DOCUMENT RESUME

ED 062 537 VT 015 074

TITLE	Annual Report (1 June 1966-31 May 1967). Information System for Vocational Decisions.
INSTITUTION	Harvard Univ., Cambridge, Mass. Graduate School of Education.; New England Education Data Systems, Cambridge, Mass.; Newton Public Schools, West Newton, Mass.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
PUB DATE	Sep 67
GRANT	OEG-1-061819-2240
NOTE	106p.
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	Career Choice; Career Planning; *Electronic Data Processing; Information Retrieval; Information Storage; *Information Systems; Job Placement; *Occupational Guidance; *Occupational Information; *Vocational Development; Vocational Education
IDENTIFIERS	*Information System for Vocational Decisions; ISVD

ABSTRACT

Designed to meet the vocational needs of users from kindergarten through retirement, the Information System for Vocational Decisions (ISVD) provides occupational facts and/or data which can be converted into vocational information. This annual report describes the first year of development of a prototype of the ISVD, the completion of which is expected to require over 3 years. Organization and results are reviewed for the three general areas in which the initial work was conducted: (1) development of a computer-based data system, (2) development of a training program in vocational decision-making, and (3) study and assessment of the system. (BH)

INFORMATION SYSTEM
FOR VOCATIONAL DECISIONS

Annual Report 1966-1967

HARVARD GRADUATE SCHOOL OF EDUCATION
NEW ENGLAND EDUCATION DATA SYSTEMS
NEWTON (MASSACHUSETTS) PUBLIC SCHOOL SYSTEM

Annual Report

1 June 1966 – 31 May 1967

September 1967

Harvard Graduate School of Education
New England Education Data Systems
Newton (Massachusetts) Public School System

The work of the Information System for Vocational Decisions is supported by grant no. 1-061819-2240 from the U.S. Office of Education, Department of Health, Education, and Welfare.

"Every man is the architect of his own future."

Appius Claudius Caecus, Aphorism, *from Speeches to Caesar's Senate, ca. 312 B. C.*

Table of Contents

I. The Inception of the Information System for Vocational Decisions

INITIATION

The United States Office of Education and the President and Fellows, Harvard College, entered into agreement as of 1 June 1966 to support and construct the prototype of a computer-based Information System for Vocational Decisions (ISVD). The prototype is to be delivered on or before 1 July 1969, thirty-seven months from the date of initiation.

ORGANIZATION

The Information System for Vocational Decisions (ISVD) is directed by an Executive Committee. (See section on Authority for a list of its members.) Through this particular committee, the ISVD embraces the interests which Harvard University, the New England Education Data Systems (NEEDS), and the Newton School Department have in the construction and field testing of a computer-based, guidance and counseling inquiry system.

OBJECTIVE

The major objective of the ISVD is to improve vocational decision-making through the use of a computer-based training system. The program is to be so designed that the

student can relate knowledge about himself to data about education, training, and work and thereby create a body of information on which he can base his career decision. The entire program links person, computer, and teacher or counselor in such a way that the student can conduct a dialogue with the computer, while the counselor assists in interpreting and evaluating the results of the dialogue.

PROBLEM AS STIPULATED IN PROJECT PROPOSAL

The following statement is quoted in full from the original proposal entitled An Information System for Vocational Decisions, *submitted by D. V. Tiedeman, E. Landy, W. J. Fletcher, A. B. Ellis, R. G. Davis, and E. G. Boyer, Principal Investigators, to the U. S. Commissioner of Education under the provisions of Section 4 (c) of the Vocational Education Act of 1963.*

"... participation in an occupation involves more than training in the specific skills required. Before, during, and even after vocational training the process of *decision-making* must also be involved. Central in decisions about occupations, jobs, or courses of study are facts/data[1] about one's self and about work. Facts illumine and frequently create decisions particularly when facts are given the status of data by inquirers. But decisions also create

1. Occupational facts/data come in two conditions, fixed and modifiable. We therefore elect to adopt the cumbersome term, 'facts/data,' to indicate this fact throughout the report. Occupational facts are directly recoverable without modification except for storage and later retrieval. On the other hand, occupational data consist of facts which must be additionally processed by the numeric and/or linguistic routines of a modifying system. Either unmodified facts or previously modified data need to be further mediated if they are to be turned into information. This is why we refer conjointly to facts/data whenever our connotation is associated with information.

facts. This project therefore provides opportunity to study the interaction of facts and decision, and their subsequent creation of information.

"The proposed ISVD will deliberately play upon a potentially useful distinction between *data* (facts) and *information* (interpreted facts). The task of the information system is to enable the individual to transform data into information. This is to be done by teaching him to interpret the data in the light of his own knowledge, experience, and intention, so that his organization and use of the data represents his own personal relationship to them in the process of decision-making. We presume that only when data are used in this way can they be described as information where the individual is concerned. The information so generated can then, in turn, serve as data in the making of future decisions.

"Given that the quality of decisions is directly related to the kind, quality, and comprehensiveness of the *information* (i.e., data in relation to personal intention) considered by the individual during the process of decision-making, then a fundamental task of guidance is to identify, evaluate, and classify needed information *and to make it readily available to counselors and students in useable forms and at needed times and places.* A second task is to learn how past decisions can be used to create information of value to the students who have made those decisions. We speak first of the provision and display of data, and its transformation into information. When we consider the teaching of decision-making, we will discuss the creation of further information by the analysis of past decisions.

"Guidance workers have had difficulty in providing and effectively displaying data. This is so because the

amount of these data is directly related to the unparalleled rate of change in the technological world, which in turn is rapidly producing basic changes in our society. If we are to prepare students with skills, and attitudes and understandings for a changed and continuously changing future, we must know something of the nature of the changes involved. We must also encourage students to think of vocational planning as a *lifetime* process, not a one-time decision. 'The counselor must think *future* and not experience or he will be of diminishing value to the student of the sixties and seventies' (Wrenn, 1962, p. 20).

"Not only have counselors found it difficult to provide and display data, but the relatively infrequent contact between student and counselor has made the student's interpretation of data largely a hit-or-miss affair. Most students in secondary schools see a counselor three or four times a year at most. Furthermore, the nature of these contacts is frequently governed by a concern for the immediate next decision to be made ("What courses shall I take next term?") and the immediate interest of the student ("I'm interested in science.") The amount and quality of facts available to the counselor at the time of an interview is limited by his own knowledge and his school's resources. And the counselor's usual function is to provide facts for the student at the same time (and frequently without distinction) that he is attempting to get the student to use them.

"What is needed is a system which will provide for the student direct access to all relevant facts without requiring the *direct* mediation of a counselor. This would bring about a change in the counselor's role. Instead of being *both* source and interpreter of facts, he would have the primary responsibility of interpreting the student's *use* of the facts as he transforms them into information. This

would require attention to the role of unconscious motivation, and the effort to help the student transform his tacit understandings into explicit ones. Also included in his role would be training the student in the use of the data system, supervising him in its use, and evaluating the student's decision-making process. Ultimately, it should be possible for the student to use the data system in a relatively independent manner for both exploration and decision-making, with recourse to the counselor only when assistance or interpretation is needed.

"Another important factor in the decision-making process is the student's *'sense of agency,'* that is, his awareness that he is an active agent in determining the course of his own career (Field 1964). We feel that many persons, especially those in economically depressed areas who have been socially and culturally deprived, may lack this 'sense of agency' because of a lack of accurate information about themselves and their real ability[2] to act on their environment.

