The Adult Learner

Regional Economic Expansion
Expansion Économique Régionale

The Adult Learner

Adult Basic Education in the
Canada NewStart Program

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I. Introduction

Education and employability have long been associated with one another and assumed to be positively correlated. It was to be expected, then, that when the Canada NewStart program was launched in 1967 it would contain substantial emphasis on adult basic education.

The Canada NewStart program was established as an experiment in federal-provincial co-operation to find ways of alleviating chronic poverty and disadvantage. It began as a pilot project of the Canada Department of Manpower and Immigration after almost four years of planning and development. When plans were made to establish the Canada Department of Regional Economic Expansion, in 1969, the NewStart program was included in the new department.

In all, six provinces entered into agreements with the government of Canada to participate in the NewStart program. Nova Scotia, Prince Edward Island, Saskatchewan, and Alberta concluded agreements in 1967; New Brunswick and Manitoba in 1969. For a variety of reasons, agreements were not reached with the other provinces.

A NewStart corporation is a private company set up under legislation of the province in which it operates. Its board of directors is selected jointly by the provincial and the federal governments and it is financed totally from federal funds. Fiscal responsibility is maintained by requiring annual approval by the province and Canada of the operational plans of the corporation. Liaison with the federal government is provided through a branch of the funding department. Under Manpower and Immigration it was the Pilot Projects Branch; for Regional Economic Expansion it is the Social and Human Analysis Branch.

In drawing up the original agreements, specific geographic areas were selected. These were Yarmouth County (Nova Scotia), Kings County (Prince Edward Island), Kent County (New Brunswick), City of Prince Albert

(Saskatchewan), Northeastern Alberta (Alberta), and a semi-circular area of 150 miles radius from The Pas (Manitoba). The areas were all within regions designated as being of slow economic growth, and all had populations between 14,000 and 32,000.

From the outset NewStart was designed as a relatively short-term program. The experimental NewStart projects were limited to an operating life of three to four years with six to twelve months additional time for planning and preparation and for phase-out. Prince Edward Island NewStart surrendered its charter in August 1971; Manitoba NewStart in December 1971. Saskatchewan NewStart and Alberta NewStart terminated their activities in 1972. Some parts of the programs of these corporations will be continued under sponsorship and funding by federal, provincial, or joint federal-provincial programs. Nova Scotia NewStart was extended to December 1972 for the specific purposes of preparing consolidated reports and disseminating information on the DACUM approach to curriculum, learning, and evaluation in occupational training. New Brunswick NewStart is expected to surrender its charter in 1974.

The ethnic and economic diversity of the areas, coupled with the freedom of each corporation to develop its own programs, led inevitably to considerable differences in emphasis. In order to record and to disseminate the findings of the NewStart program, the Department of Regional Economic Expansion is preparing and circulating a series of reports on various aspects of the work carried out by the six corporations. The present report deals with the various ways in which training in communication (reading, writing, listening, speaking) and mathematics were treated in the Canada NewStart Program. In Section II, attention is given to the rationale for considering adult basic education as a factor in alleviating disadvantage. The role of the federal funding agency in support of the ABE programs is treated in Section III.

The major emphasis in adult upgrading has been on the grade levels from five to ten. Section IV reviews the programs that were conducted by four of the NewStart corporations at these levels. These programs include mathematics and some science although the primary attention was to communication skills. Four of the NewStart corporations did original work on basic literacy programs and these are reported in Section V.

Section VI summarizes the major observations and conclusions which arose from the conduct of the various projects. Section VII is a short bibliography.

Because of the provisions of the British North America Act and the resultant emphasis on provincial autonomy in the field of education, the use of the word "education" in federally financed operations may come under question. The usual safeguard has been to substitute the word "training" in programs at the sub-college levels. Hence adult basic education is officially

known as basic training for skills development (BTSD). On the other hand, adult basic education (ABE) has become a generic term in the field and, it is assumed, can be used without implying or threatening intrusion into the traditional authority of the provinces. In this report, the emphasis will be on adult *learning* as distinguished from adult *education*, but, where it is necessary in order to maintain clarity or to avoid confusion, the generic term "adult basic education" will appear.

II. Adult Basic Education as a Factor in Overcoming Disadvantage

In summary, though our knowledge of the precise contribution of education to economic growth is still far from being adequate, there is enough evidence to show that even primary education may help significantly to increase productivity of labour; it thus generates economic development which in the long run maximizes employment. Similarly, education increases the mobility of labour and thereby removes obstacles to economic growth. However, we must not expect that education can do for employment what the economic process fails to do. The school performs in a society a multiple function, but it is by no means omnipotent. Education can play a positive role in enhancing employment only in conjunction with other measures, and a crucial one is investment in directly productive sectors [*34, p. 33*].

Certain facts may be cited to show the relationship between low educational levels on one hand and unemployment and low income on the other. For example, the Economic Council of Canada reports that "The association between low income and lack of education beyond the elementary level is particularly strong. Not only did families whose heads had less than secondary education show a high incidence of low income in 1961 (37 percent), they also accounted for more than two-thirds of all low income families" [9, p. 116].

Statistics analyzed in February 1960 indicate that, while 20.9 percent o the labour force had less than primary education, 43.9 percent of the unemployed were in this category [8]. The same report reveals that roughly 92 percent of the unemployed had not finished secondary school, and only 8 percent had finished secondary school or better.

There is no doubt, then, that the ranks of the unemployed and of low income families are characterized by low educational levels. Though it cannot be argued that raising educational levels will create job opportunities, it is certain that many people are barred from gainful employment because of educational deficiencies. In fact, figures from the 1961 census reveal that [31]:

about 175,000 Canadians had never been to school;

about 850,000 had never gone beyond grade four;

about 4,140,000 had entered grade five but had not completed elementary school;
about 7,000,000 had entered but not finished secondary school.

At that time, it was estimated that 70 percent of the available jobs required at least a secondary education [31]. With increasing automation and developing technology, that figure is now substantially higher.

Under these circumstances it would appear to be obvious that providing basic upgrading is essential to the continued well-being of the economy. On the other hand, it must be noted that, on the basis of current unemployment and job vacancy statistics, there are more than five unemployed people for every job vacancy. Even making allowances for the large proportion of the unemployed who are unqualified educationally, there are still more than enough people with the necessary qualifications to fill the available jobs.

What, then, is the rationale for applying resources to the task of reducing illiteracy and providing upgrading opportunities? The answers emerge when attention is turned away from statistics and toward the people represented by the figures. To be undereducated is not necessarily to be incompetent or incapable. Many Canadians, especially among our Native peoples, are uneducated because of lack of opportunity. Many others with inadequate education were forced by circumstances to terminate their education at an early age. And even among those who dropped out of school for less acceptable reasons there are many who later wish to remedy their educational deficiencies.

This group of people — the illiterate, the functionally illiterate, and the undereducated — forms a significant proportion of the country's human resources, and it is logical to take steps to develop these resources to a greater degree. This development, of course, involves more than simply educational upgrading. Education at best is no more than a means to an end. In providing educational upgrading we are doing no more than opening doors to an increasing number of opportunities.

When the Canada Department of Manpower and Immigration launched the Canada NewStart program, it was already involved in adult upgrading activities. This effort was known as basic training for skill development (BTSD) and was intended to prepare people for admission to trades or vocational training. Many people had been assisted by the BTSD programs, but serious structural and legislative limitations excluded some people from the program and made it somewhat less than useful to others. Among these limitations were:

1. Financial support for one course could be given for no more than 52 weeks. This put a practical limit on the educational entry level. Since the educational requirements for trades and vocational training were usually at the grade 10 level and seldom lower than grade 8, BTSD students were required to have an entry level which would enable

them to achieve the equivalent of these standings with no more than one year of training. Even with the most generous and flexible regulations it was impractical to start any lower than grade 6.

2. The number of centres at which BTSD was available were few, often necessitating long and distant absences from home.
3. Time schedules were rigid and not always suitable for the potential trainee.
4. Curriculum content was relatively fixed and made little or no provision for individual differences in either ability or achievement.
5. The classroom environment and teaching techniques were reminiscent of childhood situations, many of which had resulted in negative attitudes toward schooling.

As a result of these and other limitations many unemployed and under-educated adults were prevented from participating in upgrading programs and many dropped out after only brief involvements. It was primarily toward this group of adults that the majority of the Canada NewStart program efforts in adult basic education were directed.

III. Canada Newstart Support Programs

Before proceeding with an examination of the adult basic education program carried out by the several NewStart corporations, it will be useful to examine the role played by the funding agency in this particular aspect of the Canada NewStart program. For the purpose of assisting the NewStart corporations the Pilot Projects Branch of the Canada Department of Manpower and Immigration established a technical support centre. The function of this support centre was described as follows [22, pp. 1-2]:

> *The development of the new approaches, methods, and materials, will be carried out by NewStart corporations with the assistance of the Technical Support Centre. The preparation and testing of new training methods in essentially new settings will require close and continuing collaboration between them. To facilitate the maximum amount of useful research at the local level, the Technical Support Centre is undertaking certain preliminary activities, including a review of available resources and relevant research. These will then be related to the needs of the NewStart corporations. As the pilot projects are established they will articulate their various needs and requirements and may ask the Technical Support Centre to undertake certain developmental functions.*
>
> *The Centre will serve the Pilot Projects in the following ways:*
>
> 1. *Gather information on existing relevant programs and techniques.*
> 2. *Anticipate some of the needs of the NewStart corporations and prepare methods, materials, and training aids for their possible use.*
> 3. *At the request of a NewStart corporation, prepare methods, materials, and training aids for their use.*
> 4. *Provide consultation and exchange of information with and between NewStart corporations.*
> 5. *Encourage and support NewStart corporations in experimenting with different approaches and methods.*
> 6. *Design, in co-operation with corporation staffs, over-all action research plans, experimental methods, and methods to be used in evaluating the program.*
> 7. *Provide necessary administrative control to ensure that expenditures are within the terms of reference of the Canada NewStart Program and are accounted for on a prescribed basis.*

In order to accomplish these purposes the technical support centre assembled, in addition to administrative staff, a group of consultants under the following titles [22, pp. 4-8]:

Research Consultant

Basic Education Consultant

Community Organization Consultant

Recruiting, Motivation, and Counselling Consultant

Consultant in Vocational Training.

The duties of the basic education consultant were described thus [22, pp. 5-6]:

> *Serves as consultant to pilot projects staffs on problems of basic education in relation to persons being trained; assesses suitability of training materials and programs; directs preparation of basic education materials, devises teaching methods; evaluates training materials and methods, develops appropriate methods of evaluating training; assesses training experiences of pilot project groups.*

In carrying out this responsibility, the basic education consultant used the following procedures:

1. ORIENTATION SESSION

From the 6th to the 22nd of September 1967 the available staff members of the four original NewStart corporations were assembled in Ottawa for an initial briefing which included an introduction to all the NewStart concepts. The basic education consultant had prepared material indicating the role of adult basic education in the NewStart program. Since the participants in this orientation session were largely administrative personnel, the material prepared was more suggestive than directive [23].

At this session the following definition of adult basic education was put forward [23, p. 2]:

> *Adult basic education is a sequential program of instruction designed: (1) to help adults acquire communication and computational skills necessary to meet their need, (2) to raise the total education level of adults with an objective of making them more independent citizens, (3) to improve the adult's ability to benefit from occupational training, (4) to increase opportunity for more productive and profitable employment, and (5) to make adults better able to meet their responsibilities.*

In this context basic education skills were seen to include communication (reading and writing), computation (mathematics), social studies (history, geography, and civics), science, health, recreation and physical education, and "the world of work" [23].

The remainder of this orientation session was devoted to consideration of various alternatives for program organization and staff

that could be considered by the organizers of the basic education programs in the NewStart corporations. A tentative list of available systems that could be used in adult basic education was also presented.

2. Visits to NewStart Corporations

The basic education consultant frequently visited the sites of the NewStart corporation projects. By these visits, he was able to exchange ideas with the developers of adult basic education programs and to become familiar with problems which were arising. He was also able to refer the program developers to available resource persons and documents. Through these personal contacts he became increasingly aware that an exchange of ideas among the various adult basic education staffs would be beneficial. This led to the establishment of the third service.

3. Adult Basic Education Seminars

The basic education consultant was instrumental in setting up a series of adult basic education seminars, which were held in a variety of locations including some of the NewStart corporation facilities. The basic pattern of these seminars was an exchange of reports by the adult basic education directors indicating what programs were being developed and what progress was being made. Following this familiarization process the participants engaged in informal discussion on the advantages and disadvantages of various concepts and practices.

This experience undoubtedly resulted in a clearer definition of the activities of each of the NewStart corporations, avoiding possible duplication of effort and providing opportunities for co-ordination and correlation where possible.

4. Adult Basic Education Model Curriculum

The rationale for the preparation of an experimental adult basic education curriculum is given in the foreword which accompanies the final product [10]. This reads in part as follows:

> *Several publishers are marketing materials primarily for Adult Basic Education. However, much of this material is designed to meet the needs of the large American market and problems associated with their war on poverty rather than to meet specific Canadian needs.*
>
> *One function of the Canada NewStart Program is to assess the usefulness of these or other materials, and to design new techniques, methods, and programs that will better meet the needs of the Canadian adult.*
>
> *Most of the existing new programs in Adult Basic Education center around programmed materials and a rather structured approach to meeting the needs of adults. There appears to be a trend to place more emphasis on a programmed materials-centered approach than on the more traditional teacher/text centered approach. Perhaps this is in line with the general movement of manufacturers and publishers toward computer-centered instruction.*

To evaluate and compare a teacher-centered approach with a programmed-approach in Adult Basic Education it has been necessary to review the whole field of Adult Basic Education, and to develop this curriculum guide for possible experimental application. It builds a teacher-centered approach around existing texts and materials.

The director of the Experimental Projects Branch, Garnet T. Page, concluded his foreword thus [10]:

It is stressed that this is an experimental Edition and therefore subject to testing and revision before being recommended as a suitable program. It does contain a collection of many good ideas, however, and should be a most useful reference document for many adult basic educators.

There is no evidence of the extent to which this experimental program was utilized by the NewStart corporations. It may be assumed, since most of the corporations developed individualized learner-centered programs, that this served as no more than a reference work.

5. Annotated Bibliography

Another service provided by the basic education consultant was the compilation and publication of an annotated bibliography of adult basic education materials and resources. This work originated as a service to Canada NewStart staff. The preliminary draft, however, aroused such enthusiastic response that it was thought justified to expand the scope, update the content, and publish the bibliography in a more permanent form. The bibliography includes sections of instructional materials, general literature, and research, with author indexes and a publishers' index for both sections. The bibliography also includes a list of adult education journals. The published bibliography includes more than 1,400 entries cross-referenced by author and publisher in a volume of 310 pages [26].

In addition to those services provided by the basic education consultant, the technical support centre also supplied general assistance, much of which was of value to ABE staffs and projects. Among these services were the identification and utilization of consultants; project proposal review and criticism; project proposal guide; and interaction among the various consultant specializations.

Most of the programs to be described in the following sections were reviewed by, and discussed with, the basic education consultant and other members of the technical support centre staff.

IV. Upgrading Programs

Although the NewStart corporations operated independently of each other, some factors in their concepts and methods were held in common. It will be useful to note these before proceeding to examine the separate programs in detail.

The Adult Learner as an Individual

The traditional practice of providing education in prescribed segments to large groups of students at one time is beginning to break down in the public school system with the recognition of the importance and extent of individual differences. The tradition is even less acceptable for adults, whose age, experience, and previous education vary even more than do those of students in the public school system.

In recognition of these important differences, most NewStart corporations developed programs which made it possible for adults to exercise some control over their choice of entry and exit times, course content, and rate of progress.

This individualization was accomplished in a variety of ways which included: a broad choice of educational materials; options as to learning method; a process of individual assessment; provision for independent progress; and modifications in the teacher-learner relationship. How these variations were developed and applied will be treated in examining the separate programs.

The Learning Environment

The recognition of the adult learner as both an adult and an individual necessitated some significant changes in the learning environment. If students are not all attempting to learn the same thing at the same time, there is no requirement for all to face the teacher or the blackboard in precise geometric

patterns. This makes it possible to introduce variations in furnishings in classroom arrangement. In fact, even the term "classroom" becomes an anachronism when there is no "class".

The interests and tastes of adults necessitate a different decor for the learning environment. This need is even more important when it is considered that much adult aversion to continuing education has its roots in negative experiences in early schooling. As far as possible, learning environments were designed to avoid any carryover of these undesirable associations. With some variations, changes included tables and chairs instead of desks, carpets on the floors, attractive colours and decorations, and provision for smoking and conversation.

The Instructor-Learner Relationship

Another major change resulting from an individualized program is in the relationship between the teacher and the pupil. The difference here is so great as to necessitate a change in nomenclature. The "pupil" or "student" becomes the "learner" or "trainee". The "teacher" may be designated as a "coach", "instructor", "monitor", or a "facilitator of learning"; the preferable term for the process becomes "learning" rather than "teaching" or even "education".

In most cases, the responsibility for learning is upon the learner; the erstwhile teacher serves as a resource person. Some significant variations in this relationship will be discussed in reporting on the individual programs.

A. SASKATCHEWAN NEWSTART — LEARNING INDIVIDUALIZED FOR CANADIANS (LINC) [32] [1].

Background

Early in 1969 Saskatchewan NewStart began action research with a variety of methods and materials for adult basic education. Because of the widespread need, priority was given to work in communication and mathematics.

Program developers and instructors tried to determine the relative effectiveness of several commercially produced instructional programs used as directed by the publishers. Instruction was individualized. It became apparent as work progressed that instructional materials, regardless of their effectiveness, were not sufficient for a total instructional program. The development team concluded that an over-all curriculum was required including clearly defined objectives on which to base instruments of student

[1] This section is drawn largely from [32] and from conversations with the program developers.

placement and evaluation, program evaluation, selection and validation of instructional materials and methods, as well as other training support systems such as instructor training.

Using the DACUM (Designing A CurriculUM) model and employing behavioural objectives, the development team designed and produced an Adult 5-10 Program. After a period of operation in the Saskatchewan NewStart training laboratory, this program was used in field tests in seven provinces and the Northwest Territories. These demonstration projects, as they were called, were operated by the respective Departments of Education and funded through special Canada Manpower Training program purchases. The training institutions using the program, the various Departments of Education, and the training research and Analysis Branch of the Department of Manpower and Immigration planned the evaluation of the projects; Saskatchewan NewStart Inc. carried out instructor training in a six-week course at Prince Albert with further consultation after the projects were started. In most cases, a life skills course was operated in conjunction with the adult 5-10 basic education component.

