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THE CBT CRAFTSMAN

CBT In The Oil Fields

Tom Rebstock's CBT course on repairing mud cleaners is anything but muddy—in fact it's a shining example of instructional and graphic clarity.

Jesse M. Heines

I am often asked to recommend a course of action for learning to develop CBT programs. I've never been able to formulate a comprehensive prescription for this task, but I can identify the three activities I've found most worthwhile for my own learning. First, look at as many CBT programs as you can get your hands on. Second, write your own programs at every opportunity and analyze their shortcomings. And third, talk to experienced developers about the design stages, implementation problems, and review processes they go through to develop their own programs.

This month's column deals with this third activity. Continuing the effort I've pursued since January to "highlight the work of other CBT developers whom I consider to be true craftspeople," I asked Tom Rebstock of the Texas State Department of Highways and Public Transportation to let me write up some of his work in this space. Rebstock responded by sending a set of screen slides made for a presentation at a conference of the Association for the Development of Computer-based Instructional Systems (ADCIS), along with a tape narrating their development and use. Viewing the slides and listening to the tape, I quickly realized I was in for another enlightening afternoon like the one I spent with Paul Blenkhorn, the subject of my last column ("CBT For The Visually Impaired," March).

Rebstock's program achieves a unique level of graphic beauty while maintaining a strong focus on instructional function. I can't reproduce all of Rebstock's slides in this space, but I will try to give you a feel for the way he described the lessons as a whole by reprinting four of them and relating extracts from his narration.

The program Rebstock described was designed for SWECO, Inc., a California-based manufacturer of oil-field equipment. The program was implemented on Control Data Corporation's *Plato* system. The target students were SWECO service representatives, typically men with very strong mechanical skills who could "fix most anything." The lessons in Rebstock's program dealt with servicing the SWECO mud cleaner, a device used to filter particles loosened by the drill process from the fluids used to cool and lubricate the drill bit. Note that this program used a touch screen, which allowed students to respond by simply pointing to specified areas of the screen.

The first lesson covered external parts identification, which means identifying the name and function of the machine's various parts on an *external* view of the mud cleaner (see *Figure 1*). The first time the students saw this screen, all of the boxes were empty and the program allowed students to touch any box. When they did so, the box would be highlighted (as "Hydroclones" is in Figure 1) and the name and function of that part would be shown at the bottom of the screen.

After students had examined each part and all the boxes had been filled in (the state of affairs in Figure 1), the program would go into drill-and-practice mode. The contents of the boxes were erased and the program would randomly select a part name and function description to display at the bottom of the screen. Students

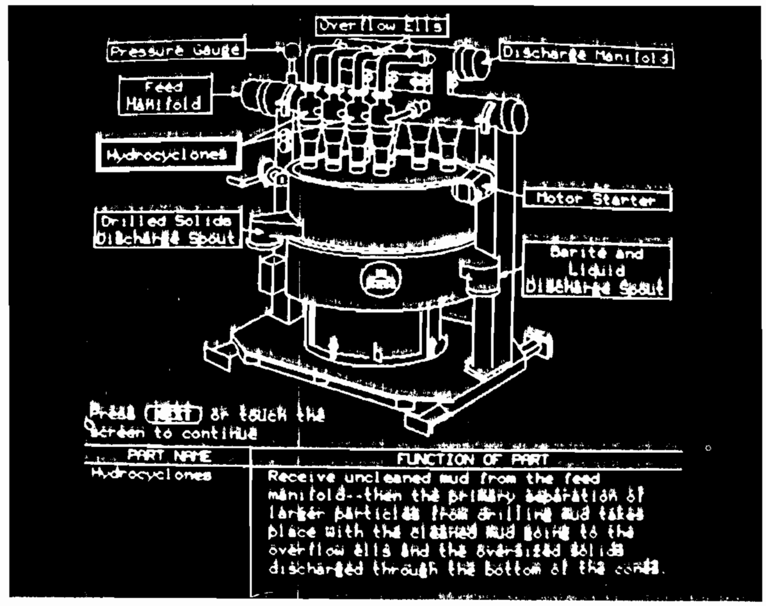

Figure 1 shows an external view of SWECO's mud cleaner, the subject of Tom Rebstock's CBT course. In this screen, the student has touched every part and the diagram is filled with part names as a result.