"This proposal is in part an outgrowth of a study conducted during 1964-65 by John B. Carroll and Allan B. Ellis under contract with the U. S. Office of Education (Contract #OE-5-10-097) (Carroll and Ellis, 1965). The study was undertaken to determine the nature of a possible data bank and the role such a bank should play in the development of a systematic education program for the New England region. A significant conclusion reached by the investigators was that an educational data bank should not be a static storehouse. To be of real value to the

2. Our colleague, Norman Sprinthall, at Harvard tells us that his recent research with Ralph Mosher and John Whiteley strongly suggests that even secondary school students lack conviction that they *have* any choice in and responsibility for their educational and vocational behavior.

process of education, a data bank must be dynamic enough to become a functional part of the education process.

"This conclusion was of special interest to the New England Education Data Systems (NEEDS), which was established in 1963 by the New England School Development Council and which is affiliated with the Harvard Graduate School of Education as well as with 57 other organizations. NEEDS is an effort to bring the technology of data processing to bear on the administrative, curricular, and guidance problems of the schools of New England. A long-term objective of NEEDS is to establish a regional information center for its member school systems so that, as NEEDS grows, a large body of data will be available to facilitate educational research and development efforts in the region. This proposal is therefore designed to take a major step toward the development of such a comprehensive regional information center in the area of vocational education."

II. Theory and Design

THESIS AND ETHIC

The Information System for Vocational Decisions intends to place an inquirer in potentially repeated interaction with a computer-centered environment programmed for his inquiry, not just for prompt reinforcing of stimulus-response contiguity. The context for the inquiries will be education, occupation, military service, and personal and family living. The inquirer may elect at will among contexts. The System will be constructed so as to expect the inquirer to learn how to harmonize his goals and their consequences by means of repeated inquiries in these four important realms of personal activity.

INQUIRY NOT REINFORCEMENT

As noted, the primary goal of the ISVD will be inquiry, not reinforcement. Because our System will intend to put the inquirer in *direct* relation with his evolving history and intentions to the extent that such can be motivated and represented through the numbers, letters, and processing available in computer reckoning, it becomes possible to avoid one of the fears which the public has of using computers in guidance, namely the fear that computers will determine lives by making decisions *for*, not *with*, persons. Our System will let any inquirer experience practically the same joy and frustration which computer dev-

otees daily do, namely the realization that the answer is in them, not in the machine. Despite any inquirer's occasional regret upon such realizations, he knows that he still perseveres. Therefore, the assumption of the ISVD will be that *any* person can and will persevere through inquiry. A further assumption of the ISVD is that repeatedly experienced failure to find full solutions to questions can be fashioned into mature capacity for proceeding on inadequate bases in adult life, as an inquirer is brought to realize the care we used in fashioning a System which can take him down the path of, *but never completely into,* awareness of the operation of his motivational system.

Because of the above conviction, we plan to assemble a System different from that now imagined in computer-aided instruction or in educational data processing. The ISVD will subsume both of these conceptions as *intermediate* in the condition of education for responsible career decisions. However, our own primary professional task will be the construction of a meta-system which permits analysis and response direction in terms of the majority of the variables of this expected responsibility.

Psychologists ordinarily study vocational development as it exists, thereby avoiding consideration of what it might be. The ISVD will do the contrary, namely, focus on vocational development as it might well be. In doing so, we will attempt both to take advantage of vocational psychologists' studies of what vocational development now is and to cultivate the career concept in which we believe. The specific dimensions of vocational development which we will be attempting to augment are:

DIMENSIONS OF VOCATIONAL DEVELOPMENT

1. the placing of occupation into vocational development as but a single instance of vocational expression which can be repeated many times during a life;
2. the offering of responsibility to students and work-

ers for many choices in relation to education, work, leisure, and marriage;

3. the extension of opportunity for occupational choice and preparation down into the elementary grades and out into work until retirement; and

4. the provision of an explicit educational context within which students and workers can be made aware of the value of fantasy, imagination, and preconscious experience for maintaining some continuity in their personality organization and careers, while permitting discontinuity in educational and occupational opportunities to be incorporated into their concepts of personality and career.

The faith of the System will be that intuition disciplined by reason offers the chief "guiding" mechanism for us in our democracy and for man in his vocationalized life.

THE CAREER AND ITS CHOICES IN THE COURSE OF CAREER DEVELOPMENT

The context of vocational decision-making offers excellent opportunity for realizing our intention when the computer is given centrality, but necessary incompleteness, in the interacting system in which career development emerges. We define career as personally-given direction in developing vocational activity. We bind a career by expecting that the exercise of personal intention brings with it accountability for self-directed activity. Therefore, we expect that career development requires the emergence of self-initiated activity for which a person permits himself to be held to account. When persons do so, we can give power to the process of social control by encouraging the *in*dependence of freedom and the *inter*dependence of social consciousness.

CONTEXTS FOR CAREER DECISIONS

Forming a career involves a *set* of decisions which are made throughout life. These decisions are made in the context of education, vocation, military service, and family. The object, plan, and progress of decisions in each of these areas have their own characteristics which we comment upon in the next section. The socially-determined choice contexts in which progress in career takes place are as follows:

Education

There are six primary choice contexts in which educational histories are forged. Each of these contexts also has a subsidiary context which we note. The primary contexts with their subsidiary contexts are:

Choice of secondary school curriculum. The subsidiary choices relate to the *kind* and *level* of curriculum and to the *specification of skill area* within each kind and level.

Choice of post-secondary education. Subsidiary choices in a post-secondary education election include the *kind* and *level* of opportunity. As final choice of post-secondary education nears, a *specific school and/or college* must be differentiated from a more general context. This specific differentiation involves choice as a part of a *post-secondary education placement function.*

Choice of a collegiate major. The choice of college major involves choices of *kinds of majors* and a later differentiation of *potential emphasis* in terms of analysis, synthesis, and/or reduction to practice in the elected major.

Choice of a graduate school. The graduate school choice is *similar in context to the choice of a college* (see above).

Choice of graduate specialization. Specialization in graduate school continues the specification of prior college majors in the several areas knowledge (see above). However, at this time the *emphases on analysis, synthesis, and*

reduction to practice must become clear cut and must be pursued avidly. At the master's level there is likely to be an emphasis on the technology of a subject; at the doctor's level an emphasis on professional activity.

Choices related to the further refining of occupational location by both *job* and *position emphases* within general vocational activity. These job and position choices find interrelation with endeavors organized as continuing education.

Vocation

There are three primary choice contexts associated with vocational development itself. Each primary context also has its subsidiary contexts. The primary and subsidiary contexts are:

Entry job. This choice involves a first choice of *kind* and *level* of occupation. As entry into work nears, the choice must be sufficiently differentiated so that work is initiated in a *specific job.* This differentiation involves occupational choice with the *placement function.*

Job progress. Choices bringing about job progress *initiate the emergence of a career.* If a person attempts to conceive his job movement in a personal historical context in which *he* also conceives his own vocational activity as progression, he initiates career considerations into his vocational development.

Position and career choices. As a person develops a sense of progress in his occupational activity, he begins to focus upon *jobs, not occupations;* then upon *positions, not jobs;* and finally upon *career, not work.* These kinds of choices become salient around midlife if they become salient at all.

