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THE CBT CRAFTSMAN

CBT For The Visually Impaired

The creativity and craftsmanship inherent in good CBT can help even those students who can barely see at all.

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The ability to see—and see well—is a covert prerequisite for anyone trying to learn via CBT. Although there are a few systems that employ audio, virtually all of today's CBT programs use the computer screen as their main communication vehicle. In spite of my work in screen design, I never really gave the need to see much thought until I tried to demonstrate CBT to Capt. Grace Hopper (retired) of the U.S. Navy, one of the first digital computer programmers and one of the most inspiring proponents of patriotism since Kate Smith.

There I was, a young course developer trying to establish CBT at Digital, when in walked the grandmother of Cobol with the vice president of educational services as her host. I had, of course, a carefully prepared demonstration of our best courseware. I brought up the first screen of the first course on my trusty VT100, and Capt. Hopper immediately remarked, "That's terrible." So much for trying to impress her, not to mention my boss's boss's boss. Luckily, Capt. Hopper went on to say that the problem was not necessarily with my courseware, but with the terminal. The septuagenarian said that the text was just too small for her to see clearly. I felt a bit relieved, but the rest of the demonstration fell flat, to say the least.

There's little importance in what you put on the screen if the students can't see it. At the Research Centre for the Visually Handicapped at the University of Birmingham, England, however, Paul Blenkhorn is demonstrating that CBT can be a very effective medium for teaching people with impaired sight. The work at the Research Centre spans many areas. It ranges from the development of large, clear type fonts for display on computer screens, to keyboard interfaces that allow Braille to be entered from a standard keyboard, to synthetic speech interfaces for Britain's Prestel and Teletext networks that allow these important national data bases to be accessed by the blind. My focus, however, will be on Blenkhorn's work in using CBT to train the visually handicapped to discriminate shapes, colors, and sizes, as I found the craftsmanship in his programs to be unequalled even in programs designed for the sighted.

One major component of Blenkhorn's craftsmanship is the ease with which his courseware can be adapted to individual students' visual handicaps. Because of this feature, Blenkhorn calls his software "person-based," and he has been able to train teachers quickly to tailor the courseware to the needs of the students with a wide variety of visual impediments. For example, teachers can change the color of a display or icon simply by pressing the C key. Additional C keypresses rotate through the system's available color palettes. There is no need for teachers to learn a command syntax, how to use a menu, or even how to correct an error. If teachers go past the color they want, they simply need to press the C key repeatedly until the desired color reappears.

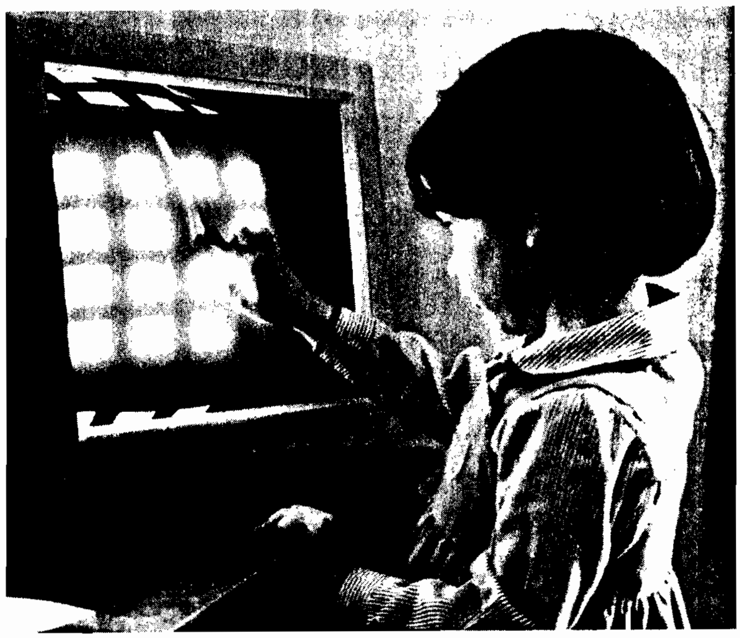
A second major component is Blenkhorn's extensive knowledge of his target population, which explains his meticulous attention to the minute details of his programs. An afternoon with this researcher is akin to a basic course in the problems of the visually handicapped. Blenkhorn told me that a significant proportion of the children classified as visually handicapped in Britain are also classified as mentally handicapped. These children need confidence and reinforcement as much as they need skills training.

