Computer Systems in Career Counseling

If the present rate of development continues, one can expect even better systems to be available soon. The issue is no longer "Should we use computers in career counseling?" Instead it has become "How can we best apply computers to our setting and clientele?"

It is impossible to provide the reader with a comprehensive, up-to-date review of a topic in which changes occur with great frequency. Technological improvements of computers can occur several times each year. These changes are followed shortly by the introduction of new software and proposals for better systems of application. Clearly, the state-of-the-art is still unfolding and many surprises lie ahead. Because of inevitable delays in publication, every book and journal discussion of computers must be viewed as describing "where we were" rather than "where we are." Accordingly, two publications are available that describe that status in 1983. One of these is Microcomputers and the School Counselor, edited by Cynthia Johnson, published by American School Counselor Association. The other is a journal issue, Volume II, Number 4, of The Counseling Psychologist including major contributions by J. Harris-Bowlsbey, M. R. Katz and L. Shatkin, D. V. Tiedeman, and others. The reader will find each of these to be useful supplements to this article.

Historical Background

Serious efforts were undertaken as early as the mid-1960s to relate computer technology to career counseling. Some of the early attempts are still operational today, although modernized and expanded. Jo Ann Harris-Bowlsbey, at that time director of guidance at Willowbrook High School, was instrumental in the planning that led to the Computerized Vocational Information System (CVIS), placed in operation in 1968. At the same time, Donald Super and Roger Myers of Columbia University were working with Frank Minor of IBM to create the Education and Career Exploration System (ECES), and David Tiedeman of Harvard and his colleagues were developing a system called Information System for Vocational Decisions (ISVD). CVIS provided a method for storing information about approximately 400 occupations arranged in the classification system originally developed by Roe. The information file also included certain items of individual information for each student user such as class rank, composite achievement and ability test scores, and interest inventory scores, thus permitting some comparison of prior data with requirements for entry and success in occupations. The system was primarily online information retrieval, and it effectively capitalized on the technology available at that time. It continued as a pilot program until 1972 and was then established as a demonstration center leading to widespread adoption of the system.

Both ECES and ISVD were more extensive efforts to computerize larger portions of the counseling process. Both provided for development and storage of self-descriptive information that would assist the client in better self-understanding, extensive data about future possibilities (in ECES this included occupations and educational files; in ISVD these two areas were supplemented by files on military service and family), and procedures for clarifying and developing plans. Both reached the operational stage in the 1969-1970 period. The elaborate program incorporated in each system was theoretically sound, useful to the client, and technologically possible. Both, however, required heavy usage of computer time so were ahead of reality in terms of cost-effectiveness, considering the developmental stage of computers, and consequently neither has been widely adopted. Several of Tiedeman's colleagues on the ISVD project later turned to the development of a simpler system that has become the Guidance Information System (GIS) in extensive use today.

Other early pioneers in applying computers to career counseling included Joseph Impellitteri at Pennsylvania State University, Martin Katz at Educational Testing Service, and Bruce McKinlay at the University of Oregon. Impellitteri's system incorporated an information retrieval system based on a limited number of occupations keyed to the General Aptitude Test Battery (GATB) but supplemented by computer-controlled audiovisual equipment that provided the user with slides of actual workers on the job and tapes of recorded comments by workers and narration about the occupation. Impellitteri's unexpected death interrupted development of the system. In the meantime, Katz was researching ways to relate work values to the decision-making process via a computer-assisted system. His efforts led to the System of Interactive Guidance Information (SIGI), which became operational in 1972. McKinlay and his associates developed a statewide system for Oregon called Career Information System (CIS), now used in several other states as well.

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In the mid-1970s, the Department of Labor provided funding to eight states to develop statewide information systems. Four of these states (Colorado, Massachusetts, Minnesota, and Washington) used the Oregon CIS system as a basis for developing their plans. Michigan elected to create its system using parts of both CIS and GIS. Most of the participating states have continued their systems under state funding. After the project ended in 1978, the director of the Michigan system relocated and marketed that system as Coordinated Occupational Information Network (COIN). It is in general use today.

The National Occupational Information Coordinating Committee (NOICC) was established in 1976 to enhance cooperation among federal agencies using occupational data. At the same time, similar committees often referred to as State Occupational Information Coordinating Committees (SOICC) were established at the state level. The primary goal at both federal and state levels has been to facilitate cooperation in the collection, dissemination, and use of occupational data. One outcome has been the continued development of state and regional computer-assisted programs. Maze and Cummings (1982) report that by March 1982, there were seventeen localized systems based on CIS, eighteen others were using GIS, four were using COIN, four were using CHOICES (a Canadian system), and two were using DISCOVER (a descendant of CVIS). It appears highly probable that these networks will continue to increase in number.