Military Service

There are three primary kinds of choices associated with the military service aspect of vocational behavior. These primary contexts are:

Kind of service. The person must differentiate between army, navy, marines, coast guard, and air force.

Level of service. A prime issue at the beginning of military service is the distinction between *enlisted* and *officer* status. Some persons start right off to prepare for officer status. However, in either status, promotion also becomes an issue in its proper time as determined by the regulations of a service.

Specialization. Within enlisted ranks in particular, choice of specialization becomes important. In the officer's ranks, specialization is likely to be present but not stressed to that degree in which it is stressed in enlisted ranks.

Personal and Family Living

There are two primary contexts for choice in the family area. They are:

Marriage. There must be a decision about marriage or not. If marriage is elected, a further decision relates to *when* in life it should occur and/or re-occur. As noted, the marriage context also involves a choice about *continuation in marriage* with divorce being the legal means for separation, termination, and potential reinvolvement.

Family. Style of life in family is also an area in which choice takes place. This area involves choices of *size of family, location of household, culture* with regard to extended family living, and the *balance of time* among work, family, and recreation.

THE SYSTEM

GENERAL FRAMEWORK

The Information System for Vocational Decisions is deliberately named despite the fact that our connotations for its words are not presently entirely a matter of common parlance. The word, "Information," is intended to connote

an inquirer's placing of facts/data into his personal context of use. This use of the word emphasizes our belief that facts/data require the context of use if they are to be conceived as information.

Students and workers are to be permitted to turn educational and occupational facts/data into information through the System by assuming an inquiring attitude. Thus, the user becomes an *explicit part* of our connotation of "System." Our connotation reflects our intention to offer the user complete responsibility in the choice of educational and vocational goals. Although it is probably inevitable that the computer will be blamed for "error," we do not intend to let the users of our System enjoy the luxury of that impression without contest. The contest will be the chief motivational device of the System and constitute the primary context for professional supervision in the System.

The possibility for user determination of data processing in the System will be provided by a time-shared (or time-sliced as some prefer) computer potential. User-computer interaction becomes possible in the time-shared mode of modern large-scale computers. In that time-shared mode, the user (1) can make direct input into the computer under guidance from its predetermined routines, (2) can direct the processing of this input and other stored facts/data, and (3) can determine somewhat the form and content of the output. The speed of modern computers makes it seem as if there were no delay in the user's access to the computer. Actually there is delay, but the trick in establishing the operating computer programs governing the System will be to minimize that delay for the several users who will be in interaction with the computer at the same time. To the extent that delay becomes a factor in our System, the System will not service the needs of the user when

he is exploring. For exploration, the mood being simulated in the interaction must be that of browsing.

DATA FILES

The ISVD will have a data file for each of the previously noted four areas of living: occupation, education, military service, and personal and family living. Data in each file are to range from general to specific in accord with the anatomy of choice in career development which was sketched above. In addition, data will schematically attempt both to represent the present and to outline the future for a decade or so, such outlining to be in small time increments. These specifications obligate the System to deal with overall data on local job markets as well as to incorporate data on specific local job vacancies which will be helpful in making placement suggestions.

The fifth data file in the System will contain inquirer characteristics. This file will be in two parts. One part will deal with the characteristics of inquirers in general and will report on the relationships of these characteristics to the later choices and successes of those inquirers. This file will be used both to suggest alternatives to users who need wider scope for consideration and to subject aspiration to the test of "reality" when the user is in a condition clarifying a preferred alternative. The other part of the inquirer characteristic data file will be the private educational and occupational history of the user as portrayed in the context of the user's developing justifications for his preferences and their pursuit with evolving consequences.

DECISION-MAKING: THE PARADIGM FOR CHOOSING

...lection upon facts/data of the several areas will be encouraged with the expectation that the facts/data will be put to personal use. The personal use to which these facts/data are put will additionally be expected to become guided by a paradigm of vocational decision-making (Tiedeman and O'Hara, 1963). The paradigm essentially conceives decision in relation (1) to the passage of time, and

(2) to the undertaking of the risk and activity required to achieve what one elects to achieve. This conception permits division of the time interval into a period of anticipation and a period of accommodation. Anticipation occurs before the activities of a socially delineated discontinuity become required; accommodation occurs after such activity is required. Stages of exploration, crystallization, choice, and clarification are distinguished within the period of anticipation. Stages of induction, reformation, and integration become possible within the period of accommodation. Distinctions among these stages will be a central part of a MONITOR computer routine in the ISVD.

COMPUTER ROUTINES

Computer routines and supporting materials will be fashioned to conform to the expectation that this vocational decision paradigm both exists and can become explicit and useful to someone who practices its use. The paradigm will delineate but not completely determine the computer routines which we will develop to permit access to each of the data files and to provide data upon request. There will be three *primary* computer routines: REVIEW, EXPLORATION, and CLARIFICATION.

The present operational versatility of the computer does not permit direct simulation of all the periods and stages of the paradigm of decision-making. For this reason, for each choice in career development, the three stages of the period of accommodation will all be incorporated within the REVIEW access routine. The four stages of the period of anticipation in any kind of decision-making can each be more closely approximated in computer simulation. The System will therefore have an EXPLORATION access routine which will presume the modes of exploration leading to crystallization in the period of anticipation. The System will also have a CLARIFICATION computer routine. The CLARIFICATION computer routine will presume

exploration, crystallization, and choice and engage the inquirer in questions of clarifying a previously designated alternative.

The REVIEW computer routine will permit call up and comparison of a prior statement about what had been a then future event both after that expected future event has occurred and after the user has provided an indication of how his prior expectations were fulfilled. The procedure will expect a person to experience insight with regard to consistency and inconsistency available during comparison, and to learn from such insight that his own intuition guides his activity. The intended outcome of REVIEW is that the user learn from his history.

The EXPLORATION computer routine will allow the person to rove through a data file as near randomly as possible. The routine will encourage the use of randomness largely at only general levels of materials in order to conserve time but will not forbid specific exploration if, and when, desired. Furthermore, routines will be developed to suggest alternatives on the basis of comparing personal characteristics with established associations between such characteristics of others and their preferred alternatives. The intended outcome from this routine is the emergence of (1) a set of alternatives, and (2) *the bases on which the alternatives are preferred.* Achievement of the second of these outcomes brings further awareness of the reasoning process which is actually involved in career development.

The CLARIFICATION computer routine will be available after specific alternatives are selected. CLARIFICATION will take the inquirer into queries about the depth of his knowledge concerning the then favored alternatives and the understanding of future alternatives which are likely linked with present preferences. The outcome desired from CLARIFICATION will be the dispelling both

of some doubt and of some ignorance concerning the next step in the progress of career which the person is evolving. Lessening both doubt and ignorance is likely to increase the inquirer's confidence in meeting the activities required by his next step.

In addition to the three primary computer routines, MONITOR will be available as the only *secondary* computer routine. MONITOR will essentially consist of the evaluations which we are able to concoct to determine the mastery of stages in the paradigm of vocational decision-making. For this reason, MONITOR must be able to play back into, as well as over, the computer inputs which the person generates. There will be three essential aspects of MONITOR. The first aspect will be the actual procedure which we concoct and program the computer to provide. The second aspect will be the bases on which we have caused our judgments to operate among the data put in by the person during his interaction with the computer. The third aspect will be the basic computer routines themselves which the person will be taught to use *if and when he desires to have them.* This aspect will make it possible for the user to write his own monitoring bases to some extent and to have these monitoring procedures play among his material just as ours did originally. We hope through MONITOR to encourage mastery of the concept of feedback and to give practice and supervision in its application.

