspace**, arrow keys, and MouseKeys. When the workstation is set up properly and

she uses both hands, Joan can reach all areas of the keyboard and keypad without undue strain.

Joan uses a regular mouse. She formerly used MouseKeys, but found them frustrating. However, she still uses MouseKeys to drag-lock and double-click. She is not a good candidate for a trackball or touchpad.

Using a mouse and MouseKeys slow her down considerably. Although she can click on a button in five to twenty seconds, there are many tasks - especially those that involve dragging - that can take several minutes. Sometimes she does not even complete these tasks. (Many of these complex tasks can be completed by pressing a sequence of two or three keys on the keyboard.)

In addition to contributing to inefficiency, Joan experiences painful back spasms from using a regular mouse. In her previous job, she missed work due to mouse-induced pain. Because her range of motion is limited, she cannot maintain neutral working postures when accessing a mini-keyboard, keypad, and mouse. The three devices take up too much space.

Learning style

Joan may have learning disabilities that she does not know about, or has not disclosed. The idea of moving the mouse cursor diagonally instead of vertically and horizontally is almost incomprehensible to her; her time management and organizational skills are weak; and she has difficulties applying skills learned in one context to another.

She tends to learn by rote. She internalizes sequences of steps by performing them repeatedly, but does not always understand why they work, or what to do if the steps fail to produce the desired result.

Computer skills

Joan's computer skills were inadequate when I began working with her. For example, she did not know about right-clicking; did not always know when to click and when to double-click; did not realize that Windows has two different cursors (the insertion point and mouse pointer); and did not know how to use MouseKeys effectively.

Accommodations

Over a two-week period, I developed macros for Joan and provided her with training/coaching. (These measures were part of a complex accommodation that included building modifications, work area reorganizations, telephone modifications, ergonomic adjustments, and speech recognition training.)

Training/coaching

Joan and I met nine times over a ten-day period for two- to five-hour training sessions. The training focused on keyboard techniques, but also included basic Windows and MouseKeys concepts and skills. My approach to keyboard access was to introduce general techniques rather than to have her memorize hotkeys. These techniques included working with menus, navigating to controls, task switching, discovering shortcuts, and using macros.

Macros

I developed 17 Macro Express macros to launch applications, workaround inconsistencies, and simplify multi-step procedures. I concentrated on tasks that Joan performed with difficulty. For example:

- Joan needs to move documents from monitor to monitor. ***Solution:*** A hotkey macro to move the window that has focus to the other monitor, and resize it to fit the screen.
- When reviewing scanned documents, Joan struggled to click on two small "zoom" buttons. ***Solution:*** Two application-specific hotkey macros that click on the appropriate buttons.
- In the same application, scrolling can only be accomplished by pointing-and-clicking. ***Solution:*** Six application-specific hotkey macros: The four arrow keys scroll vertically and horizontally, and **PgUp** and **PgDown** go to the previous and next page.
- The software developers accidentally used "**T**" as an accelerator twice on a screen. Pressing **Alt + T** activated the "wrong" command. ***Solution:*** A window-specific macro activated by **Alt + T** that sends keystrokes to trigger the correct command.
- Joan often "loses" the mouse pointer, and spends time trying to find it. ***Solution:*** A hotkey that moves the mouse pointer to a particular spot on the screen.

Results

After about 30 contact hours, Joan was using 10 or 12 of the macros. She was much less reliant on the mouse; but when keyboard access was impractical or impossible, she was more likely to use MouseKeys than reach for the mouse. She also decided to try using her right hand for the directional keys on the right side of the keyboard.

The back spasms began to abate immediately. Six weeks later, she reported that the spasms were much less of a problem.

As she began to internalize new techniques and work habits, her productivity quadrupled: She completed a task that initially took her over an hour in 16 minutes. With practice, she may shave four to six minutes from this time. Experienced co-workers without disabilities perform the same task in about five minutes. Joan's supervisor recognizes that Joan cannot work as quickly as her co-workers, but is not overly concerned. He is obligated to meet production goals *and* to accommodate employees with disabilities to the point of undue hardship. Joan's accommodations do not cause undue hardship.

Cost

The cost to develop the macros and train Joan was approximately $4000.

Payback period

Assuming that these accommodations increase the monetary value of her work by $50 per day, they will pay for themselves in four months.