

DON W. PRICE,
*Northern Alberta Institute
 of Technology, Edmonton.*

A COMPUTERIZED EDUCATIONAL AND VOCATIONAL COUNSELLING PROGRAM

A counsellor "must not reason upon the vocational experience of his generation. He can help students only upon the projected conditions and terms of the future—the future which is almost the students' present (Wrenn 1965)." Grant Venn (1966), author of a report on technical education and its place in society, indicated the dire need for accurate and up-to-date vocational information for students approaching the end of secondary school. The fact that the average student has experience, even indirect experience, with only a small fraction of the possible occupations to which he may aspire seemed particularly appalling to Dr. Venn. Bryaford and Crites (Borow 1964) in their reflection on vocational counselling and research stressed the need for more systematic and rigorous research to be conducted as well as the need for research to be conducted in a realistic setting.

Mr. S. Villett (1969), Assistant Director of Vocational Education for the Province of Alberta, made a point, while addressing a post secondary (non-university) counsellors' luncheon, of encouraging the used and application of computers to counselling. Dr. L. Ferguson, Director of Guidance for the Province of Alberta (1969) in an address to a Counselling and Guidance Seminar said "There is also a need in the school for someone who can keep abreast of the changing post-high school training opportunities, scholarship opportunities and employment opportunities." With this statement Dr. Ferguson suggested that keeping abreast of the ever-changing information needed to make an intelligent vocational decision is a full time job in itself.

The above quotes, some uttered as many as five years ago, are only slight indication of the mounting problem of providing adequate vocational guidance. The whole area of vocational counselling is almost, by definition, a delving into the future. The more remote from the future a set of facts are, the more their relevance and applicability to the future will be altered. The need for up-to-date information, the rapidly changing work environment of today, the remoteness of vocational theory and research from the practitioner and, in instances, a lack of relevance of the research to the real situation, are just a few of the myriads of obstacles that any counselling department must cope with if it is to be effective. Compounding the problem is the fact that in the past, and to a large extent even today, the role of the school counsellor has been perceived as mainly vocational in nature. However, that role is becoming only one aspect of the total counselling function as more responsibility is being thrust upon the counsellor. These additional functions were well enunciated by the Hon. R. C. Clark, Alberta Minister of Education and Minister of Youth, (1969) in an address to the Canadian Guidance and Counselling Conference. He said:

The counsellor, I feel, is the key member of the pupil personnel team and is indeed crucial to the proper utilization of community health resources.

School counsellors are in the front line of our defences against mental illness among young people. Just as important, they are a vital factor in humanizing our school system.

The trend for counselling would appear to be away from the vocational aspects and toward the personal aspects of counselling. However, educational and vocational counselling still remains and will continue to remain a very important function. Fortunately, of all the tasks required of a counsellor, vocational and educational counselling are the most adaptable to computerization.

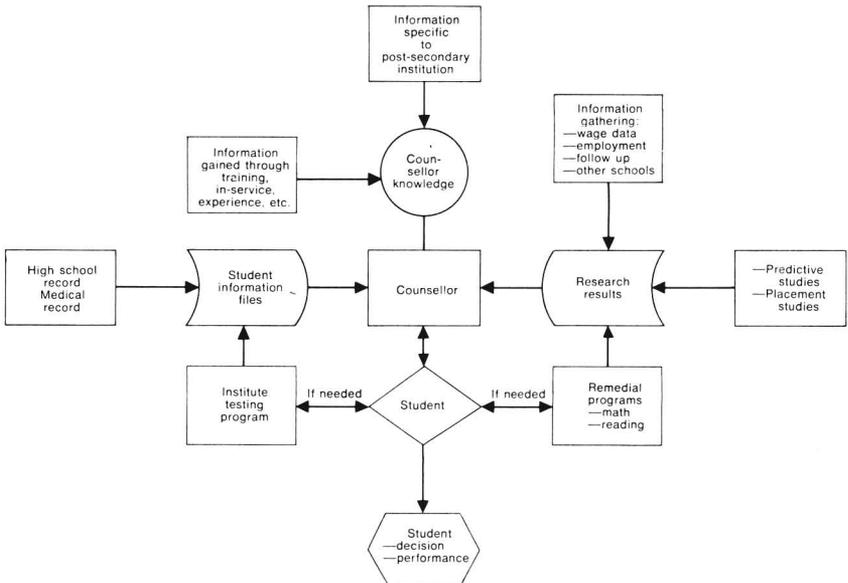
Before proceeding, however, what is meant by "educational and vocational counselling" must first be clarified. Vocational counselling refers to that process whereby a person is aided in the selection of a specific occupation or broad occupational field. Educational counselling refers to the process whereby a person is aided in the selection of appropriate courses of action in his desire to reach his goals—vocational or otherwise. Also included under this rubric of education counselling would be the identification of academic problems and the selection of appropriate remedial action.