MATERIALS

The computer routines will incorporate the vocational decision-making paradigm. We do not expect that the computer-directive materials will themselves be sufficient to mature fully the capacity and confidence for use of the decision-making paradigm. We will therefore design two other activities into the System in its totality. One of these other activities will be the simulation of decision-making.

Simulation will be available in (1) games, (2) booklets in which the concepts are taught, and (3) decision problems of a vocational nature which must be solved in interaction with the computer.

The second of our other activities which we hope will further mature the use of the paradigm of vocational decision-making will be the actual provision of responsibility for work under laboratory and practice conditions. In laboratory and practice, reality can replace imagination if there is intentful supervision of our users as they practice. This supervision will probably be of the same nature as that employed by counselors with inquirers as they are engaged in the simulated activities of vocational decision-making during the inquirer-computer interactions.

Our materials must be compatible with computer use and must contribute to education for vocational decision-making. We will attempt to make visual and typewritten inputs available to our inquirers under direction from the computer. Oral input must be made with the direct aid of the counselor or after his later review of a tape recorder. On line, oral input is not yet available in modern computers.

We will attempt to make pictorial and word outputs available to our inquirers as well as auditory outputs. The coordination of our input and output modes with the several modes of the decision-making paradigm will test our imaginations to the limits.

CAREER: THE MATURATION OF PERSONAL RESPONSIBILITY THROUGH VOCATIONAL DEVELOPMENT

We have so far attempted to show that the Information System for Vocational Decisions will expect choice and

will cultivate the capacity for and confidence in choosing by giving users almost infinite possibility for the exercise of decision-making among data bases while simultaneously attempting to make the processes of decision-making both explicit and mastered. These are elements in vocational development which have previously neither been unified in this manner nor made available for practice in modes in which complexity is possible but time is not of the essence, at least not the time of persons other than the person engaged in the exercise. The existence of the System will therefore be a first-time physical representation of the "outside" which the person must first learn to bring "inside" and then to act toward knowing that it is there but knowing that he need not be "driven" by it if he is the master of it.

In its totality the System will represent "reality" in its data bases, offer processes for working with facts/data through its primary computer routines, and provide practice for integration of a differentiated condition. The System will provide practice under supervision through (1) its secondary computer routines, (2) its simulation of decision-making, and (3) its personal supervision (a) by a counselor of the person in interaction in the computer routine and (b) by a vocational educator as the student inquirer assumes real work responsibility in laboratory and practice work situations.

The person who through his life comes to master structure *and* process in this way and to come to a comfortable and integrated accommodation to both, has mastered the architectonics of vocational development. He has both developed and been tutored in the capacity to consider his development and to engage in the thoughtful activity which puts the person into development. This is possible through vocational development in which the "myths"

of "others" and "authorities" are available in machines but interactions with their pronouncements are encouraged in ways in which all are eventually disclosed as being only partial and never completely accurate. By offering the person opportunity to come in contact with the best of the known and to grow in realization that the best of the known is still not Truth, it becomes gradually possible for him to realize his own possibilities and responsibilities in representing his desires and aspirations. Through the practice of aspiring in the System, the inquirer first has a "crutch" for the expression and testing of aspiration. It remains for the supervisors of the System to make sure that the "crutch" is later abandoned but that return for data/facts is not denied when they can usefully contribute to later decisions.

We speak of a mature condition in vocational development which is only approximated, never fully attained in all regards with all decisions. However, through patience and practice, persons should be able to achieve more mastery of the processes required for thought in action than is presently the case.

Processes of thought in action mature slowly. This is why the System expects to span a range from elementary school to retirement.

Processes of thought in action require practice and feedback as well as the exercise of imagination. This is why the System starts in imagination but spans reality through simulation of reality and through supervision of activity in real condition.

Vocational educators recognize in their daily activities the need for reality as test for imagination. This is an important reason why the Information System must embrace vocational education. Since vocational education is a form of education in which reality enters into education, it is a

shame to attempt to make vocational education more "general" by sacrificing education for a role under expert supervision while vocational experience is being acquired. Instead, we should attempt to make vocational education more specific to the goal of role incorporation. The vocationalization of preference and activity depends as much, if not more, on education for the understanding of choice and role acquisition as it does on training for occupational skills. Vocational educators would therefore do well first to insure that their colleagues in general education did not forget to train for relevant occupational skills through their "general" curriculum, and second to concentrate their own attention on the socialization processes which are involved in developing understanding in relation to the processes of choosing and role acquisition. Such priorities would (1) place a general goal into the specific interests of vocational educators, (2) make both general and vocational educators accountable for the specifics of vocational education, but (3) still leave vocational educators with an extremely important stake in education for career.

III. Work Organization and Accomplishments

The previous section outlined the theory of the Information System for Vocational Decisions. The actual project activities are not yet fully consonant with the dictates of theory because accomplishments are not yet completely mature. For this reason we have conducted the initial work of the ISVD in accord with three broad areas, each of which consists of two related sub-areas.

DEVELOPMENT OF A COMPUTER-BASED DATA SYSTEM

The first broad area is concerned with *the development of a computer-based data system for vocational decision-making.* The first related sub-area consists of *the collection of data on education, training, and job characteristics and opportunities, and on the persons who will use the system.* (These data are initially only first approximations of the kind eventually to be developed.) This aim has been achieved during the first year of work in the following Areas of the project:

Forecasting Area
Placement Area
Information Area
Inquirer Characteristic Area
Data Files Area
(1) Occupational
(2) Military

(3) Educational
(4) Personal and Family Living
(5) Inquirer Characteristics

The second related sub-area calls for the *development of computer routines (computer programs) and utilization or adaptation of display devices (audio, video, tape, cartoon, film, etc.) which will connect the user, in terms of his personal characteristics, directly with the data so that he can generate information for his use in vocational decision-making.* This aim has been pursued during the first year of the project through work in the Computer Area.

TRAINING PROGRAM IN VOCATIONAL DECISION-MAKING

The second broad area of the project concerns itself with *the development of a training program, or course in vocational decision-making.* One part of this task calls for the *specification and provision of the elements and process of decision-making for individuals of various ages and vocational situations.* This task has been pursued during the project's first year through work in the following Areas:

Decision-Making Area
Vocational Development Curriculum Area
General Curriculum Area
Psychological Curriculum Area.

A second, but related, task is that of *supervised practice in decision-making for inquirers and counselors, using the computer-based data and routines.* This activity has necessarily been given secondary emphasis during the first year of the project. However, a field test of the decision-making curriculum has been carried out and is described in the report of the Decision-Making Area (see p. 49). A project in the supervision of work-study pupils has also been carried out. These aims are focused in the project through work in the following areas:

Educational Organization and Supervision Area
Reporting and Education Area

STUDY AND ASSESSMENT OF THE SYSTEM

The third and final broad area of the project deals with the *study and assessment of the system, its users, and its use.* Since a computer-based system has not yet been constructed, very little work has been conducted in this Area. A very small field test has been provided and a demonstration set of programs has been provided on-line in the computer for test by staff and visitors (these activities are described in the report of the Computer Area, see p. 43). We have not yet, however, provided material for inquirer use.

