Overt Responding in Computer-Based Training

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This experiment compared the extent to which students learned facts included in computer-based-training frames that required an overt response to those that did not. Frames included two types of facts: Some facts had one word missing which had to be supplied by the student (active facts). Other facts had no missing words and required no overt response (passive facts). Each student completed four 14-fact modules in random order. Two of the modules contained frames with all active facts. Each frame in the other two modules contained one active and six passive facts. Paper pretests and posttests showed that students learned twice as many facts when all facts in the module were active than when only one in seven were active. The modules that included passive facts required one-fifth the time to complete than those with only active facts. Students learned more facts per minute of training in one of the two modules that included passive facts than in the two modules with only active facts.

The capacity of computer-based-training programs to interact with students is surely one of the greatest contributions of computers to education. Computers can measure a student’s responses to questions, provide immediate feedback, and adjust the course content based on the speed and accuracy of student responding. This facility of computers can be utilized only to the extent that students make overt, measurable responses that can be read and evaluated by computer-based-training programs.

The role of measurable or overt responding has been investigated in the non-computerized medium of programmed instruction. Numerous studies have shown that students learn more reliably when required to make overt responses to questions than when they are only required to read text (Holland, 1965). Furthermore, students do not reliably learn extraneous material added to questions requiring overt responses (Eigen & Margulies, 1963). Under some conditions, students may not even read training program material that is not needed to answer the training program questions (Doran & Holland, 1971): Doran and Holland tracked students’ eye movements as they completed two training programs and found that when all parts of the text were

not needed to determine the answer to questions, students only looked at the parts of the text necessary to answer the questions.

Several studies have found no differences between programs requiring overt responses and those not requiring overt responses (Alter, Millicent, & Silverman, 1962; Evans, Homme, & Glaser, 1962; Hartman, Morrison, & Carlson, 1963; Goldbeck & Campbell, 1962). While some of these studies may be methodologically flawed or contain idiosyncratic features limiting their generality (Holland, 1965), these findings suggest that we do not completely understand the precise conditions under which overt responding in programmed instruction improves learning. Taken together, the studies on overt responding in programmed instruction suggest that overt responding can significantly improve learning under some circumstances.

Despite this evidence, and the enormous capacity of computers to interact with students, many computer-based-training programs have failed to maximize the use of overt responding (Vargas, 1986).

The current study was undertaken to evaluate the role of overt responding in computer-based-training. Primarily, we sought to compare the extent to which students learned facts included in computer-based-training frames that required an overt response to those that did not.

Frames included two types of facts: Some facts had one word missing which had to be supplied by the student (active facts). Other facts had no missing words and required no overt response (passive facts). Frames contained either (a) one active fact, or, (b) one active fact and six passive facts. Each student completed four modules in random order. Two of the modules contained frames with 14 active facts. Each frame in the other two modules contained one active and six passive facts. Each of the four modules contained a total of 14 facts. The extent to which students learned active and passive facts was evaluated on paper posttests administered after the completion of each module.

This study also sought to determine if passive facts could be learned more reliably when presented in an abbreviated format that only included key words and were arranged in a quasi-outline or table format in which facts are placed in predictable screen locations. To accomplish this evaluation, frames in one of the two modules that included passive facts were constructed in the abbreviated outline format.

Finally, computer-based training programs frequently provide explanations after incorrect responses to questions that tell the subject why their answer was incorrect. These explanations are typically passive facts (i.e., facts with no missing words and that require no overt responses). If students learn passive facts only inconsistently, these types of explanations should be of little educational value. This experiment also evaluated the effectiveness of explanations in teaching. To accomplish this evaluation, frames in only one of the two modules that included only active facts provided explanations for incorrect responses.

METHOD

Subjects

Sixteen normal adults served as subjects. Subjects were recruited from advertisements and paid a fixed wage for completing four computer-based-training modules