THE EDUCATIONAL AND VOCATIONAL COUNSELLING FUNCTION

The model of the educational and vocational counselling function as used in this design is summarized in Figure 1. Central to the model is the interaction between the student and the counsellor. The counsellor because

FIGURE 1.

A MODEL FOR VOCATIONAL AND EDUCATIONAL COUNSELLING



information gaps exist in the above, such as lack of standardized test results, the counsellor would refer the student for testing.

Research Results. Statistics for prediction of success, for interest placement, for ability placement, and for personality placement would be available to the counsellor so that he may help the student in his decision-making. This research program in addition to helping students choose an occupational area would also develop diagnostic and remedial materials so that counsellors may be able to refer students for remedial help where needed. Gathering of pertinent wage and occupational opportunity statistics in relation to the programs considered important to the institute would also occur. These statistics would include follow up studies of its graduates in order to determine advancement, applicability of training to the job, and success of graduates in the job, etc.

Specialized Skills and Information.

The counsellor through his training and experience has the skills needed to determine:

- (a) Which occupational areas a client is more likely to be able to handle, intellectually and physically.
- (b) Which occupational areas a client is more likely to enjoy working in.
- (c) Which programs at his institution are most likely to fulfill the training requirements of the above mentioned occupational areas.
- (d) Whether or not a client possesses adequate preparation for a particular program and if not where he can obtain it.
- (e) Whether or not a client has basic educational deficiencies in reading or mathematics and if so what to do about them.
- (f) To what extent a client's emotional and developmental problems are interfering with progress.

Many of the above mentioned skills required years of study, reading and working to bring them to fruition. And yet, when these skills are analyzed they can be broken down into a rather well-defined mechanical decision-making process. Admittedly not all, however, a significant proportion of these vocational counselling functions can be just as well if not better handled by a computer. The following outline is an attempt to indicate how this may be achieved.

THE TOTAL PROGRAM

The proposed program of Vocational and Educational Counselling is summarized in Figure 2. Basically it consists of three types of service: service to students at the institute, service to prospective students of the institute, and service to staff and administration of the institute. These services can be broken down into several subcategories as follows:

Service to the Institute Students

- (a) Self evaluation—Ability, interest and personality testing to help a student understand why he may be having problems with his academic and social progress.
- (b) Remedial help—Reading and mathematics programs designed to help students with specific problems.

- (c) Educational information giving
 - Information on programs within the institute as well as on the prerequisites for them.
 - Information about other secondary and post-secondary institutions.
- (d) Vocational information giving
 - Wage data
 - Job demand data
 - Physical and educational prerequisites of various vocations
 - Vocational trends

Service to Prospective Students. Same as above with the possible exception of remedial programs which may be limited by economics and/or regional differences in educational emphasis.

Service to Administration and Staff. Research data upon which to make administrative and curriculum decisions.

Pervading the whole system is a plan for monitoring, evaluating and changing the programs when research indicates changes are needed.

Starting at the point "ENTER" of Figure 2 it can be seen that a mass testing program is part of the plan (the lack of uniform incoming data for each student makes the development of expectancy tables, regression or discriminate coefficients or any significant predictive data almost impossible). Perhaps when standardized data (such as that provided by the SACU tests being developed presently) is available mass testing at the institute level may not be needed.

The answer sheets from the testing program are marked by machine and cards containing the students' results are automatically punched on I.B.M. cards. These results along with any pertinent elementary or secondary school information is then fed into the computer. There it is normed, tested for differences from previous test groups, and then stored on a disk (a permanent file to which the computer has immediate access). Relevant medical and other data would also be put on the file. (The student could be tested on a computer terminal and the data transferred to the file immediately. The student would be issued a number upon application and he may even be able to take the tests from his home town school which could be hundreds of miles away).

Disk #2 in Figure 2 represents the storage file for a variety of highly specialized and sophisticated programs. Tentatively the following programs are proposed:

1. vocational and institute information program
2. vocational and educational counselling programs
3. remedial programs.

VOCATIONAL AND INSTITUTE INFORMATION PROGRAM

The labour market fluctuations, changes in job requirements, changes in programs already offered at the institute, and additional programs being offered at the institute are just a few of the problems which make it almost impossible for a high school counsellor or anyone remote from the institute to keep up to date. Even the institute counsellors find it impossible to obtain up-to-date figures on job demand or institute graduate utilization. This

program would employ a staff whose main concern would be to obtain the latest information on industrial trends and changes, job demands, pay scales, institute course changes and other relevant information. This information would be used to up-date the Information Program. Students or counsellors interested in a post-secondary institution—both those at the institute and those who subscribe to the computer system—would have instant access to this information via computer terminal. The computer terminals connected to the institution's computer facility are indicated in Figure 2 by a lightning stroke pointing to them. These terminals could be located anywhere in the world where telephone connections can be made. The tremendous advantages to the rural areas which are too poor or too remote to employ counsellors or which do not have ready access to information are obvious.