Blenkhorn has therefore programmed variations on several popular computer games specifically tailored for the visually handicapped. He points out that it is important that students don't lose a game before they even start. His version of Breakout, for instance, begins with letting students just practice watching the "ball" move. They don't have to do anything but concentrate on seeing the ball and distinguishing it from the background. The next level of the game lets them practice moving the "paddle" without the ball on the screen. This allows students to coordinate the movement of a joystick with the visual feedback of the moving paddle. Most of us have children who amazed us by how fast they mastered this skill, but you can imagine how difficult it is for a child who is severely visually handicapped.

At the next level, the game operates in super slow motion, with bright colors on a distinctly uncluttered screen. In addition, Blenkhorn wrote his program so that only one thing moves at a time, either the paddle or the ball, but not both. The craftsmanship in these minute details allows Blenkhorn's students to enjoy activities they would not otherwise be able to handle while gaining much-needed eye training and reinforcement.

The third major component of Blenkhorn's craftsmanship is the seemingly infinite creativity with which he programs numerous variations on a single exercise theme, so that richness of the computer interaction can grow with a student's ability. To demonstrate this, Blenkhorn showed me courseware that makes very heavy use of touch-sensitive screens. He prefers touch screens to joysticks, mice, microphones, and most other non-keyboard devices, he says, because touch screens allow students to focus their attentions solely on the screen, rather than requiring them to be aware of an alternative input device.

He began by showing me a program that simply required a student to touch the screen. In one variation in this program, a bright block appeared where the students touched the screen as soon as they touched it. In another, the students had to hold their fingers there for a second before the block appeared. In a third, they were required to retract their fingers before the block appeared. The variations then



Touch screens like the one above are better for CBT, says programmer Paul Blenkhorn, because they allow students to focus their attention solely on the screen, rather than on alternate input devices like joysticks or mice.

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took a slight turn. The one shown in the accompanying photograph exhibited what Blenkhorn calls a "tiddlywink" effect: the screen was filled with a matrix of bright boxes, and touching one caused it to jump away. Another had a moving box that students tried to "catch" by touching. The "boxes" then took on different shapes: circles, triangles, letters, rectangular icons. And different colors. On different backgrounds.

I thought I'd seen it all, but I was sorely mistaken. A few keypresses and four boxes appeared on the screen, three identical and one different. Here, Blenkhorn explained, students are asked to touch the one that's different. But he could present the discriminatory task with incredible variety. He could make all of the shapes the same and alter one of the colors. He could make any of the four be "the odd one out." He could make all of the colors different so that students had to identify the one difference in shape from all the differences in color. He could make the four shapes appear as two rows of two, or in a diamond shape. He could make the difference more subtle by making one of the shapes a mirror image of the other three. And of course he could add a fifth box or simplify the display to three boxes. It's important to realize, Blenkhorn explained, that these variations are not merely programming exercises. Each major variation was actually requested by a teacher to address a certain kind of visual handicap.

The last major component (which pervades the other three) is the number of parameters that Blenkhorn allows teachers to manipulate in these programs. I have already spoken of the round-robin technique he uses to allow color selection, but he uses similar techniques to allow teachers to specify parameters such as speeds, required response types (touch and hold versus touch and retract), response latencies, icon size, icon type (meaningless shapes, versus shapes such as letters, versus complete words), icon positions, and so forth. He calls it "person-based." I call it craftsmanship.

In spite of these achievements, Blenkhorn remains committed to improving his craft. As one would expect, Blenkhorn's newer programs are considerably more sophisticated than his earlier efforts. He told me, however, that his favorite program may still be the very first one he wrote. This simple program provides teachers with a method for displaying various bright, flashy shapes and colors on the screen at the touch of a key. It serves as a tool to help teachers find out what their students can see. In one instance, a teacher sat a child thought to be blind in a darkened room facing *away* from the screen. One of his most thrilling experiences, Blenkhorn reports, was to see that student turn toward the screen when his courseware produced certain displays, proving that the student actually did have some vision.

Paul Blenkhorn's work represents the best of what can be achieved with a strong sense of your target population, a meticulous attention to detail, and a craftsman's way of seeing. Once again I invite readers to bring other talented developers to my attention so that I may highlight their work in this space and so that we may all learn from their creativity. ☐