FORECASTING AREA

Professional Personnel in Area. Russell G. Davis and Richard M. Durstine, Directors; Lynne Fitzhugh, Noel F. McGinn, Laurence Wolff

Summary. The methodological framework for the forecasting of occupational information has been laid, and some initial exploratory calculations have been carried out. Information sources useful to this activity have been contacted and developed.

DEVELOPMENT OF METHODOLOGY

A theoretical foundation based on a conventional industry-occupation matrix approach has been developed in papers by Davis and Durstine. The U.S. Censuses of 1950 and 1960 have been used to calculate size and rate of growth of occupations and industries in Massachusetts. Other such calculations are pending.

INFORMATION GATHERING

The forecasting effort is based on existing sources, primary among which are those prepared by the Bureau of Labor Statistics. Written materials have been gathered from this and other sources and placed in the ISVD library. These now await processing and interpretation as a basis for the development of forecasts.

PLACEMENT AREA

Professional Personnel in Area. Duncan Circle, Director; Edward Landy, David Clemens, Arthur M. Kroll

Summary. Jobs for Youth was founded as a placement program for students in the Junior and Senior High Schools of Newton. A steering committee was formed, a procedure worked out for sharing job openings, and job openings were located and listed. Nearly 100 students found jobs for summer 1967 through this program.

FORMATION OF JOBS FOR YOUTH

The job placement program has adopted the name Jobs for Youth for publicity purposes in the Newton community and the Newton School Department is identified as the sponsoring organization. Funding of the project has been a joint effort of the ISVD, the Ford Grant for improving Technical-Vocational Education in the Newton School Department, and the Newton Division of Pupil Personnel Services.

STEERING COMMITTEE

A steering committee composed of 13 Newton school personnel, representative of all the areas of the school interested in student job placement, has been formed as the central policy-making body of Jobs for Youth. Edward Landy, Assistant Superintendent, Director of Pupil Personnel Services, and a Principal Investigator of the ISVD, is the chairman. An advisory committee of 18 community members has been formed to suggest and advise about community contacts. The chairman of this committee is Mr. Clifford Mosher, a representative of the Newton Chamber of Commerce. The Advisory Committee members have been responsible for much of the community wide publicity available for the project. A news release distributed by the Chamber of Commerce appeared in five area newspapers including the Boston *Globe* and the Boston *Traveler*. Committee members have also concerned themselves with im-

proving students' presentations of themselves in the job interview and with facilitating the exchange of vocational information between students and a wide variety of professional persons.

SHARING JOB OPENINGS

The method of disseminating the job opening information was developed by each of the participating schools within the school system. This includes the junior college, three high schools, and five junior high schools. One person in each school is responsible for job dissemination within that school.

FINDING JOB OPENINGS

In order to locate the initial jobs for students, the job placement coordinator spoke before the major civic clubs of Newton announcing the service of the business community and the students. Letters were mailed to more than 1500 businesses in Newton and surrounding communities. Nearly sixty high school students personally contacted 800 of the most likely employers for the program.

STUDENTS PLACED

The final result has been that 275 job possibilities with a total of 544 positions have been listed with the program. This includes 149 permanent positions and 395 summer jobs. Nearly 100 students have found jobs for the summer through this program. Many other students have indicated that they have been involved in decision-making about job openings by using the information available to them through Jobs for Youth and by comparing these jobs with other openings with which they are familiar, thus fulfilling one of the major objectives of the program.

INFORMATION AREA

Professional Personnel in Area. Arthur M. Kroll and Edward Landy, Directors; David Clemens, Wallace J. Fletcher, James McDade, Robert P. O'Hara, Margaret E. Pincus, Sandra Morse, Eugene H. Wilson

Summary. During the past year, ISVD has collaborated with the Career Information Project in the Newton School Department, a research project funded by the Bureau of Vocational Education of the Massachusetts State Department of Education under Public Law 88-210. The primary goal of this project was to improve procedures for acquiring, classifying, displaying, disseminating, and maintaining occupational information materials.

CAREER RESOURCES CENTER

A central career resources library has been designed and established at the Division of Pupil Personnel Services and Special Education in the Newton School Department, with satellite occupational sectors in each of Newton's secondary schools. Single copies of about 10,000 different documents of occupational relevance have been acquired, classified, and filed at the central library. All occupational materials are classified and stored according to the numerical coding of the *Dictionary of Occupational Titles* (1965 edition).

Modern storage and filing techniques were used, where feasible, to develop increased accuracy and efficiency in the maintenance and retrieval of information. All information has been catalogued and cross-indexed by author and title in reference card files. This project devoted a major portion of its time to acquiring free and inexpensive occupational information in duplicate and distributing it to potential school users.

IBM BIBLIOGRAPHIC REFERENCE FILE

Procedures were developed for transferring bibliographic reference data to IBM cards. Project clerks have verified reference cards with the original documents to insure accuracy of data. Over 8500 references have been keypunched and verified.

BIBLIOGRAPHIC RETRIEVAL PROGRAMS

A program to manage data entry, sorting, updating, and output has been written for the Career Information Project by Mr. Edward Donhowe of the Newton Data Process-

ing Center, under the supervision of Dr. Joel Berg. Donhowe and Kroll have consulted with ISVD programmers to insure that all of this work will be compatible with the RCA Spectra System. Within the Information Area, all expenses for personnel, material, keypunching, and programming have been assumed by Newton's Career Information Project. ISVD is providing computer time only.

NON-PRINT MATERIALS

Although the Career Information Project's major emphasis has been on the utilization of printed materials, the attempt was made to assemble a collection of occupational information in other media. A good sample of available film-strips, records, tapes, and slides is maintained at the career resources center. In attempting to organize, classify, and store these coordinated materials, the project experienced the problem that no storage facilities have been designed to manage audio-visual materials adequately. Although the project staff consulted several major librarians and an educational television station, no breakthrough appears to be emerging in this area of storage/display difficulty.

MATERIAL ACQUISITION AND UPDATING

The Career Information Project staff continues its routine bibliographic research for new occupationally relevant materials as they are published. All commercially available occupational information bibliographic and reference services are regularly searched. Single copies of all newly available occupational materials are acquired, coded, and filed for retrieval. Reference card files are continuously updated.

INQUIRER CHARACTERISTIC AREA

Professional Personnel in Area. David B. Clemens, Director, Allan B. Ellis, Thomas E. Hutchinson, Robert P. O'Hara, Terence J. O'Mahoney, Margaret E. Pincus, David V. Tiedeman, Eugene H. Wilson; Consultant: Paul Lohnes

Summary. Inquirer characteristics are of crucial interest to the ISVD, because of the desire to enable students to look at their own data objectively, and to relate their personal data to information about students like themselves and about people who have done things which they are contemplating doing. The efforts in this area during the first year have concentrated upon gathering a great deal of data which will be useful to the ISVD as it constructs a computer system and needs data to act upon. The data are being collected in a way such that they can be acted upon flexibly, and possibly be analyzed in subsidiary ways which were not anticipated when the data were collected.

Accomplishments in this area include: (1) acquisition of data gathered through the Newton Follow-up Program on (a) two graduating classes and (b) the fall locations of the graduating classes for each of the last thirteen years; and (2) the retrieval of information from the high school guidance department in Newton on the college acceptance experiences of the class of 1966.