Following the implementation of the adult 5-10 program in the demonstration projects, it became apparent that the individualized process was reducing the drop-out rate, increasing the use of training places, and raising the morale of instructors and students; and that no single instructional program would satisfactorily meet the varying standards and certificate levels for all areas of Canada.

Taking these factors into consideration, as well as some commonly voiced criticisms of the scope and sequence of the content, the development team at Saskatchewan NewStart decided to revise the adult 5-10 program. The new program, now designated as learning individualized for Canadians (LINC), was completed between February and August 1972, to meet the common core requirements for an instructional program in adult basic education in communications and mathematics in the different parts of Canada.

Basic Principles

Through early experience with the adult 5-10 program, Saskatchewan NewStart adult basic education program developers came to several conclusions regarding the nature and content of adult upgrading programs:

1. *There should be a wide selection of materials available.* No single book or set of books will satisfy the needs of all students in an upgrading class. Some adults prefer a textbook. Different books offer differing explanations and differing contents, even on the same subject. Instructors should be able to choose different parts of books or commercial courses for varying teaching purposes.
2. *There should be a variety of methods that can be used in a program.* No single method can suit the learning modes of all individuals. Some learn better from an instructor; others from peers. Some prefer to study a textbook or to work

things out by themselves. Certain adults like audio-visual aids or practical activities. Each instructor must be free to choose the method that he finds the most effective for any particular student.

3. *There should be a system of individual diagnosis and placement to find the functioning levels of each student in each subject to be studied.* No two adults enter a retraining program at the same academic level, nor do they function at the same level in all subjects. Age, the number of years out of school, the level at which they left school, and their reading and use of mathematics since leaving school all affect the functioning level of adults who return to academic work.
4. *There should be a process of individualization which allows adult students to progress at their own speed.* Adult students have different intellectual capabilities and capacities to comprehend and use new concepts and skills. They have innate abilities and personal motivations which can best be applied in an individual way. They differ in their rates of reading and writing. Each needs his own program to challenge him. Coupled with the process of individualization, there should be a system for prescribing learning in which the instructor works directly with each student, helping him to find his errors and lack of knowledge on particular concepts and assigning him effective work to overcome them. In the process the instructor should become thoroughly acquainted with each student's learning capacities and program.
5. *There should be a system of regular evaluation.* An adult student can gain confidence in himself by being successful, even in small stages. Progress through the program in small steps, with regular evaluation, gives him a sense of accomplishment which he may never have achieved in academic work before. Regular evaluation helps the instructor, also, to keep in close touch with each student's progress and reduces the strain of facing a final exam.
6. *The curriculum should include only the essentials, and the objectives must be clear and precise.* Most adults want to learn only what is necessary in order to gain a certificate or a credential which will open doors to a job or further training. They want to see a close relationship between what they learn in an upgrading program and what they may have to use later. They may have little time for, or interest in, academic luxuries. Exact objectives help both the student and the instructor to determine clearly what has to be learned at each stage.
7. *The physical and social environment of the classroom should be suited to the age and habits of adult students.* The rules of discipline for children in a classroom should no longer apply; adults do not like to be treated as children. They should be capable of making their own decisions and disciplining themselves. The traditional situation in which the instructor dominates the class from behind his desk and deals with the class as a whole needs to be changed to allow him to function from *within the group.* Then he can develop the one-to-one relationship that appears to be so vital in adult education, and peer teaching can flourish in a relaxed atmosphere.
8. *Instructors should be trained to assume their new roles in the classroom.* They must learn to understand the fears, needs, and characteristics of disadvantaged adults. They must learn not to treat them as children. They must learn the individualized process of diagnosis, placement, prescription, and evaluation.

The LINC program has attempted to rationalize these variables of materials, methods, individualized process, and evaluation into one consistent scheme which lends itself to a physical and social environment suitable for upgrading the basic skills of adults [32, pp. 24-25].

The Curriculum Model

The curriculum model had to ensure that the intended learning experiences closely matched what the students would actually experience during the learning process. It had to integrate all phases of the design from goal formulation to the planning of classroom activities. Other requirements were that it should:

1. produce a curriculum which will be an effective behaviour change vehicle;
2. have provision for sequencing and clustering behaviourally-stated instructional objectives;
3. have easily defined steps;
4. be easy to communicate;
5. produce a curriculum which can be modified as local conditions demand;
6. provide for automatic generation of data for the design of support systems such as for student progress evaluation and reporting, accounting, certification, and program evaluation.

These requirements led to the choice of the DACUM model, which was designed in six sequential phases:

Defining Terminal Behaviours

Designing Evaluation Systems

Defining Instructional Objectives

Preparing Evaluation Instruments

Preparing Learning Activities

Preparing Individual Student Activities.

A description of each phase of the DACUM model as applied in the development of the LINC program follows.

Phase 1 — Defining Terminal Behaviours

The objectives of this main planning phase in the curriculum design are:

1. to identify the characteristics of the target population so that entry levels and other features can be incorporated to meet their needs and to formulate a pre-training behaviour profile;
2. to define and formulate a behaviour profile which the student should exhibit at the end of the training program;
3. to plan the general nature of the instructional strategies and the instructional materials to be used.

The typical adult student for whom the program was prepared has a specific behaviour profile which includes: a general grade level of about grade 5, with a grade level in reading no lower than 4 as measured with a reliable

standard test; ability to count and general knowledge of the other properties of the decimal numeration system; ability to speak English fluently; ability to write both words and numerals; acceptance of at least the short term goal of raising the level of his basic education; and some motivation to learn.

With these conditions met, the next step is to determine in well-defined terms what the student can be expected to able to do following the experience of the program.

To establish the end-of-training profile, a hierarchy of objectives for the program was outlined:

LINC PROGRAM OBJECTIVES

LINC Communications	*LINC Mathematics*
Course objectives	Course objectives
Unit terminal behaviours	Unit terminal behaviours
Item instructional objectives	Item instructional objectives

The program objectives formulate the general aims of the LINC program as a preparation for subsequent vocational training at the trades level and/or preparation in the basic skills associated with communication and computation in personal, home, and community life.

The course objectives deal with the general aims of each of the two areas of study, and reflect and support the program objectives.

The unit terminal behaviours, in the aggregate, outline the student's post-training behaviour profile. Although fairly broad, the terminal behaviours are nevertheless stated in behavioural terms, lending themselves to the formulation of more specific objectives, to sequencing, and to the selection of techniques of evaluation.

In the LINC program each terminal behaviour represents a unit of instruction; sub-units into which instructional objectives are clustered are called items. Item instructional objectives are the immediate, clearly defined objectives used to define specific and desirable behaviour at each stage of work during instruction. The instructional objectives are planned, and the techniques for sequencing and clustering them selected, in Phase 1, but the instructional objectives are actually written in Phase 4.

Thus the hierarchy in curriculum organization in the LINC program is:

Program → *Course* → *Unit* → *Item* → *Instructional Objectives.*

The developers designed the LINC program for individualized instruction, employing a system with built-in components for diagnosis, multi-level placement, prescribed learning activities, and individual evaluation. In addition, they planned to evaluate and select a number of commercially published materials in a variety of formats to accompany the program.

Phase 2 — Designing Evaluation Systems

The main objective of Phase 2 is to plan and select methods of evaluating achievement and progress. No test instruments are actually prepared in Phase 2; rather, the task is one of planning a total evaluation system for the curriculum.

The design of the evaluation system in the LINC Program includes:

A program of standardized testing for ability and achievement. Specifically, an ability test can be administered prior to training along with the first form of a standard achievement test. A different form of the same standard achievement test can then be used when the student is at or near the end of the program.

A system of diagnostic tests built into the curriculum and valid with respect to the instructional objectives.

A system of progress testing on the short-term goals of each item, suitable for marking by the students themselves, and available in multi-form to facilitate remedial loop instruction.

A system of comprehensive testing on larger clusters of objectives in units, available in multi-form to facilitate remedial loop instruction.

The diagnostic test system consists of a series of tests valid for the instructional objectives in each unit. Each test identifies the objectives being tested for quick analysis and posting in the records of student progress. The LINC program designates these tests as *Placement Inventories* (P.I.).

The system of short-term progress testing consists of tests in two forms for each item in each unit. They are called *Item Progress Checks.* A design feature of these tests is that the criterion score at which students can proceed to the next item is at or near 100 percent. This feature was included, along with a teacher's judgment aspect, to prevent a student from proceeding to new work without mastering the concepts necessary to facilitate new learning. In addition, the immediate knowledge of results and the achievement of a high score on their tests are highly motivating experiences for an adult learner.

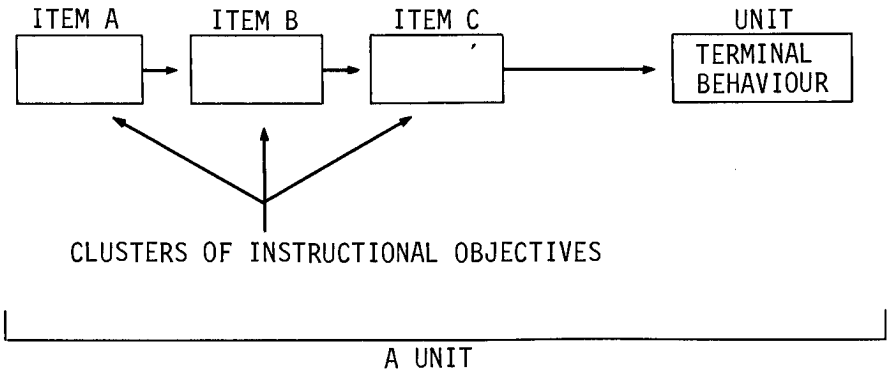
The comprehensive unit testing system includes two forms of tests designated as *Unit Progress Checks* for each unit of each course. Again a high criterion, approximately 90 percent, is required for the student to proceed to the next unit.

The flow chart of the individualized process shows how students progress through the items and units of each course in the program.

Phase 3 — Defining Instructional Objectives

Each terminal behaviour written in Phase 1 represents a unit of instruction. The main objective of Phase 3 is to write the instructional objectives and cluster them in the items which make up the units.

In the charting technique a unit is composed and laid out like this:



The objectives of the LINC program, organized in items, are incorporated in the LINC mathematics and LINC communications course books. The format of these objectives is standard: an imperative, such as identify, define, write, select, use, etc., followed by a statement of given information and/or the condition of the behaviour. For example, the Objective II-E-6 in functional reading is:

> *Write* a paragraph given a series of simple sentences *so that* events are sequenced and some simple sentences are combined to make compound or complex sentences to vary sentence structure.

Phase 4 — Preparing Evaluation Instruments

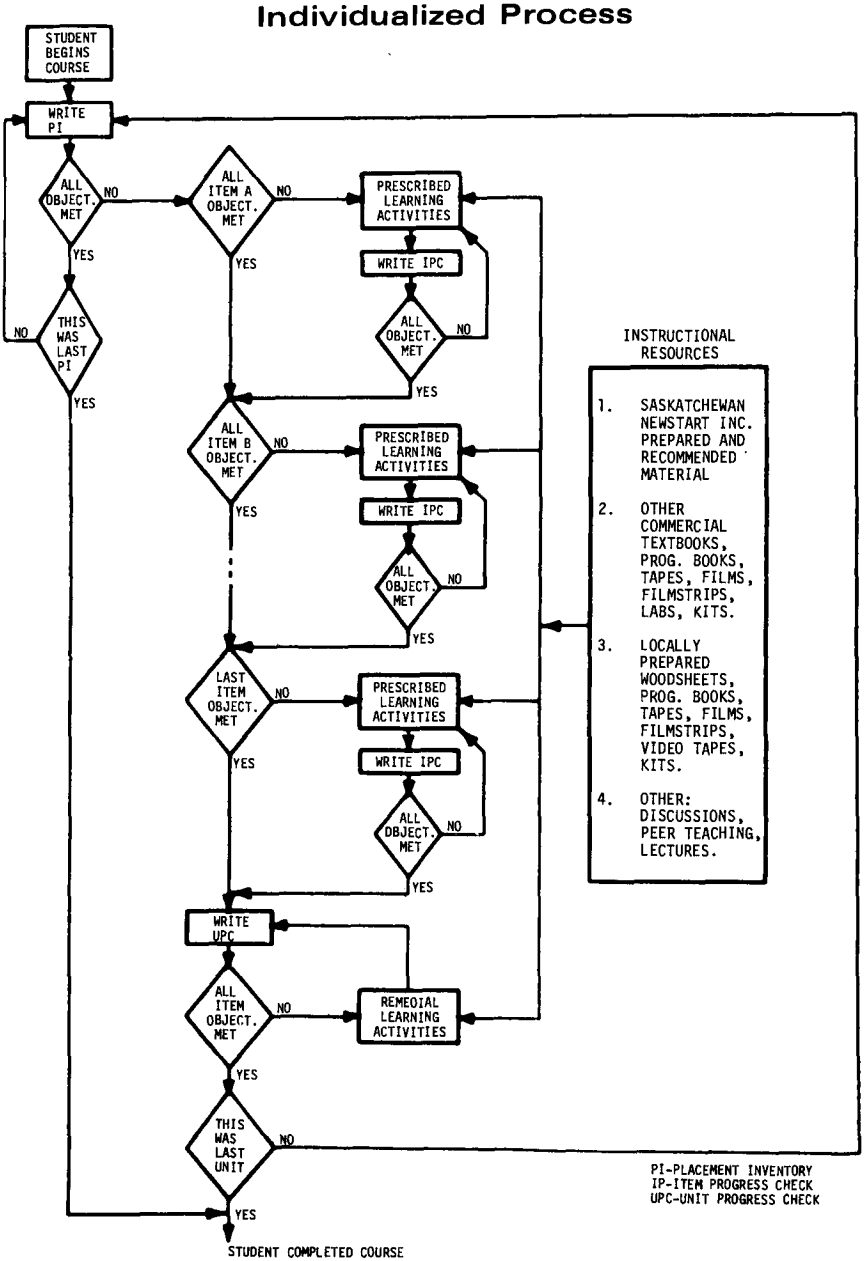
In Phase 4, the main objective is to prepare the test instruments which were selected in Phase 2. In the LINC program the developers first wrote the unit progress checks in two forms, and then the placement inventories and Forms 1 and 2 of the item progress checks. All these tests are included in the course books of the LINC program.

Phase 5 — Preparing Learning Activities

The main objective in Phase 5 is to evaluate and select, or design and prepare, the materials which will be used for the learning activities.

The process of preparing instructional material, particularly in multi-media, is difficult, time-consuming, and costly. Most curriculum designers, therefore, search the commercial market for suitable materials, evaluate them, and select those which meet the needs of the particular course. The instructional objectives from Phase 3 provide a framework on which to base the decisions. Only after a good variety of commercial materials had been evaluated and

Individualized Process



selected was any attempt made to prepare new materials to fill the gaps. The design and preparation of materials locally therefore focused on points where commercial materials either do not exist or were not satisfactory.

The criteria used to assess available materials were:

Are they appropriate to the characteristics and background of the adult target population with whom the materials are to be used?

Is it clear that the materials, and the learning activities in them:

- are of interest to adults
- use familiar adult language
- encourage further study and reading
- develop the learner's self-confidence and self-esteem
- have clear and simple directions
- show actual life situations concerning such things as food, property, home, community, job, financing, etc.?

Do programmed materials have built-in devices for reasoning and evaluation?

Do the systems designs in materials allow for individual work and maximum individual progress?

Does each lesson teach each concept or skill adequately, and are concepts and skills in logical order?

Phase 6 — Preparing Individual Student Activities

Phase 6 is the instructional phase, the stage which produces the learning experiences in a curriculum defined as "what happens to the student". This phase, therefore, is the critical part of the curriculum design; all other work to this point must be viewed as supporting and preparing for instruction and learning. The functions of diagnosis, placement, prescribed learning, and evaluation in the individualized process of the LINC program are performed in Phase 6, employing the system and components planned and produced in earlier phases of the design.

The LINC Program

Using the six phases of the DACUM process and following the principles derived from the earlier experimental programs, the LINC program was specified as follows:

Program Objectives — The program has two principal aims: to re-orient the adult student for formal training in a manner best suited to his particular experience and learning characteristics; and to help the adult student develop the basic knowledge and skills in communications and mathematics that are prerequisite to occupational training and a high level of functional literacy.

Course Objectives

LINC Communications — The following course objectives apply to both developmental reading and functional reading:

a) to develop communications skills that are prerequisite to the applied communications of occupational training;

b) to provide particular learning experiences which can be directly applied to personal and family needs for effective receiving and transmission of ideas.

LINC Mathematics:

a) to develop computational and problem-solving skills which are prerequisite to the applied mathematics of occupational training;

b) to provide particular learning experiences which can be directly applied to personal and family problems requiring mathematical solutions.

Terminal Behaviours — Terminal behaviours in the aggregate define a post-training behaviour profile which, when completed, indicates that the student has met the course and program objectives.

The terminal behaviours listed below outline the behaviour profile by course in the LINC program.

LINC Communications Developmental Reading — On completion of the course the student will be able to demonstrate that he can:

a) read, write, and use word skills in language usage associated with singular and plural forms, root words, prefixes and suffixes, and common contractions and abbreviations;

b) apply dictionary skills, select and use proper synonyms, antonyms and homonyms in context and determine meaning from context;

c) use written and spoken English at a level of literal comprehension by selecting main ideas, recalling details, and identifying the sequence of events in given selections;

d) use written and spoken English at a level of interpretive comprehension by identifying relationships, making inferences and interpreting character in given selections;

e) use written and spoken English at a level of evaluative comprehension by distinguishing fact and opinion, identifying the author's purpose, and forming opinions on given selections.

LINC Communications Functional Reading — On completion of the course the student will be able to demonstrate that he can:

a) function effectively in the formal learning environment of the training centre and apply appropriate study and learning skills;

b) formulate written responses in English using effective expression in sentence structure, correct mechanical usage and good organization of thoughts into paragraphs and multi-paragraph compositions;

c) apply the structural aspects of written expression in English to the correspondence skills of writing friendly and business letters and completing commonly used types of forms;

d) interpret and evaluate media through experiences in handling directories, catalogues, newspapers, magazines, radio, and television.

