# Implications of Using Microcomputers in Classroom Testing

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*This article identifies the applications of microcomputers to assist teachers in designing, constructing, administering and scoring teacher-made tests that address the needs of learning disabled students. Guidelines related to modifying presentation and response modes, facilitating motivation, and scoring tests is described. Additionally, cautions in using microcomputers for classroom testing are discussed.*

In the past several years, there has been a tremendous increase in the application of computers with learning disabled students (Bennett, 1982; Torgesen & Young, 1983). Brown (1982) and Wilson (1981) developed a computerized system to help special educators plan and manage educational programs. Halpern (1984) created new ways to teach learning disabled students based on computer technology. Shiffman, Tobin and Buchanan (1982) employed computers to deliver direct and ancillary instruction. Finally, computers also have been used in administering special education programs (Bennett, 1984; Ragghianti & Miller, 1982) as well as in training special education teachers (Cohen & Schwartz, 1983; Hofmeister & Thorkildsen, 1981).

One additional use of computers is in the area of educational assessment (Bennett, 1982). Several educators have begun to assess student performance on standardized measurements through use of microcomputers (Hasselbring & Crossland, 1981; Wilson & Fox, 1982). Hasselbring and Crossland (1981) developed the Computerized Diagnostic Spelling Test (CDST), which is a computer–controlled, student–paced version of the Kottymeyer Diagnostic Spelling Test (1970). Similarly, Wilson and Fox (1982) devised a computer–mediated language skills assessment instrument. Both systems compute raw scores, list correct and incorrect responses, and perform error analysis.

While the primary use of microcomputers in assessment has been with administering standardized measurement instruments (Hasselbring & Crossland, 1981; Wilson & Fox, 1982), they also can be valuable in classroom testing via teacher-made tests. Microcomputers can assist teachers in designing, constructing, administering and scoring teacher-made tests that address the specific needs of learning disabled students. The purpose of this article is to identify the applications of microcomputers to teacher–made tests for learning disabled students. These suggestions are intended to provide teachers with a framework for using microcomputers to design tests that assess the optimal performance levels of their students. Teachers should tailor the suggestions to the unique needs of their students and classrooms.

## MODIFYING PRESENTATION MODES

The format of the test, including its presentation mode, appearance and spatial organization can affect the performance of learning disabled students. Presentation mode difficulties which some students experience can be lessened by allowing students to take the test via the microcomputer. Presenting the test on the computer can aid the teacher in regulating the speed as well as the organization of the presentation, highlighting critical information and limiting distracting features that may interfere with student performance.

Microcomputers allow the teacher to regulate the speed of item presentation to match the needs of the testee and to test mastery of the subject matter. Most tests that emphasize content mastery as opposed to speed can be self–paced (Bennett, 1982), with the microcomputer presenting a new item only after a response to a prior item has been emitted. However, when speed is an important element in demonstrating mastery, the computer can present new items at fixed item intervals. For example, in testing multiplication facts the computer can be programmed to present new items every three seconds.

In addition, microcomputers can facilitate the organization of tests to optimize student performance. Too many items on a written test page can cause confusion and have a negative effect on performance. The microcomputer can alleviate potential organization problems by displaying a single test item at a time. If more than one item is displayed on the screen, visual boundaries can be placed between items. Additionally, proper spacing of items on the screen can be attained easily when designing tests on the microcomputer.

Presenting tests on the microcomputer also can minimize poor performance that is due to the appearance of the test. Computer graphics and design parameter options can improve the technical and educational quality and precision of the test. For example graphs or maps can be developed easily on a microcomputer. Computer printing also improves the legibility of the test. Further, the screen can provide students with a solid, dark background that is free of extraneous stimuli.

Computer graphics and colors can be used to promote student performance on tests by highlighting critical parts of items. Graphics and color can heighten student awareness of test directions by underlining or color coding key words in the stems of items or indicating changes in directions. For example, in a math word problem, key words such as *find the difference* can be underlined to cue students that subtraction is required. Similarly, color coding the symbols for the four basic mathematical computations (+, ×, ÷, ×) can signal to students a change in what is required.