THE VOCATIONAL AND EDUCATIONAL COUNSELING PROGRAMS

This counselling program will, in addition to making use of the above-mentioned information program, make use of:

- (a) High school or grade school results
- (b) Counselling test results
- (c) Results of interest tests, ability tests, and personality inventories
- (d) Research results.

In general this program will perform all the functions outlined in the model of vocational counselling as summarized in Figure 1. Based on information obtained directly from the student or through actual testing on the computer, a student can be aided in making a wise decision as to which area at the post-secondary institution he will apply. In cases where a lack of information about the student is evident a test could be administered on the spot through the computer. Where problems not within the scope of the computer program are detected, the student would be referred to a counsellor. That such programs are possible and probable is indicated by the work being conducted in this area. In a recent study by Donald E. Super (1970) labeled the "Educational and career exploration system" the following summation is made by him:

The prototype of a computer assisted guidance system has been developed, improved through laboratory testing, and tried out in one high school. Its value in furthering the vocational development of students has been assessed in this preliminary three months field trial. The results appear favourable. The system seems worthy of further work (p. 19)!

A little closer to home, E. Romaniuk (1968) reported no significant differences between vocational choices made by clients counselled on an IBM 360 computer terminal and those counselled by a practising high school counsellor.

Need for Local Development

Research of the nature mentioned above is usually quite general in scope and not likely to be applicable in total to any working counselling program. A working program would of necessity have to include the specifics of the region or institution for which it was designed. The nature of the feeder schools, the nature of the programs and courses offered at the specific institution and the many regional factors which are in continual flux and

peculiar to that institution make it almost mandatory that the programs be designed and maintained by personnel resident at the institution.

Apart from the vocational aspect of the Counselling Program, there could also be an educational dimension. This Educational Counselling Program or an Education Branch of the Counselling Program would accomplish the dissemination of educational information about the appropriate pre-requisites needed for particular programs at the institution in question as well as how and where such pre-requisites may be obtained.

DIAGNOSTIC AND REMEDIAL PROGRAMS

The remedial programs would ordinarily be preceded by an appropriate diagnostic test. This test would place the student at a specific level in the pertinent subject area and point out special problem areas. The student would ordinarily have to be a student at the institution and may be referred for remedial help by an instructor or may seek remedial help on his own. If an instructor knows of a problem area for a student he may refer the student to a specific part of the remedial program and bypass the diagnostic test. As shown in Figure 2 the terminal to be used for remedial programs would probably be hard wired to the computer and located in the instructional materials center of the library.

Proposed would be programs in mathematics, reading and study habits. The exact nature of these programs cannot be determined at this time but it seems safe to assume that whatever their form, they will be the most complicated and difficult to write. The most manpower and the longest development time would and should be assigned to these programs.

ECONOMICS OF SUCH A PROGRAM

There is no doubt that in terms of today's technology the size of a computer needed to implement the above described program is very large. However, with the development of L.S.I. circuits (Heath, 1970) and other technological advances the cost of the hardware in the near future will become less and less a significant proportion of a computerized system of counselling. Most experts predict better and cheaper computers for the future.

The most significant costs in the development and maintenance of such a program will come in the research and testing needed to write the program. Such costs may be made more palatable by spreading development over several years and by allowing careful testing of each phase of the overall program. It is estimated that a minimum of five years program development would precede any working system.

By far the greatest economic factor to consider, however, is the cost of the drop-out. Post secondary institutes have one of the largest per pupil costs of any educational institutions and even a rather small number of withdrawals may represent a rather large economic loss. (If one accepts the dictum that an empty place in a class is a waste and thus a cost to the system.) Studies carried out at the Northern Alberta Institute of Technology indicates that by far the most frequent reasons given for withdrawing from the institute were lack of interest and academic difficulty (Checkley, 1968).

Lack of interest—stemming in the main from lack of information about the program and about themselves—and academic difficulty—resulting from

inadequate preparation or unrealistic goals—appear to be major factors in a student's leaving the institute. Professional counselling, it is believed, represents the best approach to solve these problems. Apart from the limitations of even a well-qualified counsellor mentioned in the introduction, it is unlikely that in the foreseeable future, very small rural schools will be able to afford to hire a qualified counsellor. A program such as that outlined herein may cost a school as little as \$150.00 per month for the rental of a terminal. Since the provinces as a whole will benefit from such programs, it is assumed that the provincial governments would assume major financial roles in their development.