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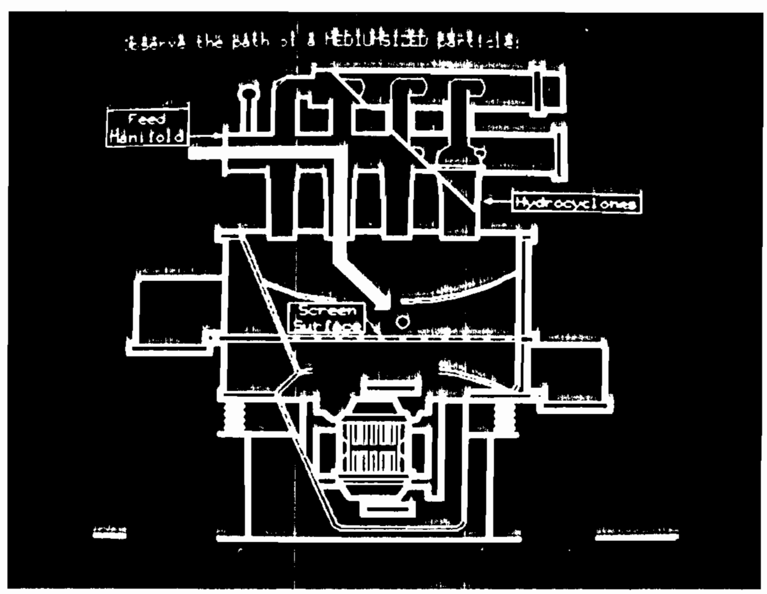

Figure 2 shows a cutaway view of the mud cleaner, and the program's feedback for an incorrect response. The student has pressed the wrong box; the program highlights the wrong choice, which then remains in the "pool" of possible answers.

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responded by touching the box pointing to the part description and were given feedback on the correctness of their response. Students could terminate this lesson at any time by touching a box labeled "stop."

The second lesson followed the same overall design, but dealt with the mud cleaner's *internal* parts. Rebstock commented that these detailed graphics took about a week to draw with the existing technology, but, as the figures show, this effort produced diagrams of exceptional clarity.

Figure 2 shows a cutaway view of the mud cleaner and the program's feedback for an incorrect response in drill and practice mode. There were ten parts to identify in this exercise, and, unlike the exercise for the external parts, students had to identify all ten correctly to terminate the drill. Rebstock described the ten parts as being in a "pool" from which the program randomly selected a part to present. If the student touched the box that pointed to the part named, that part was removed from the pool. If not, it would stay in the pool and be presented again. Students thus had to correctly identify each part at least once.

Rebstock's third lesson was a simulation, showing the solid-liquid separation that takes place inside the mud cleaner. The particles separated by the mud cleaner are measured in microns, so they are far too small to see. The lesson used a partially cutaway drawing to trace the paths of particles of different sizes through the various mud cleaner components (see *Figure 3*). Rebstock commented that the simulation was a necessary technique for showing the particle paths, because one can't see inside the machine while it's running, and it can't run if it's taken apart.