LINC Mathematics — On completion of the course the student will be able to demonstrate that he can:

a) read, write, round off, add, subtract, multiply, divide, and solve routine word problems on the set of whole numbers;

b) read, write, add, subtract, multiply, divide, and solve routine word problems on the set of numbers of arithmetic in common fraction and mixed number forms;

c) read, write, round off, add, subtract, multiply, divide, and solve routine word problems on the set of numbers of arithmetic in decimal fraction form;

d) read, write, operate with and solve routine word problems using percentages.

e) read, operate with, and solve routine word problems associated with the measurement of time, distance, liquids, and weight;

f) identify figures and forms, calculate perimeter, area, and volume, and solve routine word problems requiring linear, surface, and space measurements of common figures and forms;

g) identify the common types and configurations of lines, angles, and triangles and apply them to the interpretation of scaled drawings in common use;

h) calculate average (arithmetic mean) and interpret data from line, bar, and circle graphs.

i) operate with and solve routine word problems on the sets of integers and rationals;

j) express relationships of known and unknown facts in mathematical sentences using variables and expressions and solve equations in one variable algebraically.

THE INDIVIDUALIZED PROCESS

In keeping with the stated intention of adapting the program to the needs of each individual, the following steps were instituted:

a) *individualized diagnosis* of knowledge and skill levels with respect to the defined objectives;

b) *individualized multi-level placement* at the appropriate starting point or level with respect to the objectives;
c) *individually prescribed learning activities* employing a variety of multi-media instructional materials, directed at the instructional objectives and appropriate to the learner;
d) *individualized evaluation* to measure short- and long-term goal achievement, valid and reliable with respect to the objectives.

Sub-systems were designed for the LINC program to carry out each of these steps as well as to integrate them into a manageable instructional system. These sub-systems and their components are described below.

Integrated Diagnosis and Placement

This sub-system integrates the first two steps (diagnosis and placement) in the individualized process. The components are the placement inventories and the student DACUM chart.

The *Placement Inventories* are diagnostic tests, valid for the objectives in a unit of instruction. The format of these instruments is such that at least one test item is included for each instructional objective, and the particular objective being tested is identified in the margin of the test for quick diagnosis.

The *Student DACUM chart* is a recording device to show objectives mastered and not mastered. When the record of responses on the placement inventory is charted, it shows the proper placement level.

After marking the placement inventory and charting the results as shown, a diagnosis of what the student already knows or does not know is made from the chart, and the starting point for prescribed learning is determined.

The chart has the additional function of providing the basis for counselling the student on an overview of skills required for the unit, his relative strengths and weaknesses, and a determination of the amount of time he should spend in the particular course in relation to others. In addition, by plotting and testing to objectives, the student will become "objective conscious" and be more motivated to remove deficiencies as quickly as possible.

With the exception of Unit 1 in Functional Reading, each unit of each course has a placement inventory.

Individually Prescribed Learning Activities

Following the analysis of the placement inventory and the subsequent charting, the first "prescription" can be given. A prescription is a statement of the objective behaviour required, the instructional resource(s) to be used, the activity to be carried out, and the follow-up activity.

The component in the program for this sub-system is the objective and prescription sheet. Starting with the placement inventory, and plotting the

MATHEMATICS

ITEM A	ITEM B	ITEM C	ITEM D	ITEM E	UNIT
		C1 oC5 C2 C6 o C3 C4	D1 oD5 D2 D6 o D3 D7 o D4	E1 oE5 o E2 E6 o E3 E4	I WHOLE NUMBERS
A1 A5 A9 A2 A6 A3 A7 A4 A8	B1 B5 B2 B3 B4	C1 C5 C2 C3 C4	D1 D5 D2 D3 D4	E1 E2 E3 E4	II FRACTIONS
A1 A5 A2 A3 A4	B1 B2 B3 B4	C1 C5 C2 C6 C3 C4	D1 D5 D2 D6 D3 D7 D4 D8	E1 E2 E3 E4	III DECIMALS
A1 A5 A2 A6 A3 A7 A4 A8	B1 B5 B2 B6 B3 B7 B4	C1 C5 C2 C6 C3 C7 C4	D1 D2 D3 D4	E1 E2 E3 E4	IV PERCENT
A1 A5 A9 A2 A6 A3 A7 A4 A8	B1 B5 B2 B6 B3 B7 B4	C1 C5 C2 C6 C3 C4	D1 D5 D2 D6 D3 D4		V MEASUREMENT
A1 A5 A2 A5 A3 A7 A4	B1 B5 B9 B2 B6 B3 B7 B4 B8	C1 C5 C9 C2 C6 C10 C3 C7 C11 C4 C8	D1 D5 D2 D3 D4		VI PERIMETER AREA VOLUME
A1 A5 A2 A3 A4	B1 B5 B2 B6 B3 B7 B4 B8	C1 C5 C2 C6 C3 C7 C4 C8	D1 D2 D3 D4		VII GEOMETRY
A1 A5 A2 A3 A4	B1 B2 B3	C1 C2 C3	D1 D2 D3		VIII STATISTICS
A1 A5 A2 A3 A4	B1 B5 B2 B3 B4	C1 C5 C2 C3 C4	D1 D5 D2 D3 D4	E1 E5 E2 E6 E3 E4	IX INTEGERS AND RATIONALS
A1 A5 A9 A2 A6 A3 A7 A4 A8	B1 B2 B3 B4	C1 C5 C2 C6 C3 C4	D1 D5 D2 D6 D3 D4		X INTRODUCTORY ALGEBRA

DEVELOPMENTAL READING

ITEM A	ITEM B	ITEM C	UNIT
A1_A5_A9_ A2_A6_ A3_A7_ A4_A8_	B1_B5_ B2_B6_ B3_B7_ B4_B8_	C1_C5_ C2_ C3_ C4_	I WORD ANALYSIS
A1_A5_ A2_A6_ A3_ A4_	B1_B5_ B2_B6_ B3_B7_ B4_B8_	C1_ C2_ C3_ C4_	II WORD MEANING
A1_ A2_ A3_ A4_	B1_ B2_ B3_ B4_	C1_C5_ C2_ C3_ C4_	III LITERAL COMPREHENSION
A1_ A2_ A3_	B1_ B2_ B3_ B4_	C1_ C2_ C3_	IV INTERPRETIVE COMPREHENSION
A1_A5_ A2_ A3_ A4_	B1_ B2_ B3_	C1_ C2_ C3_	V EVALUATIVE COMPREHENSION

FUNCTIONAL READING

ITEM A	ITEM B	ITEM C	ITEM O	ITEM E	UNIT
A1_A5_ A2_A6_ A3_ A4_	B1_B5_B9_ B2_B6_B10_ B3_B7_ B4_B8_	C1_C5_ C2_C6_ C3_ C4_	D1_D5_ D2_D6_ D3_D7_ D4_	E1_E5_ E2_E6_ E3_E7_ E4_	I LEARNING SKILLS
A1_A5_ A2_A6_ A3_A7_ A4_A8_	B1_B5_ B2_B6_ B3_B7_ B4_	C1_C5_ C2_C6_ C3_C7_ C4_C8_	D1_D5_ D2_D6_ O3_ D4_	E1_E5_ E2_E6_ E3_E7_ E4_E8_	II STRUCTURAL SKILLS
A1_ A2_ A3_ A4_	B1_ B2_ B3_	C1_ C2_ C3_ C4_	D1_D5_ D2_D6_ D3_D7_ D4_		III CORRESPONDENCE SKILLS
A1_A5_ A2_ A3_ A4_	B1_ B2_ B3_ B4_	C1_C5_C9_ C2_C6_ C3_C7_ C4_C8_	O1_ D2_ D3_ D4_		IV MEDIA SKILLS

1 Training Research and Development Station, Prince Albert, Saskatchewan. Establishing the LINC Program. 1972. P. 45.

results on the student DACUM chart, it is possible to identify the skills that need developing or refreshing and to write a suitable prescription.

Prescriptions outlining learning activities are given for each objective in which deficiencies are indicated. All the traditional learning practices can be brought into the prescription, including memorization, practice, drill, psychomotor activity, quizzes to check progress, and other approaches. All learning resources available in all possible media should be considered. The instructor and the student will learn to select the method or material best suited to the student's needs.

Individualized Evaluation

The two components in the evaluation sub-system are item progress checks in two forms and unit progress checks in two forms.

If the completion of the item progress check reveals deficiencies, these are the basis for remedial prescriptions. After further work, Form 2 of the item progress check is prescribed.

Once all the items in a particular unit have been checked as satisfactory, the unit progress check, Form 1, is prescribed.

If the results of the test indicate mastery of the objectives, the student will proceed to the placement inventory in the next unit and the process is repeated. If the test analysis does not indicate mastery, remedial work is prescribed followed by evaluation with Form 2 of unit progress check 1.

Summary

After having used the LINC program with a number of groups in Prince Albert, and also using feedback from several field tests, the developers of the program believe that the distinct advantages of the LINC program include:

1. The LINC program is *flexible*. Units can be added or eliminated to meet the individual needs of students or the standards and levels of different provinces and institutions. The program can be extended to more advanced levels, and can serve as a model for the development of courses such as science or social studies. Used as a basic program, the LINC program can be the basis of preparation for a variety of occupational courses. It is also flexible with respect to instructional strategies in that any type of classroom organization will work.
2. The LINC program is *portable*. Because many basic education programs operate in temporary and often remote locations away from main training complexes, an attempt has been made in the LINC to provide for easy movement and arrangement. The limit of four instructor's books in addition to an instructor's manual, three kits containing pre-printed copies of all tests, objectives and prescriptions, and the minimum required amount of commercial

material give the program the portability needed for flexible operation. The classroom requires only the students' chairs and tables, one bookcase or set of shelves, and any suitable table on which to place the kits and the reading materials.

3. The LINC program allows *continuous intake* and *continuous graduation*. Students can enter the program at any time when there is classroom space, and can leave as soon as they have completed the program. Nobody gets behind due to late entry or absences. No students waste time repeating work that they already know, or waiting for others to catch up. They can interrupt their training if necessary and complete it at times suited to their particular needs.
4. The LINC program is *efficient*. Along with the provision for continuous intake scheduling, which results in the maximum use of training places, the start-up cost is moderate. When the program is operational, the consumption cost is also moderately low because most students can use most of the instructional materials. The commercial reading laboratories constitute a major part of the initial cost. These, of course, are not consumed, and loss is minimal if they are properly maintained. Small numbers of texts and workbooks are purchased and replaced on a classroom basis as recommended earlier and not "one per student" as commonly prescribed. Furthermore, any training institutions which have been operating a basic education program will have many of the recommended materials on hand. These and any other available materials can be used. It is estimated that if the LINC Program kits were totally consumed and some replacements were required in other materials, a class of 15 students would consume about $400 in materials for each 100 days of training. This indicates a cost of about thirty cents per training day for materials if only the recommended core list is used.
5. The LINC program uses a *systems approach*. Objectives define carefully what the student should be able to do. Placement tests and diagnosis show what the student can do on entry. There is an input process which defines what each student should do through a series of prescribed assignments. Finally, there is an evaluation system which determines whether the student accomplished what he set out to do; at the same time, it provides a feedback mechanism for improvement of the whole program.

B. NOVA SCOTIA NEWSTART — PERSONALIZED LEARNING

The major effort by Nova Scotia NewStart in adult basic education was designated by the title "Personalized Adult Basic Education". This was essentially an individualized program but the term "personalized" was chosen in preference to "individualized" because of the many connotations

which had grown up around the latter term, and to indicate the involvement of the learner in selecting his own learning objectives. This was not the first adult basic education effort of the Nova Scotia NewStart corporation; it will be useful to review some of the earlier programs in order to get a better view of how the personalized adult basic education program evolved.

At the beginning it was decided that Nova Scotia NewStart's adult basic education program would emphasize the needs of the individual. It was assumed that, because of the shortness of the NewStart mandate, there would not be time to develop original materials; consequently experimentation should be done with existing materials. An examination of available programs indicated that the McGraw-Hill Educational Developmental Laboratories (EDL) program offered considerable opportunity for individualization. As a result, this system was selected for the initial adult basic education work.

After the system was installed and staff had been trained in its objectives and use, a group of trainees was enrolled in a project whose purpose was primarily to test the effectiveness of the full range of the L-100 part of the EDL program.

To maximize the individualized nature of the program, a second project was initiated which was conceived as a drop-in intervention for unemployed adults who wished to upgrade their education. This was to enable individuals who were not working to use the resources of the centre on schedules convenient to themselves. This project was also used to provide adult basic education for participants in the corporation's on-the-job training project. In this program the EDL L-100 materials were used as the major component for the teaching of reading, and a lecture method was used for mathematics and science.

This was overlapped to some extent by a pre-vocational orientation and upgrading program for recent school leavers, and a six month program operated in co-operation with the local vocational school. In these programs the EDL Learning 100 Laboratory was used for reading; the lecture method, with some programmed instruction, was used for mathematics and science classes.

An additional service of the adult basic education centre was the provision of upgrading to trainees participating in other corporation projects. This service was provided on the basis of need and included trainees from the fisheries training project, the craft training project, and the on-the-job training project.

Information gained from these early projects indicated that large group techniques with disadvantaged adults are relatively ineffective because they are not adept at acquiring skills in this way, and enter with more variation in achievement than students in the public school system; that no one commercial system is likely to meet all individual needs; and that disadvantaged adults have a real lack of social and interpersonal skills [19].

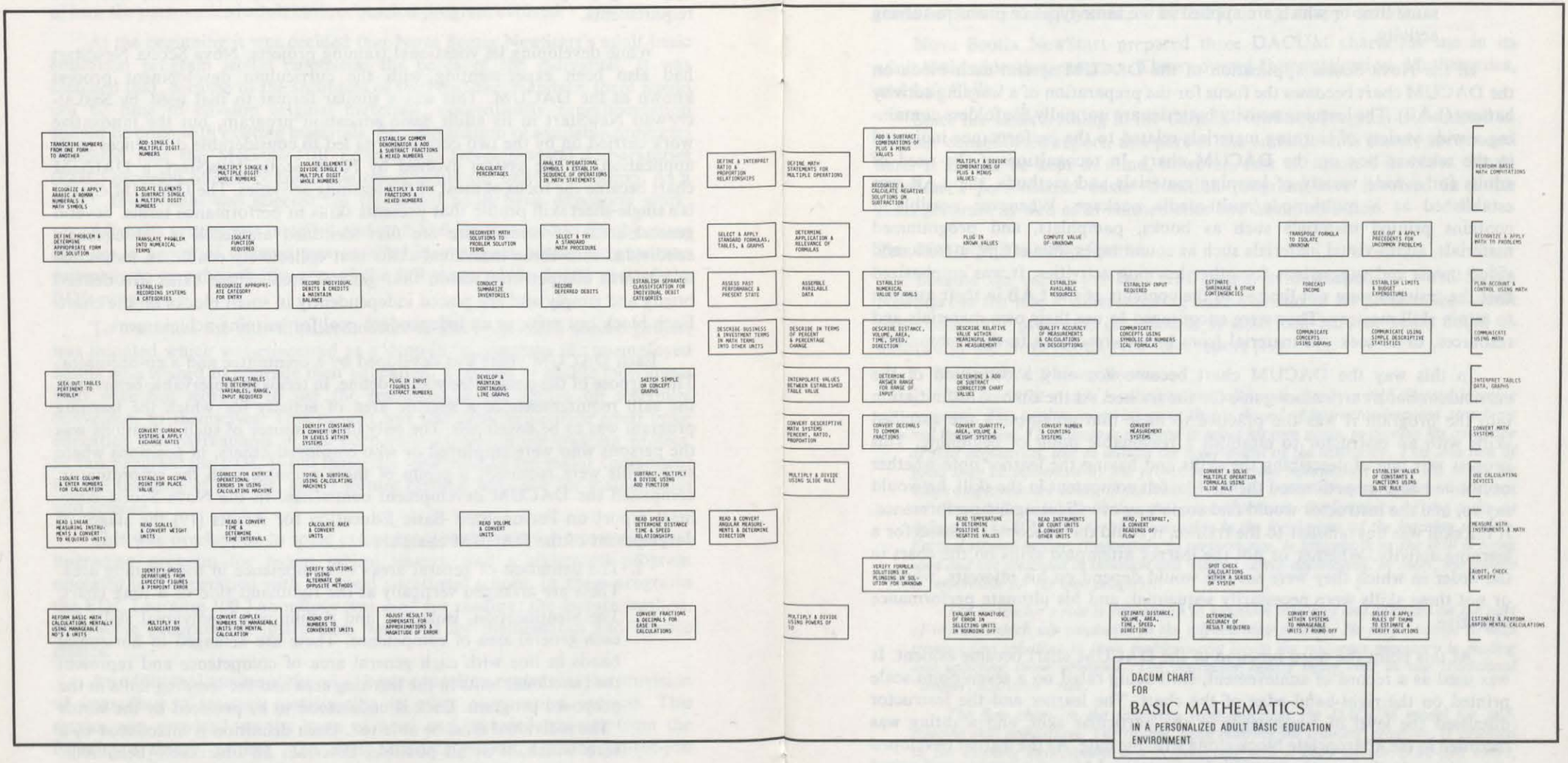
As a result of the conclusions drawn from these early interventions in adult basic education, it was decided to set up a completely personalized program that would permit participants to select and pursue educational upgrading programs suitable to their own needs, capabilities, and time requirements.

While developing its vocational training projects, Nova Scotia NewStart had also been experimenting with the curriculum development process known as the DACUM. This was a similar format to that used by Saskatchewan NewStart in its adult basic education program, but the innovative work carried on by the two corporations led to considerable differences in its application. In the system evolved by Nova Scotia NewStart, a DACUM chart became the focus of most of the learning activities. The DACUM chart [1] is a single-sheet skill profile that presents skills in performance terms. Several general areas of competence are first identified and each is subsequently subdivided into those individual skills that collectively enable an individual to perform competently within that general area. These skills are defined briefly and simply and are placed independently in small blocks on the chart. Each block can serve as an independent goal for learning achievement.