FOLLOW-UP STUDIES

The Newton Follow-up Program provides valuable information for many uses planned by the ISVD. Through analysis of the follow-up data gathered from former high school students (including one class which had been out of high school two years and one which had been out seven years), the ISVD will be able to present to inquirers some alternatives which were chosen by people who had characteristics similar to their own. These alternatives may be developed in any one of several vocationally-relevant areas of interest to the ISVD: occupational choice, military service, educational choice, and personal understanding.

The follow-up questionnaire employed was comprehensively designed so that it yields a great deal of data which is relevant to career development inquiry. It has provided educational and occupational histories of the respondents,

factors related to their occupational decisions, and their observations about the high school program as they experienced it. Data turned over to the ISVD by the Newton Follow-up Program covers 1,078 members of the Class of 1963 of Newton High and Newton South High and 954 members of the class of 1959 at Newton High School and Newton Technical High School.* Data from the follow-up studies include both responses to items on the follow-up questionnaire and information taken from the permanent record sheet at the high schools. The information from the permanent records includes the complete mark record for major subjects in grades 9 through 12; the curriculum in which each subject was taken; the rank in the graduating class for each graduate; the latest Otis IQ scores available; and a record of the College Entrance Examination Board scores. This objective information is available for use by the ISVD in developing data about relationships between factors in the student record and future educational and vocational activities.

The Newton Follow-up Program also produced a report on the data gathered each year by the records offices of Newton High School and Newton South High School which indicate the fall locations of the members of graduating classes for the years 1954-1966. A further report indicates the employment information collected by the Newton Technical High School on each graduating class for five years. This report includes the types of jobs held and the relationships of the jobs to the courses of study at the Technical High School.

COLLEGE ACCEPTANCE DATA

College acceptance data are available for eight or more years through the Newton Guidance Department. These data represent the experiences of each graduating class in

* Newton South was not operating in 1959.

being accepted or rejected at the schools and colleges to which they apply. The data are discussed here because they include information from the student record, such as average mark, rank in class, and College Board scores. These data will make it possible for ISVD to generate experience tables based on admission or rejection experience of former students. Data are now being gathered for the class of 1966, using Digitek sheets developed by Clemens and Hutchinson for the purpose. If desired by ISVD, the data for previous classes could be gathered from the studies available from the guidance department.

DATA FILES AREA: (1) OCCUPATIONAL

Professional Personnel in Area. Russell G. Davis and Richard M. Durstine, Directors; Lynne Fitzhugh, Lawrence Lerer, Noel F. McGinn, Robert P. O'Hara, Laurence Wolff

Summary. Three important blocks of occupational data have been collected, and provisions have been made for access and retrieval in intelligible form. This includes the development of a computer program to fabricate job descriptions, and to select suitable job titles based on the inquirer's traits and preferences. The latter has relation to the ISVD MONITOR function. Preparation has been made to further develop the occupational data file through ongoing collection of relevant information and through the careful selection of occupational titles for detailed consideration.

FIRST OCCUPATIONAL DATA FILE

The first occupational data file consists of three main blocks, all of which are in condition for immediate use. Some 40 categories of information on over 850 occupational titles have been collected in the past year, coded onto magnetic tape, and corrected. The second block, containing selected information from the *Dictionary of Occupa-*

tional Titles for some 14,000 occupations, was made available by the U.S. Bureau of Employment Security. It will be used to augment the first block. Finally, "Roe groups" by category and level for some 700 occupations are available on punched cards, courtesy of Professor Anne Roe.

JOB DESCRIPTIONS BY COMPUTER

Specifications for a computer program, now being implemented, have been developed. These show, in detail, how the existing coded information can, for individual occupational titles, be delivered to the inquirer in a readable prose format.

SCRIPT FOR JOB SELECTION

The inquirer will be aided in selecting suitable occupational titles from the data file by a script that sorts the contents of this file according to his stated preferences. This script exists in full detail and is now being readied for the computer. It will serve as a link between this data file and the MONITOR function.

CHECKLIST FOR SELECTION OF JOB TITLES

A carefully selected list of job titles for future use by the Occupational Data File was prepared using a full range of conventional sources. This list was prepared in a way such that additions or deletions can readily be made as the contents or currency of the sources change.

INFORMATION GATHERING

An extensive library of quantifiable information about Occupations has been prepared. Suitable contacts in both public and private organizations are maintained to keep this file up to date.

DATA FILES AREA: (2) MILITARY

Professional Personnel in Area. Richard M. Durstine, Director; Russell G. Davis, Laurence Wolff

Summary. Basic information for the development of the military data file has been obtained.

DEVELOPMENT OF BASIC SOURCES

Visits have been made to key personnel in the three major military services. With their help, written information useful for the development of a military data file has been identified. This information has been requested from the appropriate authorities.

DATA FILES AREA: (3) EDUCATIONAL

Professional Personnel in Area. David B. Clemens, Director, Arthur M. Kroll, Lawrence Lerer, Robert P. O'Hara

Summary. The significant events in this area during the year include: (1) the provision of educational follow-up data for graduates of Newton and the construction of filing procedures so that new inquirers can learn about the plans and something of the histories of their predecessors; and (2) the study of schemes for collecting and using data on institutional characteristics.

FOLLOW-UP DATA

The material in this data file has been reported in the section where the follow-up studies are described.

INSTITUTIONAL CHARACTERISTICS

The ISVD hopes to be able to aid students in locating schools or colleges which possess characteristics in which they are interested. The follow-up data will be able to aid in this process in a way which is not now available to most students, in that it will provide locally relevant data on the student's chances for admission to the schools in which he is interested. There are many aids to the location of colleges with selected characteristics available on the market. These identify colleges according to such characteristics as size, location, type, cost, student body, majors offered, etc. Also, the Educational Testing Service (ETS) has a "College Suggestor" which is in the public domain. The ISVD has investigated these systems and could use one or another of these college locators or develop its own, if desired. It will improve on the commercially available

plans in two ways: by providing locally relevant information on a person's chances for admission, and by adding data on schools of less than college level, which are not included in the plans now on the market. Non-college educational alternatives will be partially covered by the last-mentioned group of data and will be expanded by providing a body of data on educational opportunities in the armed services and on-the-job training provided by employers.

DATA FILES AREA: (4) PERSONAL AND FAMILY LIVING

Professional Personnel in Area. Charles E. Gunnoe and David V. Tiedeman, Directors.

Summary. The ISVD intends to bring personal and family decisions into the work and personality harmonizations which become accessible in self development by virtue of awareness of decision-making. However, the development of this Area depends upon prior developments in the decision-making, vocational development, and general curriculum areas. Therefore, no specific accomplishments have been forged in this area during the first year.

DATA FILES AREA: (5) INQUIRER CHARACTERISTICS

Professional Personnel in Area. David B. Clemens and Thomas E. Hutchinson, Directors; Robert P. O'Hara, Terence O'Mahoney, David V. Tiedeman

Summary. Inquirer characteristics which are to be available in statistical form in order to give historical statements to new inquirers have been reported above in the section on the Inquirer Characteristic Area (p. 29). In the

area itself we indicate those accomplishments which relate to the provision of an inquirer characteristic data file on an individual basis. The data from this file can, of course, be the primary data for summaries in the Inquirer Characteristic Area. However, not all individual data will be made available to inquirers on a general basis. In this subsection, we particularly stress these kinds of data.

