BEYOND WORD PROCESSING: COMPUTER-ASSISTED WRITING INSTRUCTION

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Learning with computers is a more educationally significant application than learning about microcomputers for computer literacy. Learning with computers involves using the computer as an alternative method of presenting, reviewing, and/or testing traditional course material. However, "to date, English instructors have utilized microcomputers primarily for lower-order concerns, teaching repetitive tasks—drill work in grammar, punctuation, spelling and vocabulary" (Hocking & Visniesky 218). Such applications, found in popular systems such as PLATO, RSVP, TICCIT, and most recently Professor CRAM (Computer Ready to Assist Memory), a system written by Breininger and Portch using "competing and repeating" to teach five grammar units, promote what Richard Young characterized as current-traditional rhetoric, focusing attention on "the composed product rather than the composing process," paying specific attention to the "analysis of discourse into words, sentences, and paragraphs," correctness of usage, and appropriateness of style, often measured by readability (31). And when writing teachers choose to use these applications, they choose to promote what Craig Etchison characterizes as a reductionist approach to writing, mastering discrete elements of language, rather than a constructivist approach, concerned with larger discourse structures. In the area of writing instruction, Cynthia Selfe cautions CAI must address the larger issues of writing, become process-centered, and involve active writing rather than answering multiple-

choice questions. CAI must move beyond the limited concerns of the current-traditional rhetoric. Some important criteria to consider for computer-assisted writing instruction include asking if the software addresses significant writing problems and if it approaches writing from a true process orientation. The programs should also be rhetorically specific and accomodate a wide range of writing skills, but most importantly, computer-assisted writing instruction should involve students in writing.

Such researchers as Kathleen Jaycox and Joseph Leibowicz cite four major types of interactive computer-assisted instruction (CAI), the fourth of which addresses higher-order concerns:

> (1) Drill and practice programs—essentially programs acting as electronic workbooks, arranged to calculate the performance as well as the difficulty of the problem given the user.
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> (2) Tutorial programs—a step beyond drill and practice, programs actually directing the presentation in response to the student's performance. The tutorial's sophistication is achieved by the use of if-then branching structures in the program.
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> (3) Text-editor programs—programs functioning as an editor, often relying on readability formulas and spelling lexicons. Of course, a text-editor cannot judge comprehensiveness, persuasiveness, or other higher-order concerns.
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> (4) Dialogue systems—programs seemingly engaging the user in human interaction through encouraging remarks, noncommital phrases, and programmed questions. This fourth category, variously named simulation or feedback, asks the user for active participation, clearly the most important feature of computer-assisted instruction. Hugh Burns explains, borrowing from creativity theory, how computers can aid writing instruction: the CAI generates the first vector necessary in any creative act, as the first speaker in the dialogue, providing direction and motivation, while the writer, as the second speaker, generates the second vector, providing content for the conversa-

tion. The content provided by the writer is then used by the computer to continue the dialogue. CAI dialogue involves the computer and the user in reaction to each other, much like the structure of human dialogue, while the other types of CAI are more mechanical—drill and practice programs evaluating only the correctness of the response and proceeding in a linear fashion, tutorial programs branching only to different levels based on the response given, and the text-editor programs correcting only text generated on the computer. Thus, CAI dialogue programs can offer advantages for teaching rhetorical invention, specifically the generating stage of the composing process, that the other three cannot.

WHAT CAN A CAI INVENTION PROGRAM DO?

Many of us as teachers of writing make a conscientious effort to teach invention strategies to our student writers, stressing the importance of time spent thinking in systematic or unsystematic ways about an assignment, engaging processes often represented as previous to the transcription process. Systematic heuristics posit a number of relevant questions asked as probes to examine a topic. Richard Young cites three popular systematic heuristics: The tagmemic heuristic of Richard Young, Alton Becker, and Kenneth Pike, the *topoi* of Aristotle reformulated as a series of questions by Richard Larson, and the dramatistic questions, the Pentad, that Kenneth Burke asks of literary works, reformulated as a general device for invention by William Irmscher.