Each DACUM chart was developed by a committee and a co-ordinator. The purpose of the committee was to define, in terms of observable behaviour, the skill requirements of a specific area of activity for which the learning program was to be developed. The only logical source of such definitions was the persons who were employed or who employed others, in positions where such skills were required; a group of these persons, with the co-ordinator, comprised the DACUM development committee. In the Nova Scotia NewStart report on Personalized Basic Education for Adults [19] the stages of development of the DACUM chart are:

1. The definition of general areas of competence in the learning area. These are arranged vertically at the righthand side of a long chart.
2. The identification, isolation, and definition of individual skills for each general area of competence. These are arranged in horizontal bands in line with each general area of competence and represent the functional units in the learning area and the learning units in the proposed program. Each is understood to be prefaced by the words "The individual must be able to". Each definition is introduced by a verb which, if at all possible, describes an observable behaviour. The skill definition exercise continues until the committee has exhausted its collective knowledge of the needs of the learning area.
3. Assuming that the trainee would ordinarily begin at the left side of a chart and work toward the right, the committee finally arranges the skills within each band so that those skills most readily applied

[1] An edited version of a DACUM chart appears on pp. 30, 31.


TRANSCRIBE NUMBERS FROM ONE FORM TO ANOTHER
ADD SINGLE & MULTIPLE DIGIT NUMBERS
MULTIPLY SINGLE & MULTIPLE DIGIT WHOLE NUMBERS
ISOLATE ELEMENTS & DIVIDE SINGLE & MULTIPLE DIGIT WHOLE NUMBERS
ESTABLISH COMMON DENOMINATOR & ADD & SUBTRACT FRACTIONS & MIXED NUMBERS
CALCULATE PERCENTAGES
ANALYZE OPERATIONAL SYMBOLS & ESTABLISH SEQUENCE OF OPERATIONS IN MATH STATEMENTS
DEFINE & INTERPRET RATIO & PROPORTION RELATIONSHIPS
DEFINE MATH STATEMENTS FOR MULTIPLE OPERATIONS
ADD & SUBTRACT COMBINATIONS OF PLUS & MINUS VALUES
MULTIPLY & DIVIDE COMBINATIONS OF PLUS & MINUS VALUES
PERFORM BASIC MATH COMPUTATIONS
RECOGNIZE & APPLY ARABIC & ROMAN NUMERALS & MATH SYMBOLS
ISOLATE ELEMENTS & SUBTRACT SINGLE & MULTIPLE DIGIT NUMBERS
MULTIPLY & DIVIDE FRACTIONS & MIXED NUMBERS
RECOGNIZE & CALCULATE NEGATIVE SOLUTIONS OR SUBTRACTION
DEFINE PROBLEM & DETERMINE APPROPRIATE FORM FOR SOLUTION
TRANSLATE PROBLEM INTO NUMERICAL TERMS
ISOLATE FUNCTION REQUIRED
RECONVERT MATH SOLUTIONS TO PROBLEM SOLUTION TERMS
SELECT & TRY A STANDARD MATH PROCEDURE
SELECT & APPLY STANDARD FORMULAS, TABLES, & GRAPHS
DETERMINE APPLICATION & RELEVANCE OF FORMULAS
PLUG IN KNOWN VALUES
COMPUTE VALUE OF UNKNOWN
TRANSPOSE FORMULA TO ISOLATE UNKNOWN
SEEK OUT & APPLY PRECEDENTS FOR UNCOMMON PROBLEMS
RECOGNIZE & APPLY MATH TO PROBLEMS
ESTABLISH RECORDING SYSTEMS & CATEGORIES
RECOGNIZE APPROPRIATE CATEGORY FOR ENTRY
RECORD INDIVIDUAL DEBITS & CREDITS & MAINTAIN BALANCE
CONDUCT & SUMMARIZE INVENTORIES
RECORD DEFERRED DEBITS
ESTABLISH SEPARATE CLASSIFICATION FOR INDIVIDUAL DEBIT CATEGORIES
ASSESS PAST PERFORMANCE & PRESENT STATE
ASSEMBLE AVAILABLE DATA
ESTABLISH NUMERICAL VALUE OF GOALS
ESTABLISH AVAILABLE RESOURCES
ESTABLISH INPUT REQUIRED
ESTIMATE SHRINKAGE & OTHER CONTINGENCIES
FORECAST INCOME
ESTABLISH LIMITS & BUDGET EXPENDITURES
PLAN ACCOUNT & CONTROL USING MATH
DESCRIBE BUSINESS & INVESTMENT TERMS IN MATH TERMS INTO OTHER UNITS
DESCRIBE IN TERMS OF PERCENT & PERCENTAGE CHANGE
DESCRIBE DISTANCE, VOLUME, AREA, TIME, SPEED, DIRECTION
DESCRIBE RELATIVE VALUE WITHIN MEANINGFUL RANGE IN MEASUREMENT
QUALIFY ACCURACY OF MEASUREMENTS & CALCULATIONS IN DESCRIPTIONS
COMMUNICATE CONCEPTS USING SYMBOLIC OR NUMERICAL FORMULAS
COMMUNICATE CONCEPTS USING GRAPHS
COMMUNICATE USING SIMPLE DESCRIPTIVE STATISTICS
COMMUNICATE USING MATH
SEEK OUT TABLES PERTINENT TO PROBLEM
EVALUATE TABLES TO DETERMINE VARIABLES, RANGE, INPUT REQUIRED
PLUG IN INPUT FIGURES & EXTRACT NUMBERS
DEVELOP & MAINTAIN CONTINUOUS LINE GRAPHS
SKETCH SIMPLE OR CONCEPT GRAPHS
INTERPOLATE VALUES BETWEEN ESTABLISHED TABLE VALUE
DETERMINE ANSWER RANGE FOR RANGE OF INPUT
DETERMINE & ADD OR SUBTRACT CORRECTION CHART VALUES
INTERPRET TABLES DATA, GRAPHS
CONVERT CURRENCY SYSTEMS & APPLY EXCHANGE RATES
IDENTIFY CONSTANTS & CONVERT UNITS IN LEVELS WITHIN SYSTEMS
CONVERT DESCRIPTIVE MATH SYSTEMS PERCENT, RATIO, PROPORTION
CONVERT DECIMALS TO COMMON FRACTIONS
CONVERT QUANTITY, AREA, VOLUME & WEIGHT SYSTEMS
CONVERT NUMBER & COUNTING SYSTEMS
CONVERT MEASUREMENT SYSTEMS
CONVERT MATH SYSTEMS
ISOLATE COLUMN & ENTER NUMBERS FOR CALCULATION
ESTABLISH DECIMAL POINT FOR PLACE VALUE
CORRECT FOR ENTRY & OPERATIONAL ERRORS IN USING CALCULATING MACHINE
TOTAL & SUBTOTAL USING CALCULATING MACHINES
SUBTRACT, MULTIPLY & DIVIDE USING ADD FUNCTION
MULTIPLY & DIVIDE USING SLIDE RULE
CONVERT & SOLVE MULTIPLE OPERATION FORMULAS USING SLIDE RULE
ESTABLISH VALUES OF CONSTANTS & FUNCTIONS USING SLIDE RULE
USE CALCULATING DEVICES
READ LINEAR MEASURING INSTRUMENTS & CONVERT TO REQUIRED UNITS
READ SCALES & CONVERT WEIGHT UNITS
READ & CONVERT TIME & DETERMINE TIME INTERVALS
CALCULATE AREA & CONVERT UNITS
READ VOLUME & CONVERT UNITS
READ SPEED & DETERMINE DISTANCE TIME & SPEED RELATIONSHIPS
READ & CONVERT ANGULAR MEASUREMENTS & DETERMINE DIRECTION
READ TEMPERATURE & DETERMINE POSITIVE & NEGATIVE VALUES
READ INSTRUMENTS OR COUNT UNITS & CONVERT TO OTHER UNITS
READ, INTERPRET, & CONVERT READINGS OF FLOW
MEASURE WITH INSTRUMENTS & MATH
IDENTIFY GROSS DEPARTURES FROM EXPECTED FIGURES & PINPOINT ERROR
VERIFY SOLUTIONS BY USING ALTERNATE OR OPPOSITE METHODS
VERIFY FORMULA SOLUTIONS BY PLUGGING IN SOLUTION FOR UNKNOWN
SPOT CHECK CALCULATIONS WITHIN A SERIES OR SYSTEM
AUDIT, CHECK & VERIFY
REFORM BASIC MATH CALCULATIONS MENTALLY USING MANAGEABLE NO'S & UNITS
MULTIPLY BY ASSOCIATION
CONVERT COMPLEX NUMBERS TO MANAGEABLE UNITS FOR MENTAL CALCULATION
ROUND OFF NUMBERS TO CONVENIENT UNITS
ADJUST RESULT TO COMPENSATE FOR APPROXIMATIONS & MAGNITUDE OF ERROR
CONVERT FRACTIONS & DECIMALS FOR EASE IN CALCULATIONS
MULTIPLY & DIVIDE USING POWERS OF 10
EVALUATE MAGNITUDE OF ERROR IN SELECTING UNITS IN ROUNDING OFF
ESTIMATE DISTANCE, VOLUME, AREA, TIME, SPEED, DIRECTION
DETERMINE ACCURACY OF RESULT REQUIRED
CONVERT UNITS WITHIN SYSTEMS TO MANAGEABLE UNITS / ROUND OFF
SELECT & APPLY RULES OF THUMB TO ESTIMATE & VERIFY SOLUTIONS
ESTIMATE & PERFORM RAPID MENTAL CALCULATIONS
DACUM CHART
FOR
BASIC MATHEMATICS
IN A PERSONALIZED ADULT BASIC EDUCATION ENVIRONMENT

early in a real work situation, and those that the committee estimates are easiest to learn, are placed toward the left side of the chart. A vertical scanning of the chart aligns those skills in different bands that are directly related and that would ideally be learned at the same time or which are applied in the same types of problem-solving activity.

In the Nova Scotia application of the DACUM system each block on the DACUM chart becomes the focus for the preparation of a learning activity battery (LAB). The learning activity batteries are normally file folders containing a wide variety of learning materials related to the performance indicated in the relevant box on the DACUM chart. In recognition of the need of adults for a wide variety of learning materials and methods, the LAB was established as a multi-mode/multi-media package. Whenever possible it contains printed materials such as books, pamphlets, and programmed materials, audio-visual materials such as sound tapes, film strips, movies, and video tapes, and suggestions for other learning activities. It was emphasized that the trainees were not limited to the contents of the LAB in their attempt to attain skill mastery. They were encouraged to use their own materials and resources, or to seek out material from human resources in the community.

In this way the DACUM chart became not only a definition of the curriculum but a curriculum guide for the trainee. At the time of his initiation into the program it was the practice to have him go through the specified skills with an instructor to establish a reasonable point of beginning. This process was one of describing the skills and having the learner note whether or not he had ever performed them. If he felt competent in the skill, he would say so, and the instructor would find some way of validating his performance. If the skill was not familiar to the trainee, it could then become the basis for a learning activity. Whether or not the learner attempted skills on the chart in the order in which they were set out would depend on his interests, whether or not these skills were necessarily sequential, and his ultimate performance objective.

At this point the third function of the DACUM chart became evident. It was used as a record of achievement, skill being rated on a seven-point scale printed on the right-hand edge of the chart. The learner and the instructor discussed the level of competence in the particular skill, and a rating was recorded in the appropriate block along with the date. As the learner developed competence in that particular skill, he re-assessed his achievement and asked the instructor to check what he believed this to be. If the instructor and the learner agreed on a new rating, that rating would be entered on the chart along with the new date.

Using this method, the chart became, at the end of the training period, not only a record of accomplishment but a part of the diploma granted on completion of the course. This emphasized the fact that not all of the possible

competencies in the DACUM chart area had been learned to maximum levels, recording what the level of skill in each unit was assessed to be. Incorporated into the diploma, this record was available to potential employers or to admission officers of subsequent training institutions so that the learner could be placed in employment, or further training, as appropriate.

Nova Scotia NewStart prepared three DACUM charts for use in its adult basic education program. These covered Communication, Mathematics, and Life Skills.

Since life skills training in the Canada NewStart Program is discussed in another consolidated report, this part of the curriculum is merely mentioned here. It should be kept in mind, however, that all learners in Nova Scotia NewStart's personalized basic education program were involved in a life skills program as well as in mathematics and communication.

The DACUM Training System

Because the use of the DACUM system as developed by Nova Scotia NewStart is the major differentiating characteristic of its personalized adult basic education program, the process is described here in some detail as outlined in the Nova Scotia NewStart report [19].

1. The DACUM Training System

The DACUM system is characterized, above all else, by a self-directed learning approach. This implies an environment that is devoid of instructor-imposed structures and limitations. The trainee is required to select his own goals, to develop his own pace of skill acquisition, and to initiate the involvement of the instructor. This selection of goals may be influenced by the provision of certain information about the skills for which employers are likely to be looking, but the trainee is encouraged to work first on those skills in which he has the greatest interest. Performance of the tasks as defined in the DACUM for the occupation is the focal point of the learning process. Factual subject matter, if necessary to performance, is brought in as the skill is being used and not presented in isolation and without direct application. In short, the trainee is responsible for his own progress.

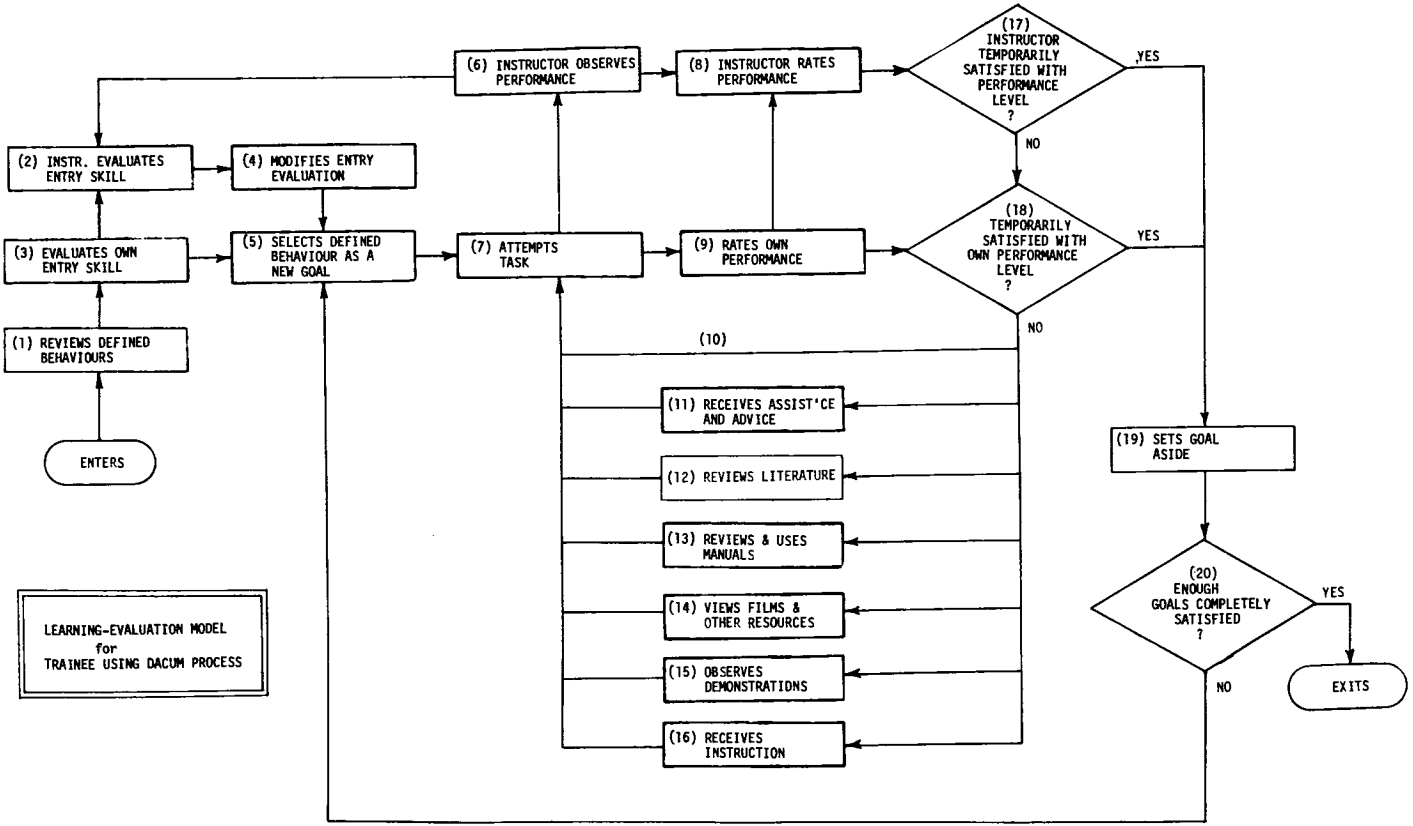
The instructor's role is principally to maintain attitudes and interests on the part of trainees which are conducive to the self-learning process. He may attempt to help trainees find solutions to their problems and locate the resources necessary in finding and applying those solutions. The instructor resists being cast in the traditional "trainer/instructor" role.

The flow chart on the following page describes the DACUM model for self-directed skill acquisition. The trainee, upon entering the training program, is oriented to the learning environment and is presented with a copy of the DACUM chart, which . . .

1.[1] *. . . he reviews with the help of the instructor, to familiarize himself with the terminology used and with the attached rating scale, and to learn to apply it to skills defined on the chart.*

3. . . . proceeds to evaluate his own prior experience and define the level of skill he feels he has in any of the skills defined on the chart. On the basis of this self-rating, the instructor works with each trainee and his chart, and . . .

[1] Numbers refer to points on the flow-chart, following.