Since the need for personnel to be close to the situation has been stressed, it is assumed that each post-secondary institution would have its own personnel working on the informational aspects of the total program. Other areas such as study habits and remedial programs could very well be assigned the task of serving a whole province. Different institutions then would submit their specific data through separate terminals on location at those institutions.

SUMMARY

It is proposed that it is humanly impossible to do a good and extensive job of vocational and educational counselling as they are defined in this paper. It is also proposed that most of the activities outlined in the model of vocational counselling in Figure 1 could be better performed by a computerized counselling program than by any other method available to society today.

Such a computerized program is outlined in Figure 2 and includes the following features:

- (a) A vocational counselling program which helps the student evaluate his ability and interests, suggests general areas of work which he may consider and, if these areas happen to be among those offered at the institution under consideration, gives relevant information about those areas as well as prediction of probable success for those programs. For occupational areas not covered at the institution the proper referrals would be made.
- (b) An educational counselling program which helps the student decide which pre-requisites to a desired program he should have and which procedure he should follow in order to obtain these pre-requisites.
- (c) A diagnostic and remedial program which would help remedy hindrances and defects in the student's previous training. Initially, reading, mathematics, and study habits would be included in the remedial program set.

When one considers the number of counsellors needed to do an adequate job of vocational and educational counselling throughout the province, when one considers that this talent is more and more being deployed in the personal problem area and thus there is little time left to perform educational and vocational tasks adequately and when one calculates the economic loss in a drop-out, such a program becomes economically viable and almost a necessity.

BIBLIOGRAPHY

- Bohn, M. J. Jr., & Super, D. E. The computer in the counselling and guidance programs. *Educational Technology*, 1969, 9, 29-31.
- Borow, H. *Man in a World at Work*. Boston: Houghton Mifflin Company, 1964, 310-340.
- Checkley, S. M. Survey of withdrawal reasons. *Student Counselling Services*, N.A.I.T., 1967-68.
- Ferguson, L. W. Paper Presented to Edmonton Regional Guidance Council. Spring, 1969.
- Ferguson, L. W. The changing role of today's school counsellor. *Counselling and Guidance Bulletin*, Counselling and Guidance Branch, Department of Education, Province of Alberta, Winter 1970.
- Heath, F. G. Large scale integration in electronics, *Scientific American*, Feb. 1970, 22.
- Loughary, J. W., Friesen, D., & Hurst, R. Autocon: A computer-based automated counselling simulation system. *Personnel and Guidance Journal*, 1966, 45, 5-15.
- Minor, F. J., Myers, R. A., & Super, D. E. An experimental computer-based educational and occupational orientation system for counselling. *Personnel and Guidance Journal*, 1969, 47, 564, 569.
- Romaniuk, E. W. *Computer assisted counselling*, Thesis, University of Alberta, 1968.
- Super, D. E. Using computers in guidance: An experiment in a secondary school", *Canadian Counsellor*, 190, 4(1), 11-21.
- Venn, Grant. *Man, Education and Work*. American Council in Education. 1966, 147.
- Villett, S. The role of counsellor in a technical institute or community college as seen from the point of view of the director of vocational education for the province. Unpublished luncheon address to counsellors at the Canadian Guidance and Counselling Association's Convention, Edmonton, Alberta, June, 1969.
- Wrenn, C. G. *The counselor in a changing world*. Washington: American Personnel and Guidance Association. 1962, 20.

UN SERVICE DE COUNSELLING D'ORIENTATION SCOLAIRE
ET PROFESSIONNELLE PROGRAMME

DONALD PRICE

L'auteur met en relief qu'il est pratiquement impossible pour un conseiller de lire tout ce qui est ou sera publié dans son domaine, d'intégrer des changements institutionnels de plus en plus nombreux et d'accomplir les tâches nouvelles que la redéfinition continue de son rôle exige. Son efficacité comme conseiller dans les domaines scolaire et professionnel ne peut qu'en souffrir. L'auteur propose que la plupart des services qu'offrent les conseillers dans ces domaines pourraient tout aussi bien être exécutés et peut-être mieux exécutés, par l'usage d'ordinateurs.

On trace l'esquisse d'un modèle de counselling d'orientation scolaire et professionnelle et on propose un moyen de le mettre en vigueur en utilisant les ordinateurs. On illustre aussi comment un tel service programmé pourrait être intégré à l'ensemble des services d'une institution scolaire de façon à ce que les administrateurs, le personnel, les étudiants et les conseillers puissent tous en bénéficier.