Unsystematic heuristics, by contrast, require the writer to approach a writing task more informally—by free-associating, by brainstorming, or by continuously writing whatever relevant ideas and/or digressions are brought to mind by the topic. Rather than positing a set of pre-determined questions, this heuristic relies on the chain of associations in the memory of the writer to retrieve information about a topic. Two unsystematic heuristics are free-writing and journal keeping—advanced by Gordon Rohman and James Moffett, and popularized by Peter Elbow and Ken Macrorie. Each type of invention, and its numerous variations, works for a different approach to writing, for a different problem-solving style, and sometimes just for a different type of writing assignment.

Many of these heuristic activities can be programmed for

computer-assisted instruction. I have written two computer-assisted invention programs—QUEST, a systematic questioning program, and FREE, an aptly named unsystematic freewriting program. Teaching invention strategies on the computer offers a variety of invention strategy alternatives, informed by the rhetorical task at hand and the writer's representation of that task.

For example, Michelle logs onto the computer and loads a program called ASSIGNMENT to receive her writing task—a task which asks her to compose an argumentative paper about the desirability of nuclear awareness programs in high school. The computer itself loads the QUEST heuristic, an invention strategy based on the comprehensive model of Pat Hartwell. QUEST offers a wide range of possibilities. Michelle can answer content-related questions, goal-setting questions, or audience identification questions, depending upon the time she has available to her and her preferences. QUEST can ask the same question a teacher would in the writing conference—for example,

> Michelle [here inserting the student's name], we've considered that NUCLEAR AWARENESS [here inserting Michelle's topic] in the past was a COMIC BOOK THREAT, UNREAL AND INCREDIBLE [here inserting Michelle's earlier answer]. Now, let's consider what NUCLEAR AWARENESS might become in the future. What do you think it might become?

The computer is also adaptable. Just as it can be directed to follow one heuristic strategy from a menu of choices, it also offers a number of choices, or "branches," within a single strategy. For example, Michelle might be considering her topic, nuclear awareness, by answering questions about comparison/contrast. If this exploration seems especially fruitful, she continues in this mode, branching to more comparison questions. On the other hand, if Michelle answers the question and wishes to consider another type of question, she can direct the computer to return to the menu for another branching. This adaptability cannot be matched by a dittoed set of questions. It can however be matched by a good teacher, always alert to new avenues and possible twists and curves. And yet, even the best teacher's alertness can fail, especially for the last conference of the hour, or of the day. A computer, its electricity on, its disk spinning, its input devices connected, is always ready.

One of the advantages of computer-assisted invention strategies is that the programs can be individual, generative, and encouraging. For example, if Michelle had previously only been exposed to one type of systematic heuristic, such as Young, Becker and Pike's tagmemic matrix or the questions of Aristotle's topics, then she might have found rhetorical invention to be less than successful. However, the same writer, on-line with a computer-assisted invention program such as QUEST or FREE, could sample from a "menu" of available heuristic strategies for different rhetorical situations, at various times within a writing task, until she succeeded in invention.

In a similar fashion, the heuristic could address a specific rhetorical problem. For example, Michelle might, at some point in her work, feel a need to clarify her sense of audience. This student might remember that a particular heuristic strategy dealt with the question of audience but she would probably be more successful if she knew that, merely by calling it up on a computer menu, a strategy would be available to her, a strategy designed to address that rhetorical question. For example, she could command QUEST, using its menu, to run a series of probes designed to help a writer consider her audience's educational background, values, and knowledge of and attitude toward her topic.