(1) REVIEWS DEFINED BEHAVIOURS
ENTERS
(2) INSTR. EVALUATES ENTRY SKILL
(3) EVALUATES OWN ENTRY SKILL
(4) MODIFIES ENTRY EVALUATION
(5) SELECTS DEFINED BEHAVIOUR AS A NEW GOAL
(6) INSTRUCTOR OBSERVES PERFORMANCE
(7) ATTEMPTS TASK
(8) INSTRUCTOR RATES PERFORMANCE
(9) RATES OWN PERFORMANCE
(10)
(11) RECEIVES ASSIST'CE AND ADVICE
(12) REVIEWS LITERATURE
(13) REVIEWS & USES MANUALS
(14) VIEWS FILMS & OTHER RESOURCES
(15) OBSERVES DEMONSTRATIONS
(16) RECEIVES INSTRUCTION
(17) INSTRUCTOR TEMPORARILY SATISFIED WITH PERFORMANCE LEVEL ?
YES
NO
(18) TEMPORARILY SATISFIED WITH OWN PERFORMANCE LEVEL ?
YES
NO
(19) SETS GOAL ASIDE
(20) ENOUGH GOALS COMPLETELY SATISFIED ?
YES
NO
EXITS
LEARNING-EVALUATION MODEL for TRAINEE USING DACUM PROCESS

2. . . . *prepares an entry level profile of the trainee's skill. He uses the trainee's DACUM sheet and ratings (if any) as a starting point for discussion. He explores each of the trainee's skills and tries to confirm the accuracy of the trainee's skills and tries to confirm the accuracy of the trainee's rating by asking him to describe how he performed the skill. He will also explore some of the categories left blank by the trainee. The instructor records new ratings (or the same ones) on a master chart for the trainee in his presence. In some cases the instructor may give higher ratings, and in other cases lower ratings. This process causes the trainee to . . .*

4. . . . *modify his own evaluation of skill on entry to the program. He will, as a result of this discussion and feedback, have a better understanding of the occupation which he is seeing defined in this way for the first time. He will now realize better what the instructor expects of him and what will be expected of him, in terms of performance, when he gets into an employment situation. He will then . . .*

5. . . . *select one of the defined behaviours on the DACUM chart as a goal for personal achievement. This may be a skill that he has already performed to a limited degree and wants to improve, or one that he has observed others doing and would like to be able to perform himself. The skill may also be one he realizes he has to perform to enable him to complete a specific project or job. Either on his own, or with the help of the instructor, he . . .*

7. . . . *attempts to perform the selected task. The instructor will closely . . .*

6. . . . *observe performance in tasks the trainee attempts for the first time, and and will be able to confirm the accuracy of . . .*

2. . . . *his initial evaluation of the trainee's entry skill (if any). If there are apparent inaccuracies he will subsequently revise entry level ratings given to the trainee.*

This initial attempt at performing a task will normally be done in the presence of the instructor who will discuss with the trainee what is involved in the task, and what equipment, tools, materials, and information may be required. He may also help set up a situation so that the trainee can perform the task. Following this attempt at performing the task, the trainee . . .

9. . . . *rates his own performance using the rating scale included in the DACUM chart. If he feels he has performed to one of the acceptable levels (1 to 6) on the scale he records the appropriate rating on his copy of the DACUM chart and notes the date nearby. If he is . . .*

18. . . . *not satisfied with his own performance (he has not performed to one of the acceptable levels in the scale) he will . . .*

10. . . . *again attempt to perform the task (perhaps several times) until he is satisfied, or he may wish to apply additional resources (11 to 16 in the flow chart) to solution of this problem.*

If the trainee finds he cannot complete the task, after bringing one or more of these resources to bear on the problem, he rates his own performance as successful (to one of the levels on the rating scale) and will ask the instructor to confirm his rating. The instructor mean-while has been . . .

6. . . . *observing the trainee's performance in attempting the task. He is able to . . .*

8. . . . *rate the trainee's performance as he has observed it, using the trainee's own rating to assist him in reaching a decision. He will record his new rating on the master copy of that trainee's DACUM chart and will note the date nearby. This is done in the presence of the trainee. If the instructor is . . .*

17. . . . *temporarily satisfied with the trainee's performance and the trainee is . . .*

18. . . . temporarily satisfied with his own performance, then . . .

19. . . . that goal will be set aside until a later date when the trainee again decides to improve on that skill or is influenced to improve it by the skill needs of another learning situation.

If the instructor is . . .

17. . . . not temporarily satisfied with the trainee's performance, he will discuss the quality of performance and reasons for his decision with the trainee. This will probably cause the trainee to become . . .

18. . . . dissatisfied with his own performance and to recycle through the resources and again attempt the task, seeking a performance level that will satisfy both himself and the instructor.

As long as there are . . .

20. . . . not enough goals completely satisfied the trainee will . . .

5. . . . select new goals he has not yet attempted or again select goals he feels he can and should improve. This process continues until both the trainee and instructor (and ideally a prospective employer) agree that the trainee has performed . . .

20. . . . satisfactorily in enough of the goal areas to enable him to perform competently in an employment situation in the occupation.

At this point the trainee EXITS from the program.

The first students admitted to the personalized adult basic education program conducted by Nova Scotia NewStart were given a 10-day orientation session to familiarize them with the DACUM system and to emphasize the individualized nature of the program which they were entering. Because the Educational Development Laboratory's system was incorporated into the personalized learning program, there was also the necessity of familiarizing the learners with the operation of the equipment. It was intended that each new student would go through the same orientation process, but in practice peer-group orientation was found much more efficient and more rapid than the more formalized process and the planned 10-day orientation procedure was dropped.

Evaluation

When setting up the personalized adult basic education program, Nova Scotia NewStart had four specific objectives in mind:

a) to establish and to test an educational facility that would permit participants to select and pursue educational upgrading programs suitable to their own needs and capabilities and on schedules convenient to them;

b) to determine if there is any identifiable relationship between characteristics of participants and their preferences for particular modes of instruction;

c) to examine the success of the program in terms of retention rate, trainee satisfaction, and relationship of methods and materials to the needs of the participants;

d) to focus on individual, educational, personal, and social deficits and so optimize the time-benefit ratio toward success in subsequent vocational training for each participant by eliminating or reducing irrelevant and redundant material.

It will be noticed that the objectives were not primarily concerned with a given amount of learning in a minimum amount of time, but rather with meeting the needs of adult learners. In fact, it can be said of this program, as of the Saskatchewan LINC program, that the purpose was more the development of a suitable program than the testing of it. The effectiveness of the program in comparison with alternatives could only be tested after the program was defined and developed.

In the process of gathering information for assessing the personalized adult basic education program Nova Scotia NewStart collected certain types of information for a subsequent analysis. Using a modified Hollerith card, trainees were required to record information as to each skill attempted, the learning method used, the catalogue number of the material, the number of hours spent on that particular activity, and a personal rating of the material as poor, fair, good, or excellent.

Ratings of the students were in two forms: the ratings on the DACUM chart as already described, and weekly trainee profiles prepared individually by each member of the instructional staff based on his or her observation of the trainee during the week. This produced six separate weekly opinions about each trainee involving ratings on the following:

Goal-striving behaviour
Achievement time
Self-direction in learning
Identification with learning environment
Physical and mental alertness
Realistic self-perception.

In addition to these routine records, other bases for evaluation included a pre-post reading comprehension test from the Canadian Test of Basic Skills; the mathematics concepts and math problem-solving section of the Canadian Test of Basic Skills; the Institute for Personality and Ability Testing "Culture Fair" Intelligence Test; and three questionnaires to help define the attitudes of the trainees:

My Opinions About Education [1]
For the Sake of Argument. [2]
My Attitudes and Opinions. [3]

[1] Developed by Rundquist, E.A., and R.S. Sletto. Published in [21].
[2] Adapted by Shaw, Blair (Ontario Institute for Studies in Education) from J.B. Rotter.
[3] Developed by Shaw, Blair.

For orientation to the life skills part of the course, a life skills problem checklist was used.

Major Findings

In both the mathematics and the communication areas, books proved to be the most popular and most widely used medium of learning. This was most pronounced in the mathematics section, where printed materials were chosen in preference to other materials by a ratio of better than ten to one [19, p.21]. In the communication area the use of printed materials outnumbered other methods by a ratio of four to five.

Opportunity was given for individual or group activity, but in the mathematics unit 91.5 percent of the time was spent in individual activities and 84.2 percent in the communication section, indicating that when the opportunity existed most of the students preferred to work alone [19, pp. 91, 106].

Extensive statistical analysis of the data collected during the course of this project has largely been inconclusive because of the lack of a control group for comparison. No formal attempt was made to correlate the characteristics of the trainees with their choice of method of learning. In view of the preponderant preference, in mathematics, for printed materials, it appears that a multi-media presentation in this field has little appeal. The evaluation report [12] comments on the deficiency of measurements as follows:

> *Detailed measurements were not available on all, or even most, aspects of the program so that it was difficult to trace a measured change to any specific program characteristic. The evaluation, for instance, does not provide us with a means of determining whether specified objectives should be changed or whether some instructional procedures should be more personalized or whether group methods are adequate. There is also no information on program efficiency except insofar as the evidence clearly indicates that student satisfaction with the personalized adult basic education training was high. This is evidenced by the low dropout and absence rates. There was insufficient variation in attendance or dropout to ascertain what student characteristics might be related to these factors, which, although pleasing to the instructor, is a frustration for the statistical analyst . . . Concerning the special characteristic of personalized adult basic education, namely the student's relative freedom in choosing both the objective to be achieved and the materials to be used to attain them, little can be said since there is no comparable program with the same objectives but different procedures with which to compare Personalized Adult Basic Education.*

The statistical analysis, however, did turn up some positive findings, among which were the following:

> *. . . the most educationally disadvantaged students showed most improvement. This clearly supported the initial assumptions of the PABE system which argued that one of the deficiencies of classroom instruction was that it forced the poorer students into a situation which made it more difficult for them to learn, rather than easier.*
>
> *. . . there is little doubt that some students improved remarkably in mathematical skills and a much smaller number in reading skills even though reading was not a specific program objective. Also, when a regression (or discriminant) analysis was*

applied to distinguish which factors discriminated between the two groups, the students with greater educational disadvantage did better in both reading and mathematics. This confirms the observation that PABE is particularly suitable for the disadvantaged. However, it raises the question of whether, in its present form, the PABE course is suitable for all students.

The major conclusions from the over-all analysis and evaluation approaches are the following:

1. *The PABE system seems to work for some students, usually the most disadvantaged even when the criterion variables are not those directly related to the program objectives.*
2. *The assumptions of the system are partly supported by the analysis in that it appears that the learning environment is such that the students find it satisfying and that some learn while others fail to increase grade levels materially when measured by standardized tests.*

   The importance of individual student choice cannot be assessed, but, since some students did not succeed, it may be possible that less choice might result in greater improvement for some and less for others.
3. *There is a need to try and optimize PABE by detailed testing of the many factors which influence learning within such a program.*
4. *The DACUM ratings, although possibly valuable for instructional, motivational, and feedback purposes, in their present form cannot be employed for program evaluation. To be useful for program evaluation, the reliability and validity of their ratings should be substantially improved or, where possible, replaced by criterion referenced test.*

The evaluation goes on to identify a number of aspects of the Personalized Adult Basic Education program which require further analysis and assessment. Among these are the following [12, pp. 134-5]:

The PABE system may be counted as a partial success. It is surprising that it worked at all, given that the time available to design and implement such a complicated system was less than one year. However, more than 50 percent of the students did not indicate improvement on standard measures of achievement. The system also revealed a number of deficiencies with respect to appropriate measurement. It also raises a problem in that if those trained under this system go on for further education, they will probably be required to learn in formal classroom situations which are very different. There is a possibility that they will then slip back into their previous poor learning habits. It appears necessary to determine the minimal factors which make for effective learning under PABE. Is it the support of environment? Is it the availability of multiple materials? Is it the provision of student control over choice of learning methods and objectives? Are all these necessary? Unfortunately, the data do not permit any conclusions about these significant matters.

Concluding the evaluation report, the author states [12, pp. 160-1]:

It is the problem of developing the capacity to utilize effectively personalized adult basic education and its variants that prompts the only policy recommendation which follows from the NewStart research and development effort in personalized instruction. It is recommended that a centre be established to provide the means for developing individualized instructional systems in the variety of ABE and skill disciplines. The purpose of these new systems will be to provide a means for those individuals who cannot effectively be taught by existing systems and those who can be better taught by the new system, to learn the necessary skills to improve their choice and opportunities for productive and satisfying work.

C. ALBERTA NEWSTART — ADULT BASIC EDUCATION

The adult basic education program of Alberta NewStart must be examined in the context of the corporation's total program. Located in Northeastern Alberta, the corporation was primarily concerned with the Indian and Metis people who comprise about half of the 14,000 people living in the project area. Most of these people lacked the social, vocational, and academic skills needed to participate meaningfully in the Canadian culture. In practical terms this meant that, although many jobs were developing in the north, not many were available to the Native people in the area. Due to this long-range failure of relocation programs, Alberta NewStart introduced an approach encompassing four basic principles:

1. the development process should begin in the student's own physical and social environment;
2. the family unit should be the focus of development programs;
3. the training process should be arranged in graduated stages relative to the developmental level of communities of students;
4. the training environment should approximate normal employment conditions found in industry.

Following these principles, family training facilities were located in selected communities throughout the target area. Married couples participated in experimental social, educational, and vocational development programs and experiences while their pre-school children benefitted from day care services. The objective was to prepare families for advanced training at the adult vocational centre in Fort McMurray. The move from their home communities to Fort McMurray also provided families with a first-stage relocation experience to a more sophisticated urban centre. Following completion of the vocational and social training process at Fort McMurray employment placement and follow-up services were provided by Alberta NewStart personnel in co-operation with other agencies, [11, pp. i-ii].

From this, it can be seen that adult basic education was one facet of a larger program whose main objective was the successful relocation of Indian families from isolated communities to a centre where employment was available.

Both sexes were included in the program carried out in the Alberta NewStart mobile centres at Lac La Biche, Janvier, Kikino, and Fort Chipewyan. The basic education courses were confined to communication and mathematics skills, using commercially prepared materials. For communication, use was made of the Mott Basic Language Skills Program [7]; for mathematics, MIND Inc.'s Math Facts [16], Allyn & Bacon's Refresher Arithmetic [4], and McGraw-Hill's Applying Mathematics [14]. From experience with these programs, some minor modifications in their content and use were made, but these have not been documented.

At the Lac La Biche centre the academic program was varied to the extent that one program was set up in which students could take academic upgrading exclusively. This was done to allow some students to gain entrance to such institutions as Mount Royal College, Northern Alberta Institute of Technology, or Southern Alberta Institute of Technology. It was found that at Lac La Biche some students were strongly interested in taking the total academic upgrading program before making a vocational choice [1, p.94].

EVALUATION

An examination was made in November 1970 [11] of 74 subjects, 34 female and 40 male, who had completed the academic program in the Alberta NewStart mobile centres at Lac La Biche, Janvier, Kikino, and Fort Chipewyan. Subjects had taken two batteries of tests on entering the program, and were retested with the same instruments when they completed it. The test batteries included various tests in mathematics and English from the adult basic learning examination (ABLE). Intellectual assessment was determined with the Raven standard progressive matrices. The subjects tested had spent varying times, ranging from one to nine months, in the program. The study points out that the results cannot be considered conclusive, but indicate the following trends [11, p. 47]:

1. The subjects who remained longest in the program tended to learn more. It is interesting to note, however, that the time a subject spends in the program is inversely proportional to his academic level when he enters. In other words, the subject who enters the program at a higher level may be nearer the ceiling of the instrument, the adult basic learning examination in this case, and may not show as much increase. Also, since the mobile units were upgrading centres to qualify individuals for advanced training in the Alberta vocational centre program in Fort McMurray, they sent the better students as soon as they appeared to be ready.
2. The subject who remained the longest in the program was usually older with no academic standing. Single females also tended to remain longer in the program than single males.
3. The subjects appeared to gain at a much more rapid rate in mathematics than they did in communication. This may have appeared to be the case because it is easier to detect small gains in mathematics than it is in English.
4. Subjects who entered the program at a higher academic and intellectual level did not gain as much as the lower-level students, perhaps because the programs may have been oriented for the lower-level subject.
5. No particular program appeared to be better or worse than another.
6. Age did not appear to make much difference in terms of rate of learning.

D. PRINCE EDWARD ISLAND — ADULT BASIC EDUCATION

Prince Edward Island NewStart's involvement in adult basic education upgrading programs can be divided into three main programs: the MIND program; basic education for farmers; and basic education within the comprehensive manpower development system.

From the outset, Prince Edward Island NewStart assumed that the causes of disadvantage lay in at least three broad areas of deficiency: skills, attitudes, and information. Its efforts were likewise divided into three sections: basic education, socio-vocational development, and pre-employment skills training. Each of these three sections dealt with all three areas, but had different priorities. In basic education, skill deficiencies were considered to be predominant, with information and attitudes following. In the socio-vocational development section, attitudes were paramount, followed by information and skills; and in the pre-employment skills training section, information was considered to be the most important deficit but consideration was given also to attitudes and skills [17, pp. 1-2]:

1. MIND Program

From the commercially prepared materials suitable for individual instruction, Prince Edward Island NewStart selected the MIND [16] program as appearing to be the most suitable for providing adult basic education training to some of the disadvantaged individuals in the project area. To test the usefulness of the MIND program for adults, Prince Edward Island NewStart set up projects with two groups of trainees. The first group consisted of 23 male subjects who were unemployed or underemployed and were from 17 to 24 years of age. This group had a mean age of 20 years, and a mean of 7 years of stated formal schooling. The second group consisted of 24 females, also 17 to 24 years of age, whose mean age was 21 years and whose mean educational accomplishment was 7 years of stated formal schooling. The MIND program was offered to each of these groups for three hours a day for 12 weeks, a total of 180 hours of instruction, divided equally between communication and arithmetic skills.

Each group was further divided into a high-achievement group and a low-achievement group, and a monitor was assigned to each of the four groups. Monitors for both the male groups, and for the higher achievement female group, were people with teaching experience. The monitor for the low-achievement group of female trainees was the youngest of the four, and the only one not professionally trained.

Pre and post achievement testing used the Stanford Achievement test, Intermediate Battery. [1] Pre and post intelligence testing used the Otis Quick Scoring Mental Ability Test, Gamma. [2]

[1] Kelly, Madden, Garner, and Rudman. 1964.
[2] Otis. 1954.

The results of this study have been published by Prince Edward Island NewStart [13], providing data in detail. In general, the results indicated that the MIND program increased the grade level and I.Q. scores of the participants, but not to the degree predicted by the developers of the MIND package [13, p. 30].

The recommendations accompanying the report were [13, pp. 33-5]:

The MIND Program should be used only with homogeneous groups in terms of grade levels and I.Q. scores. Experience in both these studies indicates that the range of differences should not be greater than two grades nor more than 15 I.Q. points. This is indicative of the degree to which it is felt the program and instructional technique failed to allow for individual difference.