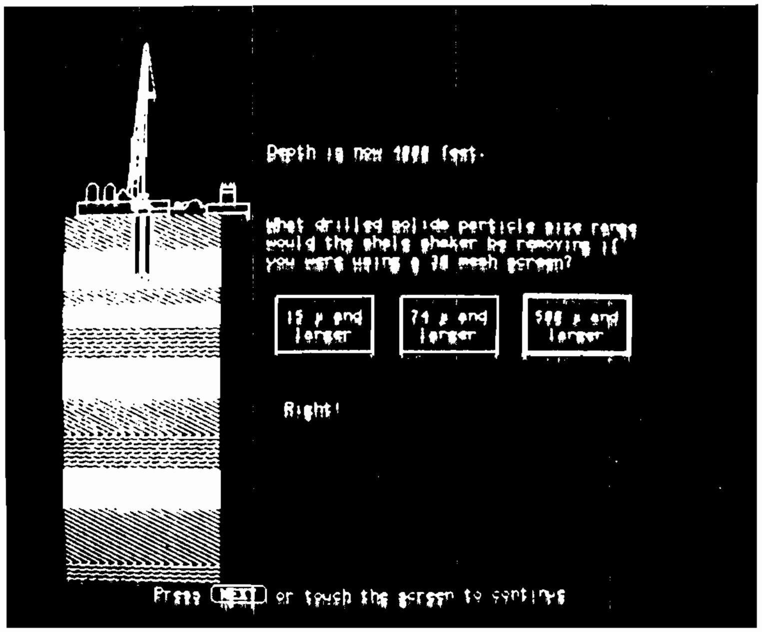

Figure 4 is a simulated drilling scenario, in which students are asked to use the knowledge they just learned.

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As in the parts identification lessons, this lesson began by showing and describing the paths. It then went into drill-and-practice mode, and students were required to use the touch screen to trace the path of the different-sized particles.

The last lesson from Rebstock's program that I have space to highlight was what Rebstock called an "application synthesis," because it attempted to combine the information presented on the entire product line. The general scenario was a simulated drilling situation out on a typical drilling rig. The screen showed a little drilling rig with the bit set and ready to "spud in." (See *Figure 4*.)

The program then presented questions from all of the three previous lessons. If students answered a question correctly, the drilling operation continued and the bit moved downward. If they answered incorrectly, the program provided feedback and gave them another chance. If they continued to answer incorrectly, the program would eventually proceed, but it kept track of the number of errors.

If students got five answers wrong, the drilling operation stopped and the program displayed feedback keyed to the specific errors made. The feedback indicated which answers were wrong and what the students should watch out for next time. Students then had the choice of either going to a review or starting the drilling operation over again.

If they made it through this exercise with less than five errors, the drill eventually got down to 18,000 feet, where it hit a gusher. Interestingly enough, Rebstock reported that after using this lesson for a while, they tightened the mastery criterion from less than five errors to less than three. In both cases, though, this lesson was a hit with the service representatives.

Rebstock's work demonstrates a unique combination of beauty and function. His program is replete with sound instructional functions implemented through screens with a beautiful "graphic touch." Thus we turn the page on yet another developer whose work can teach us new techniques, stimulate our creativity, and give us a target to shoot for in the endless pursuit of craftsmanship. □

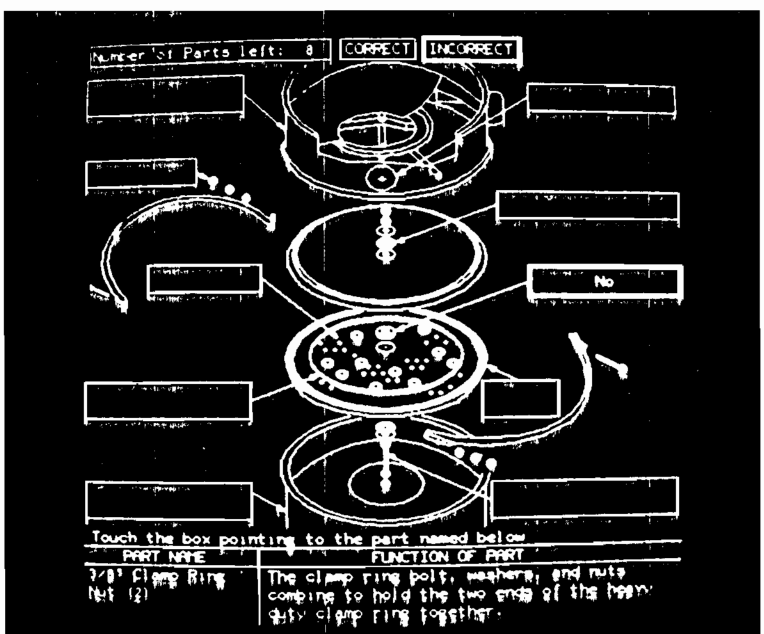

Figure 3 simulates the separation of solids and liquids that takes place inside the mud cleaner. This screen is designed to help students understand how the machine operates.

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