It is not the purpose of this treatise to discuss the technical aspects of computer science. After all, many of us drive thousands of miles each year with only a rudimentary understanding of the theory of internal combustion engines and possibly no idea at all of the workings of catalytic converters, transaxles, or voltmeter gauges. Nevertheless, just as one must know certain basic automobile terms in order to explain to the mechanic why the whatchamacallit sounds strange, so too one must know a few basic terms to discuss computers and their application.

In this article we will examine briefly the present applications that are practical with existing systems and programs. The reader must be aware that new developments may facilitate extensive application in areas that now are not feasible.

**Knowing and understanding self**

In general, computers have quite limited value at present in this phase. Considering the many components of each individual's psychological world, the experiences and events that have made that world unique, and the interaction between the individual and that world, one can see at once that attempts to establish categories or ranks must result either in superficial groupings or innumerable, and impractical, combinations.

Small sections of this area-for example specific personal attributes such as interests, aptitudes and abilities, personality, and values-lend themselves to computer applications. These attributes can be measured online, at least in part, either by the kinds of assessment instruments or by programmed exercises that are quite similar in function to tests. Obviously, most of the so-called paper-and-pencil tests can be incorporated into a computerized presentation so that the client answers test items presented using the computer instead of in the customary manner. This approach, however, has little advantage (possibly the only one would be almost instantly available test results) and some serious disadvantage, particularly the inefficient use of terminal time, since the test-taking client would prevent the use of the equipment by others for the time periods involved in the various tests. No additional information ordinarily would be available, and most test data warrant some discussion with the counselor to prevent misunderstanding and even error if instructions have not been followed. Several software systems for computerized administration of many commonly used interest and personality tests are now available. Ordinarily, they are used separately from a computer-assisted career-counseling program. Also, there are several companies that provide computerized scoring service for tests on either a batch or single-copy basis.

Among the current major computer-assisted systems, very little effort is made within the system to help the client review and understand his or her personal attributes, attitudes, ambitions, and psychological world generally. The CIS software includes a brief group of eight questions about temperaments and another eight questions about abilities. The GJS system assumes that review and evaluation will precede use of the system. Both SIGI and DISCOVER include modules that aim at value clarification. DISCOVER also includes a module that incorporates Holland's Self-Directed Search.

**Knowing about the world of work**
From their first application to career counseling, computers have been most useful in the storage and retrieval of career information. Myers (1978) describes this step as the "opportunities realm" and as the most dazzling of the computer's capability. Except for the smallest of the microcomputers, storage space in most systems is sufficient to provide detailed information on a thousand or more occupations. The occupations included can be arranged in multiple combinations or clusters using such variables as occupational family, related personal attributes, educational or training requirements, geographic location, and a great many others.

Two very important advantages accrue from maintaining a computerized bank of career information. One of these advantages is the ability to maintain currency. Unlike print material, where revision is slow and cumbersome and, worse, may result in continued usage of outdated information, computer-stored information can be readily revised by replacing present information with new data, much like erasing a chalkboard and then writing a new statement. Second, the greater degree of flexibility permits maintaining all of the data that might be found in the usual print-media file, plus regional or state information that may contrast significantly with national information. Most computer-assisted programs can capitalize on the existing array of clustering and grouping systems to permit users to survey occupational information at various levels of detail according to user needs, or to use data on a regional or national level, or adjust the system in terms of any one or several variables of concern to the user.

One word of caution must be emphasized relative to the occupational information data bank. The world of work is amazingly complex and there are numerous levels of specificity in classifying occupations. The more specific and precise the classification system, the greater the number of categories included in the system. If one were to use all of the coded titles included in the Dictionary of Occupational Titles the demand for memory storage would greatly exceed all but the largest of the mainframe computers. For example, we can compare the generic title "high school teacher" with the specific titles that represent each particular kind of high school teacher—probably twenty or more, depending on how precisely we wish to make distinctions (teacher, social studies teacher, history teacher, world history teacher, and so on). For most of these more exact titles the data in the memory bank would be practically identical. Therefore, systems are continually caught in a conflict between exact information versus expediency. Although memory bank capacity is growing rapidly, most systems must still use titles that can best be described as generic or broad. Most systems with approximately one thousand occupational titles have sufficient specificity to claim that they include the occupations pursued by 90 to 95 percent of the working population.

At present, stored occupational information is delivered to the user ordinarily as a print-out either on the terminal CRT or via the terminal printer. As previously mentioned, Impellitteri was refining a system that incorporated computer-controlled slide projectors. Others have also pursued the possibility of supplementing print information with visual or audio information. Undoubtedly, further technological improvements will permit use of such varied delivery systems in the near future.