The math program is very well organized and appears to be very appropriate for adults. One good feature of it is the amount of drill work provided in both the audio and textual materials. It could be further improved by adding computational drills, fractions, decimals, and per cent to the audio part of the program.

The language materials should be modified for a Canadian audience. This is particularly true of the prose selections and the many badly chosen meanings in the vocabulary studies. In the sections of the language program designed to develop comprehension and analytical skills, considerably more thought-provoking questions should be added. Also we feel that a phonetic key approach should be much more effective if used in the section on the improvement of "vocabulary skills".

Finally, the language program could be challenging and more responsive to individual needs if the work attack portions of the text were recorded on tape.

The over-all program is recommended for adults ranging from grade two to grade eight. It is not felt that the material is sufficiently challenging for those who test above the grade eight level although it is very adequate for review purposes.

The one factor that recommends the MIND program is essentially that the same results can be obtained in less time and with less effort than with the conventional adult basic education program. Although the MIND program is more efficient, the relative significance of this factor must be determined by those who are responsible for curriculum design in any particular adult basic education program.

2. Basic Skills for Farmers

Agriculture being the major industry of Prince Edward Island, the needs of disadvantaged farmers received considerable attention in the Prince Edward Island NewStart program. The initial training programs for farmers, which included courses in cole crop growing, potato growing, and general farm management, are described in the Canada NewStart report, *Achieving Occupational Competence*. The courses showed that in many cases academic upgrading was also required.

During two years of research and development, members of the Prince Edward Island NewStart staff produced two specialized courses in academic basic education for farmers: *Communication Skills for*

Farmers [5] and *Advanced Math Skills for Farmers* [29]. These are designed specifically for the use of farmers and use farm terminology and farm examples. The Communication Skills volume includes sections on development of speaking, listening, and reading skills, and the essential parts of the business letter. The Advanced Math Skills volume contains 26 sections ranging from fundamental operations through fractions, decimals, percentages, measurement, interest, investment, taxes, insurance, payrolls, and statistics.

Work on the development of reading skills includes short articles devoted to farm topics followed by suggestions for resource materials such as films and includes a series of questions for discussion. The topics include:

Social and economic changes on the farm

Advantages of city and farm compared

Purpose of a Co-operative

Types of business organizations in marketing

Engineering methods to reduce mechanical damage in potatoes

Soil management.

Each section includes a vocabulary of pronunciation and meaning of new and difficult words.

The volume, *Advanced Math Skills for Farmers*, adopts a problem-solving approach with examples drawn from practical farm experiences. For example, Section 5 on Averages begins [29, p. 35]: The Smith farm has 40 cows, the Jones farm has 20 cows, and the Down farm has 30 cows. What is the average number of cows per farm? One of the exercises on the same page reads: A farmer has 52 acres of potatoes in one field, 35 acres of potatoes in another field, 40 acres of pasture in another field, and 53 acres of potatoes in another field. What is his average size field of potatoes? In the section on percentage this problem appears [29, p. 50]: Potatoes shrink 10 percent in weight from November until March. How many pounds in November will amount to 280 pounds in March?

The two volumes were used in conjunction with the farm management training course, but no formal measurement was made of the effectiveness of their use. Some observations were made [17, p. 4]:

> *We do have some standardized achievement measures, however, and in terms of our experience with other materials and groups there is reason to be satisfied with the results. By comparing the results of this group to a similar group in the BTSD Program as described in the MIND report, you will find, on the average, the same amount of achievement change being recorded although the BTSD groups spent two and one-half to three times as much time in such endeavours. With these generalized conclusions drawn we feel that these materials warrant further study and general implementation in any such program for Maritime farmers.*

3. Comprehensive Manpower Development System

Early experiments and efforts on the part of the Prince Edward Island NewStart corporation led to the creation of a comprehensive manpower development system. This system was designed to put into a single sequence all the services required for identifying, classifying, training, counselling, and placing disadvantaged persons. One objective was to remove the obstacles placed in the way of aspiring undereducated adults by the multiplicity of agencies involved in the rehabilitation process. Under the Prince Edward Island NewStart comprehensive manpower development system a person looking for work could, through this one agency, receive testing services, assessment counselling, training, and placement. Training included basic education, pre-employment skills training, and vocational training, with whatever counselling seemed to be indicated. The trainee's personal and family needs for allowances, medical or legal aid, child care, or on-the-job training could also be provided. Job placement either concurrent with or subsequent to training was part of the system [27].

The object of the basic education component of the comprehensive manpower development system was to provide a process which allowed trainees to begin at any level from basic literacy to high school equivalency, at a time suitable to them, and to progress at their own rate. Based on their experiences in earlier adult basic education projects, the Prince Edward Island NewStart corporation made use of a wide variety of commercially prepared materials including the Mott Programmed text [3], the Sullivan Series [15], various SRA (Science Research Associates) materials [1], Dorsett Audio-Visual Machines [2], and the Bell and Howell Language Master [3]. Attempts were made to identify and incorporate material with adult themes and with as much Canadian content as possible [17, p. 8].

Conclusions

As was the case with most integrated programs, the research design did not permit isolation of the basic education components in assessing final results. The program operators appeared to be satisfied with their choice and use of materials, with the possible exception of the Dorsett machine [17, pp. 5-6], with which they encountered mechanical difficulties. The cost of the comprehensive manpower development system as operated was somewhat higher per trainee-day than the BTSD programs being operated by the province with the assistance of the Department of Manpower and Immigra-

[1] Science Research Associates, 259 East Erie Street, Chicago, Illinois.
[2] Dorsett Educational Systems, Norman, Oklahoma.
[3] Bell and Howell Company, 7100 McCormick Road, Chicago, Illinois.

tion. This was attributed largely to the fact that it had been operated for only one year and as an experiment. The program operators estimated that costs per trainee day could be reduced in operation to a level only slightly higher than the cost of the BTSD program [6, pp. 55-7]. Since learning progress appeared to be more rapid than in the BTSD program, any cost difference might not be significant.

V. Basic Literacy Programs

Although there is no definite line of demarcation between either literacy and functional literacy, or functional literacy and illiteracy, it has been found convenient to distinguish, for the purposes of this report, the NewStart programs which were definitely designed as upgrading programs from those which were defined as basic literacy programs. For practical purposes the cut-off point comes at approximately a grade five level. This is because persons having grade 5 competence could, within the allowable time of one year and with better than average progress, achieve the levels necessary for admission to vocational training courses. Those with less than grade 5 were not considered able to meet this entrance requirement in the time available. For the purposes of this report, therefore, basic literacy programs are defined as those covering the range from complete inability to read and write up to approximately grade 5 and a functionally literate level.

All four of the original NewStart corporations became involved in innovative work with basic literacy in one form or another. Saskatchewan NewStart did the greatest volume of work in this field and their work will, therefore, be considered first.

A. SASKATCHEWAN NEWSTART

1. Basic Literacy for Adult Development (BLADE)

The BLADE program, which was designed completely under the aegis of Saskatchewan NewStart, consists of completely new materials and has a number of distinctive characteristics, at least one of which is unique to this system.

The program is described as follows in the instructor's manual [33, pp. 1-2]:

> *The BLADE program raises adults to a measured grade 5.0 level in reading, other communication skills, and mathematics. It also teaches the student how to*

go about the process of learning, and it provides some basic facts for effectual living in a literate world.

It is completely individualized: it tells the student what he is to learn, provides the materials and dynamics for learning it, tells him how to use the instructional sequence, tells him how well he should learn the content, and gives him the means to find out if he has met these criteria before he exposes himself to an informal test of his progress.

The instructor has an important role in the learning process — not as the giver of all information, but as the guide, tutor, and encourager of the student, as judge of his performance. The student consults the instructor at any time when he needs specific help. At strategic points he is directed to consult with the instructor.

The program is constructed to meet clearly expressed behavioural objectives. It is sequenced on the spiral curriculum plan: a content area is dealt with several different times, on progressively challenging levels.

The media include audio tapes (cassettes), texts, study sheets, study cards, exercises, and some manipulative items. The instructional texts have two column pages: the left side is what the student looks at, and the right side is the verbatim text of the tape relating to the corresponding material on the left side. The tape does not "read the book", but keeps the student responding and interacting in a variety of ways.

The two most unique features of the program are the taped text combination and the cueing system. The cueing shows the student how a word is pronounced, thus helping him to recognize the word.

These two processes will be described in detail later.

The BLADE program covers approximately the equivalent of grades 1 to 4 and concentrates largely on communication and mathematics. The communication course focuses directly and indirectly on some of the basic information and skills an adult needs to function effectively as a job seeker, employee, tenant, purchaser, parent, etc. Both the communication and mathematics programs focus on "learning how to learn".

The mathematics component places emphasis on the solving of word problems based on situations common in adult life, as well as on operations with a basic number of facts and processes.

The communication component includes reading, writing, spelling, oral expression, language structure and word study, use of the dictionary, and supplementary reading, both free and controlled [35].

Both the communication and the mathematics courses are organized in four levels. The following excerpts from the instructor's manual will provide some indication of the contents of each level [33, pp. 4-8]:

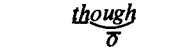
Communication — Level 1

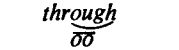
The approach is linguistic: the sounds of English are used as a key to word recognition; the structures and functions of the language are emphasized as a key to meaning. There is some use of metered verse as a guide to the rhythms of English.

From the beginning, letters and sounds are learned in the context of words. As soon as possible, words are learned in the context of sentences, then paragraphs, then stories.

The student learns a word first by analyzing its sounds; soon afterward he is required to recognize and say that word instantly.

The cueing system overcomes the inconsistencies of English spelling. Even words like "though" and "through" can be read early in the program when cued:





The cues appear underneath the normally spelled word, so that the student actually reads the normal spelling and uses the cues simply to help him recognize the word.

If he is to recognize the word, it must already be present in his speaking or listening vocabulary. Therefore the program presupposes an adequate (though not necessarily complete) command of English.

Reading materials in levels 1 to 3 have each page printed twice — cued and uncued. For convenience, the cued and uncued versions face each other on a two-page spread, and identical line positions are made for all words.

At first, the student reads from the cued version until he is sure of the words and meaning; then he reads from the uncued version. Later when he becomes more familiar with the words and spelling patterns, he may choose to attempt the uncued version first, consulting the cued pages only when necessary.

Throughout level 1, while the student is learning the sounds of the letters, they are referred to only by sound, not by name. At the end of level 1, when he has learned all the letters and their common sounds and all the cues, the program presents the names of the letters, alphabetical order, and the BLADE dictionary. The spelling of very irregular words is not required in level 1. The spelling words in each unit in level 1 are based on the instructional content of that unit.

As soon as the student can write sentences, he studies sentences containing the spelling words. In this way, (a) he is kept continually aware of sentence structure and punctuation, (b) he has the added learning advantage of a meaningful context, and (c) words previously learned have been included in the sentences as an automatic review.

The main reason for including spelling in level 1 is to help the student to focus on the word patterns he is currently learning. It is not expected that he will remember the spelling of all the words. However, he has his cumulative spelling list for reference, and the words learned in level 1 are repeated in the spelling sentences in subsequent levels.

Communication — Levels 2 and 3

Levels 2 and 3 deal with such subjects as plurals, contractions, abbreviations, suffixes, prefixes, context clues, interpreting signs and labels, synonyms, antonyms, meaning from context, recalling details, and so on.

Each unit involves at least two short stories or articles, written for the program, and presented in cued and uncued form.

In level 2 the student begins to given written (or printed) answers to questions about some of the reading selections. This is further developed in level 3, as a prelude to more original efforts in writing.

It is desired to avoid prolonged dependence on the cues. However, unless the student uses them to a considerable extent, he will not learn them well enough to profit from them. Therefore, the program seeks to effect an optimum balance between the use and non-use of the cues.

Since the student never leaves the reading selection until he can read it fluently without cues, he begins to achieve independence from the outset.

Cueing is an all-or-nothing commitment. It would be misleading to cue only part of a sentence of paragraph. Therefore, the gradual withdrawal of cues in levels 2 and 3 has been done en bloc for sequences containing only familiar vocabulary, while the cues are still provided in other sequences.

Communication — Level 4

Here, the cueing, which was reduced in level 3, is discontinued. A standard classroom dictionary is introduced.

The curriculum spiral for some subject areas that were dealt with in unit 2 and 3 is continued. Useful applications of the reading skills are fostered in units dealing with filling out forms, writing letters and notes, reading newspapers and books, using the telephone and telephone directory, and so on.

It is assumed that non-BLADE materials will be gradually introduced by the instructor while the student is working in level 4. These might include the Reader's Digest Skill Builders and materials from the Science Research Associates Reading Laboratory.

Mathematics — Level 1 to 4

Experience has indicated that few adult literacy students need to start at the beginning in mathematics. However, the program provides instruction from the most rudimentary level for the few who may need it.

Level 1 introduces the number system and the money system. Level 2 deals with addition and subtraction. Level 3 covers multiplication and division. Level 4 includes measurement (linear, liquid, weight, and time), as well as simple fractions. Operations with money are included at every level, for their motivational value as well as their practical value.

There is considerable emphasis on word problems, which are usually found difficult by students whose reading skills have been inadequate — as well as by many other students. The student is helped with the understanding of problems, and with the process of solving them, as well as being trained to use checks and safeguards to insure accuracy.

The Cueing System

Even a cursory examination of the English language reveals that many letters and combinations of letters have different sounds under different circumstances. For instance, the letter "a" is pronounced differently in the words "can" and "cane", and the "ough" combination has at least five different sounds as evidenced in the words "bough", "cough", "dough", "enough", and "through". The cueing system is designed to ease the student through the intricacies of this problem without getting him further confused or setting up patterns which must be unlearned later on. The best way to illustrate how this cueing system

works is to include two appendices from the BLADE Instructor's Manual [33, pp. 39-41]. These cover the sounds of English and the BLADE cueing system.

THE SOUNDS OF ENGLISH

Consonants

There are eight pairs of consonant sounds, which are differentiated from each other by the use or non-use of the voice.

Say "pet"; now say the "p" sound alone — not the letter name, but just the sound of the "p".

Now say "bet", then say the sound of the "b" alone.

Now say "p", "b", "p", "b". There is no difference in what you do with your lips and your tongue. The only difference is that you use your voice to say the "b" but not to say the "p". In other words, a "p" is an unvoiced "b".

In the same way, a "t" is an unvoiced "d"; a "k" is an unvoiced "g"; an "s" is an unvoiced "z"; and "f" is an unvoiced "v".

Here are the eight pairs, with the voiced consonant shown below the unvoiced one:

Unvoiced:	*p*	*t*	*k*	*s*	*f*	*th (thin)*	*sh*	*ch*
Voiced:	*b*	*d*	*g*	*z*	*v*	*th (the)*	*zh*	*j*

Other consonant sounds are:

h, w, wh (actually pronounced hw or just w), m, n, ng, l, r. The q sound is nearly always in the combination "qu", and is pronounced kw (as in quite) or "k" as in liquor; the x sound is ks.

Vowels

The main division of vowel sounds is between "long" and "short".

Short: a (at), e (bet), i (sit), o (dot), u (but), oo (look).

Long: $\bar{a}$ (ate), $\bar{e}$ (need), $\bar{i}$ (site), $\bar{o}$ (dote), $\bar{u}$ (cute), $\overline{oo}$ (tool).

Other vowel sounds are:

ou (out), aw (law), oi (boil).

In Canada, little distinction is made between the "aw" sound as in "law", and the "o" sound as in "lot". Therefore, in the BLADE cueing system, the "aw" sound has been cued as "o".

Vowels before r may have a slightly different sound. This is quite noticeable in the sound er, which may be spelled in many ways:

fur	*bird*	*vertical*
word	*heard*	

In these cases, it is hard to hear exactly what vowel sound precedes the r. If you force it into any of the other vowel sounds listed above, it does not sound like "er". This sort of change is less noticeable with "ar" as in "far" (a definite "ah" vowel) and with "or" as in "for" (somewhere between an "oh" and an "aw" vowel).

One vowel actually starts with a consonant sound. It is the long ū. Compare the pronunciation of "cute" and "cool". There is a "y" sound after the "c" in "cute". Say the word "use" — there is no difference between the first sound in that word and the first sound in the word "you" — they both start with a "y" sound. For that reason, this difference has been made in cueing the word "the" before a vowel:

the amount	*the upper*	*BUT the use*	*the unit*
ē	*ē*	*ū ∉*	*ū*

A person first becoming aware of the sounds of English in an analytical way, must continually remind himself to think in terms of sounds, not letters. For instance, "ch" is one consonant sound, although it has two letters; "x" is two sounds, although it is one letter.

As you have probably observed, there are more sounds in English than there are letters in the English alphabet. Ch, sh, th, wh, ng for instance, are not given a letter to represent them. Another sound not represented is "zh". We listed it above as a voiced "sh". If you just say an "sh", and then say it again using your voice, you will have said "zh". It is the sibilant sound in words like "vision" and "casual".

A single sound, such as "b", "ch", "a", or "oi", is called a phoneme, and a system based on these single sounds is phonemic. The BLADE cueing system is phonemic.

THE BLADE CUEING SYSTEM [33, pp. 43-9]

The following comments and examples are offered as a guide to the main features and the pattern of the BLADE cueing system.