The accomplishments in this area during the year include: (1) the coding and entry onto tape of student record data for all 1966-67 students at the Bigelow Junior High School and the retrieval of student record data for students at Newton High School who attended the Bigelow Junior High School; (2) a study of the testing and self-concept index needs of the project; and (3) a preliminary specification of an inquirer characteristic data file and of its use in the access routines planned for the ISVD.

STUDENT RECORD DATA

In addition to the follow-up data, there are two other sources of inquirer characteristic data which are being taped for ISVD use. One is the current records of students in the schools with which the ISVD is involved. The other is data available from the high schools about the experiences of the senior classes in college admissions. Student record data have been gathered at the Bigelow Junior High School for all students attending the school during the academic year 1966-1967. A Digitek form was designed to receive this information and enter it onto tape. The information gathered included yearly marks in the major subjects and term marks for ninth graders; third, sixth, and eighth grade IQ scores; sixth and eighth grade STEP scores; a summary of the sixth grade teacher's ratings; and vocational plans as expressed by the student in the seventh grade.

Work has recently begun on retrieving information from the student records of students at Newton High School who went to Bigelow Junior High School. All high school stu-

dents (sophomores, juniors, and seniors) at Newton High (no Bigelow graduates attend Newton South High) during the academic year 1966-1967 are being included in this work. Clerks are making copies of sheets in the cumulative record folder which include information of interest to the ISVD. This includes the elementary student record card, which contains basic identifying and family information plus teacher anecdotal comments for grades K-6; the final teacher's report for the sixth grade; the secondary student record card, which contains junior high school marks, teachers' comments, and information from the student himself on such things as work experiences, interests, and vocational plans; the test record cards which contain scores for all city-wide standardized tests taken by the student; the high school form "educational and vocational record" which is filled out by the student each year; high school mark reports; and any other forms which contain information which might be of interest to the ISVD. When these copies are available to the ISVD, Digitek forms will be developed to transfer the information onto tape.

TEST SCORES AND SELF-CONCEPT INDEXES

A preliminary survey has been made of the several test score needs of the project. This listing is not yet final and cannot be so until the "building-block" scripts mentioned under the Vocational Development Curriculum Area (p. 53) have been crystallized.

A survey was also conducted in relation to the self-concept indexes which will be a part of the project. Gribbons's Vocational Readiness Planning index and O'Hara's Self-Concept Index are to be a part of the inquirer characteristic data file. Other scales developed by Crites are also under consideration.

PLANNING THE DATA FILE

Test score and self-concept specifications were provided in order to get some tentative estimate about the size of the inquirer characteristic data file which will be needed. At

the present time these estimates are very general and subject to considerable change. Preliminary consideration has also been given to the intermediate and semi-permanent forms of inquirer responses which must be saved in order to make System use of the Tiedeman-O'Hara paradigm of vocational decision-making.

COMPUTER AREA

Professional Personnel in Area. Allan B. Ellis, Director; David Archibald, Peter Christie, Wallace J. Fletcher, Charles E. Gunnoe, Barbara Howley, Thomas E. Hutchinson, Lawrence Lerer, Roy E. Norris, Jr., Terence J. O'Mahoney, Margaret E. Pincus, Richard A. Roman, Thomas E. Swithenbank, Ann W. Taylor, Charles S. Wetherell, Barbara L. Zurer. Consultant: Calvin N. Mooers, Sub-contractor: Computer Associates.

Summary. The general areas of activity and accomplishment in the computer area during the first year of this project include: (1) analysis and acquisition of equipment; (2) exploration and preliminary development of computer software; (3) creation of an on-line demonstration package; (4) investigation of certain research questions.

Analysis and Acquisition of Equipment

TERMINALS

The first mechanical device the computer area acquired was a model 33 KSR teletypewriter, used from July 1 through autumn, 1966, for access to the time-sharing system of System Development Corporation (SDC) in Santa Monica, California. A second piece of equipment, an IBM 1052 keyboard/printer, was added that summer to provide similar access to the time-sharing computer at the Massachusetts Institute of Technology. In mid-winter we discontinued our link to SDC, and the three teletypewriters which we had acquired by then were used (along with the 1052) solely for access to M.I.T. The addition of four teletypewriters

in late spring, 1967—one connected to the Harvard Computing Center's SDS 940 computer—brings our present total of computer-connected terminals to seven.

HARDWARE SPECIFICATION

A study of the computer hardware capabilities needed by the project for large scale storage, quick retrieval, computation, and on-line access, produced the following general specification:

CORE—Approximately 130 K bytes

AUXILIARY STORE—20-50 million characters, 100 ms access

CPU—Capable of communications, full computation, with such features as memory protect, interrupts, and floating point arithmetic.

OTHER HARDWARE—Four tape drives
Card reader/punch
Printer
Operator inquiry station.

COMMUNICATIONS—Hardware need for communicating with remote terminals.

SOFTWARE—Multiprogramming, time sharing Control Program, with FORTRAN IV or ALGOL language capability.

CONSOLE—As much flexibility as possible in media of display.

COMPUTER SYSTEMS CONSIDERED

Based on this general set of specifications, we investigated the products of a number of computer manufacturers including IBM, Burroughs, RCA, Control Data Corporation, General Electric and Honeywell. While several general purpose, third generation computers met these specifications, the price of renting such machines (anywhere from

13 to 19 thousand dollars a month) was considered beyond the reasonable limitations of our budget.

The IBM System 1500, the smallest computer proposed by any of the manufacturers we contacted, has a price closer to our hopes and, therefore, was given careful and extensive consideration.

While the IBM System 1500 appeared, at first glance, to be the computer best suited to the ISVD project, on close inspection a number of serious limitations became evident —suggesting that in spite of its good features the 1500 was inadequate for the job. System 1500 provided a console which permitted keyboard or light-pen input and audio, film strip, cathode ray tube, and printed output. This console was by far its outstanding feature, particularly in view of ISVD's concern for providing occupational information to the student through every available medium. Another desirable feature was Coursewriter, a computer language designed to facilitate programmed instruction by computer, which would be useful in the production of guidance "scripts" by ISVD staff. It was true that our programmers would have needed to make additions to Coursewriter for it to be useful for our application, but if this had been the only limitation to the System, it would hardly have stood as an argument against our adopting the 1500 as ISVD's computer.

A number of other, more severe, problems existed with this machine, however, which made it unwise to consider it for the project. First, all the consoles were connected to a single cable whose length could not exceed two thousand feet, requiring, therefore, that they must all be clustered in the vicinity of the central processing unit of the computer. The only plausible solution IBM offered was unnecessarily expensive ($4,000 a month, plus computer rental) and required a piece of equipment which would not be available

until mid-1968. The project's alternatives were either to bus students to the project site or to locate the 1500 at Newton. The latter alternative would still not provide the needed convenience of access, and would require the programming and operations staff to move to Newton.

Although the Coursewriter language provided by System 1500 was useful to ISVD, it was by no means either sufficiently valuable or powerful to be the major programming language of the project. Yet, the 1500 had Coursewriter as the primary interacting language of the system along with an as yet undocumented ancillary language called MAT. These were not the sophisticated programming languages needed to do the kinds of analysis envisaged by the ISVD staff.