The computer, with a force beyond that of even the best teacher, encourages students to spend time prewriting, an important change since the activity is one which many poor writers ignore completely. It is now possible to keep the option of heuristic activities available at all times during the writing process, just as the editing mode is always available. Writers using a computer/word-processor quickly become aware of the recursiveness of revising. In the act of writing a sentence, writers are aware that they can easily correct surface errors as well as make global changes in the text. Writers who use a computer/word-processor gain a sense that electronic text, free floating and expendable, has a different "mode of existence" from that which is typed or handwritten, mechanically imprinted onto tablet, fixed and unchanging (W. Selfe 19-20). Word-processing programs have freed writers from the "first-write-then-revise" paradigm. Invention programs such as QUEST afford the same possibility for the other side of the model—the prewriting process. A writer, once familiar with the heuristic options, will quickly become aware that at any given point

in the writing process, she can cycle back into the invention mode to do some brainstorming, problem solving, or tagmemic probing. A writer can file the text-so-far, using a simple command to store what has been written onto a permanent memory sector on the floppy disk, and then call up the menu of heuristic strategies. Another possibility is to split the screen and work on the heuristic strategy in the top half of the screen while retaining the text-so-far on the lower half of the screen. A writer who encounters writer's block will learn that one solution is to cycle into invention or revision activities. The weaker writer who is still stuck in a linear model can take advantage of the computer's ability to do two things at once: attend to a writing/word-processing program and offer a menu of other options—heuristic strategies in this case—at the top or bottom of the screen. The weaker writer would not only be able to use the techniques writing teachers have recommended, but would be reminded of the options available.

WHAT OTHER SOFTWARE IS AVAILABLE?

A check of the annotated bibliography of Ellen McDaniel confirms the lack of commercially prepared software packages dealing with rhetorical invention. However, a number of CAI invention programs written by writing teachers are being exchanged among campuses across the country. A heuristic based on the Aristotelian topics, developed for main-frame computers by Hugh Burns, is now available for Apple microcomputer use as ARISTO from John Harwood of Pennsylvania State University. Another variation of the Aristotelian approach to prewriting is CREATE/RECREATE, developed by Valarie Arms of Drexel University. The tagmemic program TAGI, again written by Hugh Burns for main-frame computers, is part of WRITER'S HELPER, written by William Wresch, distributed by Conduit. BRAINSTORM, developed by Michael Spitzer of New York Institute of Technology, provides an open-ended invention program with content-specific questions. The WRITE WELL series, written by Deborah Holdstein, and also distributed by Conduit, includes six guided questions in the prewriting program. Various problem-solving techniques for prewriting, similar to the synectics strategies developed by William Gordon, have been programmed for CAI prewriting strategies as CREATIVE PROBLEM SOLVING by Ray Rodrigues and Dawn Rodrigues of New Mexico State University.

An unsystematic approach to writing, approaching a writing task by free-association exploration rather than answering a set of pre-determined questions, is also represented in CAI invention programs. Freewriting programs are contained in Wresch's WRITER'S HELPER (BRAINSTORMS), in Ruth Von Blum and Michael Cohen's WANDAH (now marketed as HBJ WRITER by Harcourt Brace Jovanovich), in Bolt Bernanek and Newman's QUILL (cited in Shostak's *Computers in Composition Instruction*), and in Cynthia Selfe's WORDSWORK (a.k.a. WORDSWORTH II).

Other areas of the planning process are also being explored. Helen Schwartz has added a program called ORGANIZE to her SEEN hypothesis-testing prewriting package, containing AUDIENCE ANALYSIS, a program routine designed to help a writer consider her audience's educational background, values held, and previous knowledge of and attitude toward the writer's topic.

From what we have seen about computer-assisted writing instruction, an important change may be noted: rhetoricians are no longer looking for the perfect finite heuristic to program for CAI. The emphasis has shifted to developing a range of heuristic strategies, available to writers at any point in the writing process, through the computer delivery system. I believe this shift will be beneficial as we move beyond word-processing toward a systems approach to CAI, providing computer-assisted help for all phases of the writing process.

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