1. *The common spellings of short vowel sounds are not cued:*

   hat bet sit not but look

2. *Long vowel sounds are cued as follows:*

break	*meat*	*fight*	*boat*	*beauty*	*tool*
ā	*ē*	*ī*	*ō*	*ū ē*	*oo*

3. *Silent letters have a slanted line through them:*

date	*island*	*hour*	*bomb*	*biscuit*
ā ∉	*ī ∉*	*∉*	*∉*	*∉*

4. *Less common or less regular vowel spellings are cued with the sound symbols that indicate their pronunciation:*

honey	*head*	*through*	*dough*	*enough*	*cough*
u ē	*e*	*oo*	*ō*	*uf*	*of*

laugh	*was*	*women*	*busy*	*many*	*some*	*there*
af	*oz*	*i*	*izē*	*e ē*	*u ∉*	*ā ∉*

5. *All of the "er" sounds are cued with those letters, if spelled otherwise:*

work	*bird*	*heard*	*fur*	*her*	*further*
er	*er*	*er*	*er*		*er*

6. *The "ar" and "or" sounds are learned and not cued:*

star	*are*	*park*	*for*	*store*
	~~e~~			~~e~~

They may be used as cues:

four	*door*	*oar*
or	*or*	*or*

7. *Diphthongs are learned as if they were a single grapheme or letter:*

oi in words like boil
ou in words like about

They are also used as cues:

boy	*crowd*
oi	*ou*

8. *The unvoiced "th" is uncued; the voiced "th" has an underline:*

through	*then*	*thin*	*this*
oo			

9. *The "e" in "the" is left uncued, except when it precedes a word beginning with a vowel sound other than long "u":*

the end	*the ant*	*the island*	*the umbrella*	
e	*e*	*e ~~i~~*	*e*	*u*

BUT: the use

u	~~e~~

10. *The sibilant sounds are cued as they sound, when cues are needed:*

birds	*ducks*	*center*	*zero*	*sand*
er z		*s*	*e o*	

11. *The consonant combinations "ch", "sh", "th", "wh" and "ng" are learned as if they were a single grapheme:*

church	*shoe*	*thin*	*where*	*sing*
er	*oo*		*a* ~~e~~	

and are uncued, except where they have a different sound from that represented above:

voiced "th" — then
silent "w" in "uh" — who whole
hoo ~~w~~ *o* ~~e~~

"ng" with "g" pronounced — hungry angry
g e g e

12. *The "ng" sound in "bank", "link", etc. is not cued — it is learned as the regular sound of "nk":*

trunk mink bank

13. *Where "n" in the prefix "un" or "in" precedes "k", it will not be confused with the above, because the main part of the word will be bracketed:*

unkind	*unknown*
ī	k ō

14. *All compound words have their parts bracketed for easy recognition:*

grandson	*gooseberry*
u	o͞o e ā ē

Hyphenated words are similarly treated:

jack-knife	*ready-made*
k ī e	e ē ā e

15. *The "sh", "ch", etc., are used to cue words with an "sh" or "ch" sound spelled in another way:*

sure	*ignition*	*match*	*furniture*	*issue*
shūr	*shun*	*ch*	*er cher*	*shū*

16. *The voiced "sh" sound is usually spelled differently, and is cued as "zh":*

measure	*occasion*	*pleasure*	*division*
e zher	*āzhun*	*e zher*	*zhun*

17. *A curved underline is used for three purposes:*

(1) *to indicate the letter(s) to which a cue refers when more than one letter is involved:*

eat	*pleasure*	*word*	*truly*
ē	*e zhur*	*er*	o͞o ē

BUT: son *bind*
u ī

(2) *to bracket double consonants and ck, so that the sound will be pronounced only once:*

letter	*beginning*	*luck*	*furry*
			er ē

(3) *to mark off parts of a compound word, or any meaningful part of a word, that will help students to recognize and understand the word:*

grandson	*gooseberry*	*mankind*	*unbroken*
u	o͞o e ā ē	ī	ō
treatment	*overdose*	*underdog*	*downtown*
ē	ō ō e		ou ou

18. *Consonant sounds are cued, when necessary, with whatever symbol represents them:*

gentle	*gift*	*center*	*cork*	*of*	*looked*
j ∉		*s*		*v*	*∉t*

ljfted	*cooked*	*crooked*
	∉t	

19. *The "qu" combination and "x" are simply different spellings of familiar sounds, and are always cued accordingly:*

quick	*cheque*	*liquor*	*box*
kw	*k ∉*	*k er*	*ks*

20. *The ending "le" as in "table" is cued with a silent "e" whether it ends the word or is followed by a "d", "s" or other letter:*

bottle	*bottled*	*rifle*	*rifles*	*bottleneck*
∉	*∉*	*$\bar{i}$ ∉*	*$\bar{i}$ ∉z*	*∉*

BUT: bottler

21. *The "schwa" (that almost indistinguishable vowel sound in many unaccented syllables, such as the "e" in "student", the "i" in "accident", the "a" in "soda", or the "o" in "gallon") represents difficulty in any system. It usually sounds like a very brief "u" as in "but" or "put", and therefore it is cued with a "u".*

The BLADE cueing system disregards it when the word can be easily recognized without the cue. The "e", "i" and "o" schwa can usually remain uncued — e.g., although the normal pronunciation of "gallon" is "gal-un", "gallon" will surely be recognized. The "a", however, with its uncued sound as in "hat", is much farther from the short "u" sound of the schwa. The uncued schwas in "Canada" might prevent recognition, so it is cued. Examples follow:

Canada	*soda*	*eatable*
u u	*$\bar{o}$ u*	*$\bar{e}$ u ∉*

A schwa sound at the beginning of a word is seldom cued:

about	*around*	*afraid*
		$\bar{a}$

22. *There are words in which dictionaries do not commonly show a schwa sound, although the word cannot be pronounced without one. An example is found in the "le" endings. A word like "able" is usually shown as "$\bar{a}$bl", although a schwa sound actually occurs between the "b" and the "l". A similar convention applies sometimes to "n", as in "sweeten": "swēt'n". The BLADE cueing system follows the "le" convention, but not the other one:*

able	*trouble*	*sweeten*	*often*
$\bar{a}$ ∉	*u ∉*	*$\bar{e}$*	*✗*

23. *Sometimes there is a choice of cues. For instance, "trouble" could have been as trouble instead of trouble. Where a group of*

ø ∉ u ∉

letters occurs very commonly with the cued sound, they are cued as a group; exceptional combinations are not grouped. Where the omission of one letter is phonically convenient, it is cued as silent:

edge	know	gnat	should	right	nation	boisterous
j	∉ ō	∉	ood	ī	āshun	us

The "d" was included in the cue for "should", because "oul" with the "oo" sound does not commonly appear without the "d". The "t" was excluded from the cue for "right", because the "igh" combination with the "i" sound occurs with the "t" — e.g., "sigh".

There are three possible ways of cueing "sure":

sure	sure	sure
shūr	shoor	shū∉

(The BLADE system uses the first, as it seems the most helpful.)

24. *The pronunciation of the first vowel sound in words like "berry", "bury", "marry", and "Mary" varies in different localities. After considerable inquiry and observation, an arbitrary decision was made to cue all of these vowel sounds as a long "a". It should be remembered that the purpose of cueing is to help the student identify words that are already in his speaking vocabulary, not to tell him how he should pronounce them. A cueing system could not possibly indicate the precise pronunciation without using the hundreds of possible phonetic markings used by the professional linguist.*

A phonemic system, not being phonetic, contains many symbols that are only an approximation of the actual sound. For instance, if you say the words "big" and "bit" slowly, you will notice that the two "i" sounds are not the same, though they can both be defined as a "short 'i'". The long "a" cue in such words as the following just happens to involve a more noticeable difference — for some people:

marry	Mary	berry	bury
ā ē	ā ē	ā ē	ā ē

It is expected that literacy students will use the cue for identification, then pronounce the word in whatever way is considered correct in their locality.

25. *A similar arbitrary decision was made in not cueing the "u" as "oo" in words like:*

put	bush	sugar	pull
		shuger	

The cue seemed awkward, and the words quite recognizable without it.

26. *Some people make a distinction in pronouncing:*

fore and for
dawn and Don

while some do not even hear a difference when others pronounce it. For simplicity, the BLADE cueing system ignores any difference that may exist:

fore *for* *morning* *mourning* *door*

or *or*

BUT: poor

oo

27. *The word "eighth" needs a cueing pattern similar to that for the words "hungry" and "angry". There, the "g" was pronounced as part of the "ng" combination, and then pronounced again as an ordinary "g". In the word "eighth", the "t" is pronounced first as an ordinary "t" and then as part of the "th" combination:*

eighth

a t

In the first three levels of the BLADE system, as was previously noted, all new reading material is presented in dual-page form with the standard English on the righthand page and the cued copy on the lefthand page. This material is supplemented by cassette tapes which enable the learner to hear as well as see the words. This type-text system is one of the important techniques of the BLADE program.

The BLADE material has been assembled in a kit which includes copies of the 69 communication and 46 mathematics unit books with accompanying audio cassettes, the BLADE dictionary (132 pages, with over 2,000 cued words defined in simple terms), an introductory description of the cueing system and supplementary reading material. This includes:

— the Cross-Canada Series (four books, five cassettes)
— the Indian Story Teller Series (three books)
— the Bare Facts (14 books, 14 cassette tapes)
— a Beer Story and other rhymes (one book)
— the Choke Cherry Pit Spitting Contest and other rhymes (one book)

Also contained in the kit are a tape text orientation (one book, one cassette tape), a reading/learning disabilities test examiner's booklet and candidate's profile sheet, a mathematics placement test, an instructor's manual, an instructor's manual supplement, and two spelling tapes.

The 14 books in the Bare Fact series are:

— Parole in Canada
— Workmen's Compensation
— If Food Costs Too Much
— Looking After the Baby

— Take It Back
— Buying on Credit
— Fishing and Hunting Licences
— Licences and Permits
— Buying at the Store
— Finding a Place to Stay
— Unemployment Insurance
— You and the Landlord
— What is Vagrancy?
— Housekeeping

Advantages of the BLADE System

1. The system involves no complicated equipment or hardware. A simple cassette player is the only mechanical equipment required: this can, if necessary, be a battery operated unit.
2. The content is adult-oriented, maintaining interest and involvement during the learning process.
3. The cueing system used to distinguish among the various sounds of letters is supplementary and does not involve an unlearning process at a later date. The process involves a "learning how to learn" component which provides momentum for continued learning after the formal course has been completed.
4. The process is individualized, making it possible for students to enter and leave at their own convenience and to make progress at their own rate. The role of the teacher in this individualized process is very subtly conveyed to him in the instructor's manual as follows [33, p. 20]:

> *Please don't feel that you have been displaced by a tape recorder. If you let the the materials do the job, you will be free to do the more challenging and rewarding work of dealing with each student as an individual and helping him to take the greatest possible advantage of the training opportunity. If a student has obviously rushed through a unit without learning thoroughly, don't waste your time "teaching" him — send him back into the unit to do it properly. The success of the program depends on your resisting any impulse "to be the tape recorder" and making the best use of your opportunity to guide and assist each student. Too much time spent with one student will be to the disadvantage of the others. There is really no "teaching" in this program; it is designed to help the student learn. He has to do the learning. You are depended on to play a very important role in guiding, assisting, and encouraging that process.*

Utilization

The BLADE program was initiated at Saskatchewan NewStart and completed by its successor organization, the Training Research and Development Station of the Canada Department of Manpower and

Immigration. The program is now in a second edition with revision based on experience with the first edition in the NewStart experimental classroom at Prince Albert and in several adult training institutions in various parts of Canada. Among the locations where the first edition was used experimentally were Wollaston Lake, Saskatchewan; Grouard, Alberta; Fort Resolution, Northwest Territories; Saint John and Fredericton, New Brunswick; and Stephenville, Newfoundland.

2. Fluency First

One of the basic prerequisites for successful participation in the BLADE program is the ability to recognize words. As was mentioned earlier, if the trainee is to recognize a word it must already be present in his speaking or listening vocabulary [33, p. 4].

It has been noted [28] that:

> *Among the Indian and Metis population in the Northern part of the Prairie Provinces the inability of many to use, effectively, the English language prevents the acquisition of literacy skills, thus precluding progress in school or in adult training schemes; hinders participation in economic and social development projects; lessens the probability of successfully managing their own affairs, either corporate or individual; frustrates the intentions of enfranchisement; inhibits the growth of self-confidence; and in general limits their ability to cope with the daily problems of life.*

Teachers of English in Indian communities soon learn that it is important to a student that he be able to understand directions and to ask questions without being frustrated by a limited command of the language and without feeling shame about his speech. Recognizing this fact, Saskatchewan NewStart decided that a new approach was necessary and that many northern students had first to learn to speak English before they could learn to read it. This gave rise to a process of oral education which came to be known as "Fluency First".

Fluency First is a method of teaching English as a second language in which all instruction takes place through the medium of English. The course includes a variety of oral language approaches and activities, among them direct oral teaching by an instructor, special coaching in the production of certain sounds that do not occur in the learner's first language, the use of language laboratory practice, short field trips followed by general discussion, and conversation on items or events of mutual interest.

In deciding on the basic approach to be used for the Fluency First program, the developers considered both a structural approach and a situational approach. A structural approach would put emphasis on thought and sentence structure with structure words dominating over content words. Content words are defined as those in which substantive

meaning predominates, and structure words are those in which grammatical meaning predominates. It was observed that, although much information can be conveyed simply by using content words even if the structure words are inaccurate or omitted, both speaker and listener must have a good knowledge of structure to facilitate full communication.

> *As a generalization, one can say that content words are relatively easy to learn, especially in the early stages of language work before much abstract language is tackled, because it is usually possible to help learners associate the word and its meaning directly by using real objects, pictures, and actions. Structure — the grammatical words and their essential arrangements — is more difficult to master, but one cannot make progress in a language beyond the rudimentary stage without this mastery* [28].

Because the meaning of any structure is best illustrated in natural circumstances, the developers of the program decided to use the situational approach. The course was designed to begin with situations familiar to the adult student in the north and to work outward gradually from his experience to new situations that he would eventually meet in the content of an upgrading or a trade course.

In this context, Fluency First proposes to use activities such as home and machine repairs and visits to maintain the level of interest and sense of relevance to the student.

Mathematics is to be based on the practical experience and needs of the adult trainees, to stimulate interest and to reinforce mathematical concepts only vaguely familiar.

Having agreed on these basic principles, the course developers specified terminal objectives as follows [28, p. 169]:

> *The students will be able to understand the structural patterns and vocabulary of the course when they hear other persons speak them, distinctly, at a normal rate of speed.*
>
> *The students will be able to pronounce the sounds in the structural patterns and vocabulary items of the course accurately enough so that their speech will not be misunderstood, and to speak English sentences with natural intonation, stress, and rhythm, so that their meaning is not obscured.*
>
> *The students will be able to recognize all the English phonemes when they hear them pronounced distinctly, to reproduce them, and to distinguish one phoneme from another.*

More specifically the students who have completed a Fluency First course are expected [28, pp. 169-70] to be able to:

a) *Say the regular sound of any symbol used in English writing.*
b) *Write the regular symbol for an English sound.*
c) *Use the regular sound symbol relationship as a cue to other spellings of the same sound as in the BLADE cueing system.*

d) By knowing the sounds-symbols involved, attack words they have not met before in reading but have learned orally.

e) Read aloud fluently sentences containing known words written in patterns they have learned orally.

f) Comprehend by silent reading a short passage containing known structure and vocabulary.

g) Use a simplified dictionary.

h) Write the words and sentences they have learned orally.

i) Use their knowledge of common prefixes and suffixes to help themselves learn the meaning of a new word.

j) Use other means, such as oral informants and context, in learning the meaning of a new word or new pattern.

The Fluency First program is not designed to be totally a prerequisite for the BLADE program, but the second and third Fluency First levels appear to run concurrently with the first and second BLADE levels. At the time of writing this report, the Fluency First program was largely in the developmental stage; no data on effectiveness are as yet available.

Other Basic Education Programs — Saskatchewan NewStart

While the NewStart mandate related specifically to adults, many of the programs proposed by Saskatchewan NewStart had potential for use with children. They are mentioned here simply to round out the information about Saskatchewan NewStart's adult basic education programs.

3. Learning English as a Second Language Through Recreation (LEREC)

The LEREC program is a special application of Fluency First designed for use in recreation programs with children. It is defined as [18, p. 5]:

> *A plan to make use of summer recreation programs in order to raise the standard of accurate and naturally fluent use of English by exploiting the opportunities for language use that are inherent in participatory activities.*

Kindergartens

Drawing on its experience in the basic education field, Saskatchewan NewStart submitted two briefs in 1971 to a committee on kindergartens set up by the Minister of Education for the province of Saskatchewan: *Kindergartens in the Education Process* and *A Bilingual Program for Northern Kindergartens.*

B. ALBERTA NEWSTART — ENGLISH WITH EASE

Teachers of adult basic education in northern Canadian communities are faced not only with the problem of overcoming illiteracy, but also with the complications of teaching English as a second language. The Alberta NewStart program developers encountered these problems in attempting to teach English to people whose native language was Cree or Chipewyan. In addition to the vocabulary differences there are important phonetic and structural differences to be considered. Many of the sounds which occur in English are not used at all in Cree, which possesses only half the consonant phonemes of the English language. Major differences in structural usage also occur. For instance, whereas the normal order of an English statement is subject first and verb following, the Cree language places the verb in primary location and then inflects the verb to convey the presence of the subject. In fact, the verb is modified to reflect tense, mood, number, gender, case, and voice. Where English employs masculine, feminine, and neuter forms, Cree makes distinction between animate and inanimate.

For these reasons and because of the absence of appropriate materials for use in literacy programs with Indians and Metis, the Alberta NewStart adult basic education staff decided to develop a program specifically designed for northern Canadian peoples. The result was "English With Ease"[2].

Course Construction

The first step was a letter frequency study of the materials used in the various mobile centres. From this study a sequence was established for the introduction of sounds in the new program. The first four letters in terms of frequency were s, t, the short a, and p. "Pictophemes" were developed to introduce to the student the consonant and the short vowel sounds in the initial position. This associated the sound with a familiar object and word designed to induce and encourage oral language. The first lesson consisted of words made up only of the letters s, t, a, and p, and its objective was to develop the ability to recognize the sound of the initial consonants, s, t, and p, and the short sound of the vowel a. In subsequent lessons the short i and the consonant blend sp were introduced, followed by a lesson to assess the mastery of these words and to review words using these five letters. The lessons proceeded in this way following the sequence determined by the letter frequency until a basic vocabulary had been established.

Concurrent with the vocabulary development a series of original stories was presented based on typical family life of five characters: Tom, a hunter; Annie, a young woman, Tom's wife and mother of Stan; Stan, active mischievous son of Tom and Annie; Mosom, wise grandfather of Stan; and Nokom, doting grandmother. Another character who found his way into the story was Atim, Stan's dog.

English With Ease grew into a program consisting of five exercise books and three reading texts with many illustrations and references to the pictophemes.

Evaluation

When the Alberta NewStart mandate ended *English With Ease* was still in the developmental stage and consequently no formal evaluation has been possible. Draft materials prepared by the corporation contained a request for any observations or data from teachers or organizations using the program on an experimental basis.