## MODIFYING RESPONSE MODES

The variety of ways in which students can interface with computers can decrease performance problems that are due to response mode difficulties. Students with writing problems can respond on the microcomputer through keypunching or using peripheral devices to activate the computer such as their hands, a mouse, a light pen or joysticks. For example, Hewlett-Packard has developed a computerized system that responds when an individual touches the screen. Similarly, the light pen, a pen–like device that allows individuals to interface with the computer by touching the pen to the monitor, is particularly suitable to completing multiple choice items. Finally, computerized devices such as the Apple Echo II speech synthesizer can be used so that nonverbal students can respond orally to test items.

Tests that require handwritten responses such as essay exams are often difficult for learning disabled students who lack the motor and organizational skills required to produce a written product within a specified time limitation. Microcomputers can alleviate the need for handwriting and erasing as well as provide a structure within which the student can develop and formulate responses. For instance, word processing can assist students with organizing essays, spelling and using correct punctuation. Furthermore, the microcomputer is capable of producing a final product which is legible and free of erasures or unsightly crossings-out.

## FACILITATING MOTIVATION

An important part of test performance is motivation to achieve (Douvan, 1956; McClelland, 1961). However, because of prior "failure experiences" many learning disabled students may not be motivated to perform at the height of their capabilities (Gans, 1962; Salend, Blackhurst, & Kifer, 1982). The motivational aspects of the computer can help overcome lack of motivation in the testing milieu.

Since research indicates that feedback and reinforcement during testing can promote motivation and test performance (Ayllon & Kelly, 1972; Salend, et. al., 1982), tests administered via microcomputers can be programmed to deliver feedback and reinforcement to students. For instance, after students answer three math problems they can be given feedback and reinforcement by the microcomputer flashing the statement, "That's right!! Keep it up!!" or by the computer displaying an unusual or colorful graphic. The frequency of the delivery of feedback and reinforcement can be customized to the needs of the students. To insure that student motivation is maintained throughout the test, reinforcing statements should be varied to avoid satiation on one or two statements and feedback and reinforcement should be delivered after a variable number of items have been answered.

The motivational level of students also can be enhanced by using the microcomputer to present the test in a game-like format. Thus, test items would be presented by the microcomputer and correct responses would allow movement toward winning a game. For example, the test can be designed as a tic-tac-toe game, whereby correct responses to test questions allow students to put an X or O on the screen to beat the computer. Video-game formats can be especially useful in fostering the motivational appeal of the test (Chaffin, Maxwell & Thompson, 1982).

The branching capabilities of microcomputers can help foster motivation by preventing frustration. Branching allows teachers to further assess mastery of educational objectives by providing exploration of specific subject matter (Lord, 1980). For instance, students who respond correctly to two out of three problems involving multiplication of fractions can be channeled to similar problems before progressing to more difficult computations involving fractions. Similarly, where tests are developed according to a specific skill sequence, ceilings may be built into the test so that once students have failed a specific number of times, testing would be terminated.

## SCORING TESTS

The speed and versatility of microcomputers can assist teachers in scoring tests. Microcomputers allow not only for quick scoring of tests but also can be programmed to perform diagnostic error analysis. For example, a phonetic based spelling test can be programmed to be scored by the computer to list words spelled correctly and incorrectly as well as to categorize the types of words misspelled. Thus, if students misspell "accompanies" and "relies" as "accompanys" and "relys" the computer can identify that the students have failed to master the spelling rule regarding 'consonant Y'.

## ANTICIPATING PROBLEMS

While taking tests on the microcomputer can be helpful and fun for students, several precautions should be taken in order to avoid frustration. First, students should be familiar with how to run the computer and use the programs. For instance, if typing is required, students should be familiar with the keyboard and possess the necessary typing skills. Students also should have a knowledge of the specific commands for the programs they will be asked to run. If printers and other peripheral devices are to be used, teachers should ensure that they are working properly. Additionally, teachers should provide students with all the supplementary materials such as paper and pencils to complement taking the test on the computer. Finally, teachers periodically should monitor student behavior to assure not only that the program is running smoothly, but also that students are engaging in on-task behavior.

A limitation of using microcomputers for classroom testing can be the time it takes to program the test. However, the time invested in programming can be recouped in a variety of ways. Once the program is created to test specific objectives, it can be continuously used to accurately assess the optimal performance levels of all students. Further, test items easily can be changed or modified without taking large amounts of teacher time. Finally, the efficiency of scoring procedures on the microcomputer frees teacher time which can be used for individual instruction.

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