C. NOVA SCOTIA NEWSTART

1. Functional Literacy

As the work of the adult basic education unit at Nova Scotia NewStart progressed, and particularly from communication with the Canada Manpower Centre regarding recruitment for upgrading programs, it became apparent that there was a pressing need for programs and materials at the basic literacy levels. On this basis, and encouraged by both Canada Manpower and the provincial Department of Education, Nova Scotia NewStart undertook to prepare a functional literacy program using the DACUM model as that corporation had developed it.

Functional Literacy Chart

The first step in developing the new functional literacy program was a functional analysis of the skills involved in literacy. The functional analysis was conducted by a small committee including people who were: trained reading or literacy specialists; actively engaged in pioneering literacy work; front line elementary school reading (literacy) personnel; and/or Department of Education personnel actively involved in remedial literacy work related to BTSD or the regular school system.

The completed analysis then became the curriculum format for the training program. The analysis is presented graphically on a large chart similar to the DACUM charts used in other Nova Scotia NewStart programs and covers the entire range of literacy skills including speaking, communicating non-verbally, listening, reading, and writing. Through the use of this chart the instructors and the trainees (when they have enough reading ability to begin to interpret the chart) are able to see at a glance what has been achieved and what remains to be achieved.

Each subdivision on the chart is a skill expressed in performance terms and is understood to be prefaced by the words "the individual must be able to." These skills include such diverse activities as "pronounce

short and long vowels"; "comprehend and follow spoken instructions"; "interpret common abbreviations"; "recognize difference between fact, opinion, fiction"; "arrange ideas in chronological order"; "use dictionary to verify spelling"; "write personal letters"; and "use commas to separate words in a sentence."

On the chart these skills appear in five groups of pyramid shape with the basic elementary skills at the base and the more comprehensive complicated skills at the top. These five major pyramids are in turn made up of sub-skill pyramids. Interrelationships between skills are indicated on the chart by various types of linkages which indicate whether one skill is dependent upon another, whether they are interrelated, and whether or not they can be learned separately. These linkages are expressed by relative positions of the skills on the chart and by solid or broken lines connecting the skills.

Curriculum Content

The content of the functional literacy program is indicated and determined by the skills identified on the chart. Once the chart was completed the next step was to identify and tabulate materials related to the skills. In the Nova Scotia NewStart application of the program, the primary sources of these materials were existing remedial reading or basic literacy programs that were commercially available. Each skill on the chart was given a code letter and number, and the materials identified as related to that particular skill were given the same code and either filed or listed for access. The final step in this process was to compare the accumulated materials with the chart to determine whether certain skills were too well or too poorly represented in the material. Where materials were in short supply, extra effort was made either to locate appropriate materials or to produce them.

Particularly at the initial stages the curriculum is basically instructor-controlled. There are, however, enough options so that the individual abilities, needs, and particular interests of the learner can be met. The skills listed on the chart are diverse and discrete enough to enable the learner to attempt skills at a number of places on the chart. Similarly, because there are several learning resources coded for each skill, it is possible for the learner to choose, or for the instructor to suggest, materials, media, and methods most suited to the abilities and interests of the learner.

Recording of Achievement

In practice each trainee has a copy of the functional literacy chart, on which his standing and progress are recorded. The process of determining entry skill levels is relatively simple; it is largely a matter of

observation of activities during the initial stages. This can be done by conversation, by watching the learner's efforts to read and write, and by administering simple achievement tests. Three basic checklists were drawn up, as part of the program for use in establishing placement levels, to cover the areas of reading, writing, and listening and speaking. It was not suggested that an attempt at absolute accuracy in initial placement be made. It was considered more important that the learner begin working at the achievement of some skills with which he felt comfortable and where he had a reasonable chance of success. Entry levels could be refined during the first days or weeks in the program.

The recording of achievement in individual skills is described by the program developers as follows [30, pp. 5-6]:

> *The program is designed in such a way that the chart can be used to record achievement in each of the skill blocks. Upon entry into the program the trainee is given a chart, and an additional master chart is to be kept by the instructor. Although non-reading trainees cannot read the chart initially, it tends to act as a motivating factor when trainees see blocks being assessed and checked off.*
>
> *This check-off system is used because it is realized that in the field of literacy several problems exist in terms of evaluation. Mastery of a skill is difficult to assess with any degree of certainty because of the twin problems of retention and transfer to other situations. Reading would seem to involve a gradual accumulation of related skills eventually applied together to achieve reading and writing prowess.*
>
> *With this in mind, an attempt was made to use a check-off or evaluation system which would not place trainees in a threatened position and which would make no effort to pass judgment on the proficiency of the individual's performance at any point in time, but, however, would be a rough indicator of the ability of the trainee to accomplish this skill, (a) in isolated instances, (b) in a more generalized sense over an extended period of time, and (c) in informal instances.*
>
> *Using this system, a perusal of the chart at any one particular time should give an indication of (1) whether the student has been able to accomplish this task on the initial occasion of his starting to work on the skill block, (2) whether he has been able to transfer his newly acquired skill at a later date to an upper level skill; in short, does he have a modicum of transferability and retentitivy? (3) whether he is able to generalize the skill to broader, more informal applications, (4) whether he has been forced to return and review the skill, and (5) whether over-all progress is evident.*

Implementation

This program was constructed at the request of the Nova Scotia Department of Education in the spring of 1971, at a time when the Nova Scotia NewStart corporation was phasing out its program activity. As a result the corporation did not implement the program, but co-operated with the Nova Scotia Department of Education in setting it up and in monitoring progress.

The corporation also produced a pictorial brochure, entitled "A New Approach to Functional Literacy", which described the system briefly. In it, the following advantages are claimed for the program [20]:

a) the trainee enters the program at his own convenience (continuous intake), starts at his own level, and proceeds at his own rate;
b) to an extent that is not possible with traditional methods, the trainee is able to select his own goals and mode of learning;
c) the program accommodates and takes advantage of individual differences in adult learners;
d) objectives are expressed in terms of observable behaviour: trainees are required "to be able to do", not merely "to know";
e) evaluation is based on performance rather than on retention of information for test purposes;
f) homework and test stresses are eliminated;
g) the chart is a motivational tool, a curriculum guide, and a cumulative record of achievement;
h) learning materials in the learning activity batteries can be revised and improved as new materials become available;
i) staff time and talents are more efficiently and productively used.

2. Contingency Management

After the Educational Developmental Laboratories (EDL) program had been used by Nova Scotia NewStart for about a year, there was still little or no substantive evidence of its usefulness in teaching communication skills, or of the motivational factors related to its efficiency. In view of the fact that the EDL system laid claim to inherent motivation features, some controlled experimentation to determine the motivational level of this system in comparison with other techniques was needed. Specifically, the question to be answered [24] was: "Can EDL Learning-100 program-specified behaviours be acquired with fewer errors and less repetitions when using a token reinforcement system to supplement the motivational features of the EDL program than occur with an unaltered program?"

General Experimental Design

The experimenters chose what was essentially an "N = 1" design with the emphasis on determining if a student's behaviour can be repeatedly manipulated in a quantitatively consistent fashion depending on the presence or absence of a particular variable (or set of variables). Several students were involved in the project, but each was working independently and being compared only with himself. Thus the essential characteristics of the "N = 1" design were maintained.

CONTENT

Material to be learned was chosen primarily from the "RA" and "AA" levels of the EDL L-100 program. Several reinforcement schedules were drawn up to examine the effect on the number of correct responses of learning periods with and without token reinforcement.

RESULTS

Normal progress in the public school system is one grade a year. Assuming 180 teaching days in the year and one hour a day of instruction in reading, this would mean an achievement of one grade level for 180 hours of instruction. Of six subjects in this experimental program the slowest progress was made by an 18-year-old male with an I.Q. of 77, who progressed at the rate of one grade level for 113 hours of instruction. The fastest was a 17-year-old male with an I.Q. of 79 whose progress was at the rate of one grade level for 48 hours of instruction. Brief descriptions and progress rates of six students in this program follow.

Student A. This unemployed 17-year-old male dropped out of school before completing the fourth grade. During his training he was on probation. Entry level testing indicated a WAIS FSIQ (Wechsler Adult Intelligence Scale Full-Scale I.Q.) of 79 and a reading grade level of 3.6 on the CRT (California Reading Test). Following 180 hours of training his reading level on the CRT was 5.8. Progress was at the rate of 1 grade level per 48 hours. Training was involuntarily terminated by his arrest.

Student B. This unemployed 21-year-old female dropped out of school before completing the fourth grade. Entry level testing indicated a WAIS FSIQ of 67 and a reading grade level of 2.6. Following 122 hours of training her reading level was 5.0. Progress was at the rate of 1 grade level per 51 hours. Training was involuntarily ended by the project's scheduled termination.

Student C. This unemployed 18-year-old female dropped out of school prior to the fourth grade. Entry level testing indicated a WAIS FSIQ of 85 and a reading grade level of 3.8. Following 110 hours of training her reading level was 5.9. Progress was at the rate of 1 grade level per 52 hours. Training was involuntarily ended by the project's scheduled termination.

Student D. This 23-year-old male was a normal labourer. He dropped out of school following completion of the fourth grade. Entry level testing indicated a WAIS FSIQ of 74 and a reading level of 5.0. Following 82 hours of training his reading grade level was 6.0. Progress was at the rate of 1 grade level per 82 hours. Training was frequently interrupted by week-long absences while he worked at odd jobs and was ended by the project's scheduled termination.

Student E. This unemployed 28-year-old female was a sister of Student B. She dropped out of school following completion of the third grade. Entry level testing indicated a WAIS FSIQ of 71 and a reading level on the CRT of 3.5. Following 159 hours of training her reading grade level on the CRT was 5.4. Progress was at the rate of 1 grade level per 73 hours. Training was involuntarily ended by the project's scheduled termination.

Student F. This unemployed 18-year-old male was expelled from school before completing his second year in the second grade. At the beginning of his training he was on probation for shoplifting. Entry level testing indicated a WAIS FSIQ of 77 and a reading grade level of 1.7 on the CRT. Following 228 hours of reading jnstruction his reading level on the CRT was 3.7. He progressed at the rate of 1 grade level per 113 hours. Training was voluntarily ended just prior to the project's termination.

D. PRINCE EDWARD ISLAND NEWSTART — A NEW START IN READING

After some disappointing results in attempting to upgrade illiterate adults, Prince Edward Island NewStart decided that new materials were needed. Consequently they set about to produce a system which would be based upon adult themes and would have as much Canadian content as possible. It was intended that the system should be functional, informative, and (as far as possible) self-directing.

Materials were produced on three levels: Level 1 for readers ranging from 0 to grade 3; level 2 for readers from grade 2.5 to grade 5; and level 3 from grade 5 to 7.5. Each level had an instructor's manual, a trainee's book on phonics, and two or more books of prose readings. In order to achieve the self-directing goal of the program, cassettes were prepared to give trainee guidance and assistance in following the material. Six trainees were involved with the program developers in setting up the program, but there was not time to test out the new material [25].

VI. Summary and Conclusions

Adult basic education was included in the programs of the four NewStart corporations set up in 1967. The high correlation between unemployment and lack of education undoubtedly influenced this choice, as did the fact that the founding department, Canada Manpower and Immigration, was concerned about the relatively large number of disadvantaged adults who were not being involved in upgrading or who were dropping out of courses prematurely.

To assist the NewStart corporations, which were independent and quasi-autonomous organizations, and to provide some degree of correlation and interaction, the funding agency set up a technical support centre, which included a basic education consultant. This consultant carried out his responsibilities through visits, seminars, and the preparation of resource materials.

Most Canada NewStart programs in adult basic education were designed with emphasis on the needs of the individual adult. Both materials and methods were intended to make maximum provision for individual differences and to avoid the limitations of group instruction. In this report, the NewStart adult basic education programs have been classified, for convenience, into two categories: *upgrading*, which is considered as starting at about the grade 5 level and proceeding to grade 10 or, in some cases, to high school equivalency; and *basic literacy*, which includes all work below a grade 5 level. All four of the original NewStart corporations conducted projects in each category.

Upgrading Programs

Saskatchewan NewStart developed a packaged program, Learning Individualized for Canadians (LINC), which covers grades 5 to 10 and meets the requirements of an individualized system. It makes provision for continuous intake and continuous progress. A complete system of placement inventories, item tests, and unit tests makes it possible to give credit for previously acquired

skills and to assess progress at any point throughout the system. LINC covers the basic minimum requirements for grade 10 and consists entirely of printed materials, though provision is made and suggestions are given for the use of other media depending on the circumstances.

Nova Scotia NewStart's personalized adult basic education uses charts on which the skills considered essential are expressed as performance. Each skill is backed up with material in a learning activity battery. The learner, under guidance, chooses both the materials and the method by which he will achieve the skill. The skills to be learned are similarly chosen, with guidance, to relate to the learner's own objectives.

Evaluation of progress is a co-operative process between the learner and the staff. Once the learner believes he has competence in a particular skill he discusses his achievement with the appropriate staff person; they agree on a rating of the skill, and record this on the chart. The chart thus becomes a record of progress and, with ultimate ratings recorded, eventually becomes part of the diploma.

Alberta and Prince Edward Island NewStart corporations both incorporated adult basic education into broader systems.

Alberta NewStart's program was primarily designed to enable Native families to make the transition from isolated communities to larger centres where there were opportunities for employment. Adult basic education was included for both sexes as a step toward vocational competence.

Prince Edward Island NewStart brought its various areas of interest together into a comprehensive manpower development system of which adult basic education was one component. The nature and amount of training provided for any particular trainee was related to his previous accomplishments, his needs, and his objectives. For the most part, commercially prepared materials were used.

To provide materials with Canadian content and adult orientation for participants in farm management programs, Prince Edward Island NewStart prepared two specific volumes: *Communication Skills for Farmers* by Carol Ann Bower and *Advanced Math Skills for Farmers* by Veronica Soloman.

Basic Literacy Programs

BLADE — basic literacy for adult development — is another product of Saskatchewan NewStart: a packaged plan covering the range from zero literacy to approximately grade 4. It deals with both communication and mathematics and includes a series of lesson units with accompanying audio cassettes, supplementary reading, testing material, and an instructor's manual.

The BLADE program consists of completely new material and incorporates a unique cueing system which enables the beginning reader to

distinguish readily between different sounds even though they may be written with the same letter or group of letters.

Another program, Fluency First, was developed by Saskatchewan NewStart to develop oral competence in English in preparation for learning to read and write the language.

On the basic literacy level, Alberta NewStart produced a series of books known as *English With Ease*. These, designed specifically for people whose native language is Cree or Chipewyan, make use of "pictophemes" which associate the sound of a letter with a familiar object starting with that sound. The vocabulary is developed by starting with the most frequently used sounds and makes allowance for sounds and structures not found in the two Native languages.

Nova Scotia NewStart's functional literacy program follows the same format and pattern as its personalized adult basic education. The chart is much larger, includes more detailed expression of sub-skills, and shows the fundamental linkages between skills.

Prince Edward Island NewStart, attempting to meet the needs of functionally illiterate adults, prepared a set of textbooks on phonics and reading on three levels covering the grade range from zero to six. These texts included word lists, reading selections, and short texts.

Conclusion

Although the NewStart corporations were designated as action research organizations, very little emerged that could be described as definitive findings in the field of adult basic education. Even Saskatchewan NewStart, which produced the greatest body of material in this field, was aware that its evaluative procedures had concentrated on the improvement of its programs rather than on proving how effective they were. Warren and Lamrock, in a paper on evaluation of the life skills course, distinguished between *formative* and *summative* evaluation [36, pp. 148-9]. Formative evaluation is that which "identifies the need for revisions when the opportunities for revisions still exist." Summative evaluation establishes the degree of effectiveness which can be claimed for a program that has been completely developed. The research activities in the NewStart basic education programs, at Saskatchewan NewStart and in the other corporations, were primarily formative.

For the most part, it was the concern of the NewStart corporations to provide basic educational upgrading in a manner appropriate for the disadvantaged adult recipients of the programs. One of the most widely recognized criteria of such appropriateness was the degree to which the programs offered an individualized learning experience. The disadvantaged adult requires individualized programming for several reasons. Firstly, because he is an adult, he needs to determine, by himself, his learning goals and the means by

which he may attempt to attain them. Secondly, the wide variation in amounts of previous schooling, types of out-of-school experience, and natural abilities and inclinations leaves the adult learner in a unique position with respect to academic achievement levels and readiness to learn new basic skills. Thirdly, each adult has his or her own occupational objectives, which will indicate the particular basic skill profile that the person must seek to develop.

Aside from, but related to, the individualization of the basic education process, are several other issues with which the NewStart corporations attempted to deal effectively. One of these is the question of continuous entry and exit of trainees. This was recognized as an important element in upgrading programs, but the shortness of the NewStart experimental period did not permit full development of such procedures. Another issue is the need for adult learners to have clearly defined objectives. That adults can no longer be told by an instructor what they must learn next is obvious. If they are to steer their own course successfully, however, they must be able to conceptualize the abilities which they are going to acquire and understand the ways in which these abilities fit into their over-all self-development goals. In Herzog's words [12, p. 145], "Education does not function in isolation. It is education for a purpose." Because the prime purpose in upgrading the basic skills of an adult is to prepare him or her for employment, these skills must be defined and understood in terms of their relevance to occupational functions. It is however, equally important that the learning goals and activities be expressed in terms which are already familiar to the learner. This is especially valuable in programs to overcome illiteracy in adults. The words and sounds they know and use most frequently are the ones which ought to be learned first.

Herzog, in a summary of his evaluation of the personalized adult basic education system at Nova Scotia NewStart, recognizes the principles embodied in that system and in most of the NewStart basic education programs [12, p. 141]:

> *... it attempts to provide solutions to the criticisms raised about the failure of the standard educational practice. It utilizes a more realistic curriculum based on actual practice; it provides for active rather than passive learning; the system is made accountable to the students in a sense that they are free to choose what they will learn within fairly wide constraints. Implicity, it also proposes a more radical criticism of the present educational system. What is suggested is that the ritual of "credentialism" and the "lock-step" method of certifying success in the standard classroom situation in terms of so many hours of attendance, and based upon teacher evaluation or standardized tests, has nothing to do with the actual requirements of the world of work. If education is viewed as one element in a manpower adjustment system which includes the individual, the employers, educational and training institutions, facilitative organizations such as unions and manpower agencies, and resources for innovation and educational maintenance, then the appropriate approach to learning is not to compartmentalize the student in a rigid educational mold, but to bring the educational resources to the student in a way that makes it possible for him, through his own free choice, to optimize his career path.*

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