Compounding this software limitation was the restricted size of storage of the 1500. Sixty-five thousand characters of memory and about four million characters of on-line auxiliary storage was the maximum fast access storage available. While the disk packs were removable, this was not good enough since at any one time, only 1/10 to 1/20 of our total data could be on-line unless tapes were used, in which case search time would become excessive. These restrictions in console location, programming power, and storage hit the project in three of its most sensitive areas.

Whereas there seemed to be no immediate way out of the console-distance problem for the 1500, the two other limitations could be removed, it was suggested, by connecting the 1500 to an IBM 360/40 or /50 using transmission control devices, telephone lines, and special adapters and other equipment. Some objections came immediately to mind. For example, if we were to lease both computers, the *monthly* cost would be about $23,000 for equipment alone. Further, since we would have one computer connected to another, there would be extra software problems to be solved

before the Project's programs could operate. While the prospect of such a connection was interesting from the point of view of computing people, it posed problems which ISVD needed to avoid. IBM estimated that the software would take one man-year to produce and that they would not support this effort.

Leasing the 1500 alone would cost $11,000 a month, requiring, then, that time on a 360/50 be purchased from the Harvard Computing Center or some other agency. Norman Zachary, the Computing Center's Director, was quite encouraging in suggesting the availability of one of his machines. This was the most realistic proposal for ISVD to get the added power it needed to use a 1500. If we wish to design a prototype which others will be able to use with minimum effort, however, it was questionable that a system requiring two expensive computers was consistent with this wish.

The conclusion to which all these hardware considerations led is that ISVD, instead of leasing its own computer, should rent time on someone else's computer.

HARDWARE ACCESS

Of the many dangers one faces when renting computer time, the two biggest for ISVD are (1) that the project's time schedule, priorities, flexibility, and scope be constrained or shaped by outside forces; and (2) that since the project would thus be a participant in an outside generalized time-sharing system, the product would be prototypic only with regard to content and not to software. Protection against both these dangers rests in having sole access to someone else's computer, but on a part-time basis. That is, if we could rent a computer, not just computer time, for, say, four hours a day, to use as we wish, the problem of budget would be met without any substantive compromise. Of all the agencies—university computing centers, service bureaus, experimental projects, and the like—who might

provide computer access to ISVD, only the New England Education Data Systems (NEEDS) is able or willing to offer the type of access we need.

Our present plans, therefore, call for the implementation of the ISVD system on an RCA Spectra 70/45 to be housed at NEEDS as of September 1967.

Exploration and Preliminary Development of Computer Software

EXPLORATION

A major part of the first year of this project was devoted to exploring existing computer programs and techniques which conceivably might be useful to our software development. The specific programs examined and tested centered around the areas of natural language processing (ELIZA, QUEST, PROTRAN, The General Inquirer), data retrieval (DSR, LUCID), educational materials presentation (PLAN-IT, COURSEWRITER), statistical analyses (MSA, F2-STAT, SSP), applications (AUTOCOUNSELOR), computer languages (JOVIAL, TRAC), and the like. A description of these and other programs is provided in Technical Memorandum: 1.

TRAC

Following this exploration phase of our activities was the implementation of TRAC (for Text Reckoning And Compiling) in order to test our first impression that it should be the primary language of the System. TRAC as specified by Calvin Mooers in "TRAC, A Text Handling Language" which appeared in the *Proceedings of the ACM, 20th National Conference*, was implemented on the M.I.T. computer. As a result of initial tests of TRAC's usefulness to ISVD, two types of changes in the language were envisaged. The first consisted of adding primitives to facilitate certain operations peculiar to ISVD; the second consisted of building a statistical capability into TRAC by forming primitives from the statistical operations of Albert Beaton's F2-STAT.

MINORCA .5

Two major conclusions were drawn from our exploration of existing instructional languages: (1) it is not possible

to lump all of these programs together and merely input data; and (2) it is not reasonable to conceive of our software system as a set of specially designed computer programs, performing functions similar to those we explored, which are linked together or called up by the user at appropriate times.

In view of these conclusions it is appropriate to conceive of a new, specially designed computer language whose general characteristics are such that:

a. it provides the means to describe the desired algorithms;
b. it is sufficiently non-technical and uncomputer-like to facilitate the description of such algorithms by people who are not computer specialists;
c. it provides all the capabilities that existing CAI languages have;
d. it has extensive retrieval capabilities;
e. it has a natural language question and answer system;
f. it has a multivariate statistical analyzer;
g. it has a source level file descriptor.

In this regard, the preliminary specification for a language called MINORCA .5 were stated, and discussions were held with members of the project to insure that the language would provide for their needs. From that point, one of the major efforts of the computer area has been to implement this preliminary version on the MIT time-sharing system. While far from ideal, rudimentary versions of MINORCA go well beyond what would otherwise be available. We expect that the capabilities of MINORCA .5 in its final state will be sufficiently powerful to meet all of the needs of the project.

Demonstration Package

During the year, members of the computer staff felt that it was necessary to demonstrate some of the potentials of our

future system. The demonstration package implemented on the MIT CTSS system was not designed as a prototype of any kind. It was designed to show outsiders examples of what ISVD is doing in terms of materials, to allow script writers to analyze the content, flow, and branching of scripts, and to show examples of computer staff members' ideas on the structure of the system.

The demonstration package is composed of four components: scripts, a test, a preliminary version of a script-writer language, and an occupation description data base.

SCRIPTS

Three of the scripts included are: (1) a script which deals with exploration of occupational choice and knowledge (the Aylmer Script); (2) a script which deals with exploration of the Roe categories (the Roe Script); and (3) a script which deals with educational requirements (the Lerer Script). In addition to these three, a script dealing with choice or preference of occupational characteristics (Durstine's Script), and a script which describes occupations (Wolff's Script) were also implemented. Each script branches to one or more of the others.

A TEST AND A SCRIPT-WRITING LANGUAGE

The McSherry and O'Hara *Test of Occupational Knowledge* was implemented both to study the feasibility of on-line testing and also to act as the beginnings of a MONITOR system. A rudimentary form of MINORCA was implemented to allow script writers to write a script on-line.

OCCUPATION DESCRIPTION DATA BASE

For the purposes of further experimentation and demonstration and further specification of the data file system of the computer, it was decided to have a small data base consisting of ten occupations. These occupations were selected on the basis of maximum intersection between McSherry and O'Hara's one hundred occupations (from the *Test of Occupational Knowledge*), Roe groups and levels, and Durstine's and Wolff's materials for the occupational data file. The facts for the occupations in this small occupational data

base were implemented so that they can be retrieved in compatibility with Durstine's Script and Wolff's Script. With this material implemented we can now ask such questions as "Does the script provide enough information about each occupation?" "What additional information should we provide?" "Is there any information that we don't need?"

The demonstration simulates two situations: (1) the user going through the system for the first time; and (2) the user having already been through the system at least once.

If the user is going through the system for the first time, he is presented with an introduction to the demonstration and to the ISVD. He is then presented with a choice of three activities: he can write a script in MINORCA, take the McSherry-O'Hara *Test of Occupational Knowledge*, or go through the scripts.

If it is not the first time he is going through the system, the user can get a summary of his previous interaction with the computer if he so desires. He can then either continue where he left off or repeat his previous activity in order to change his responses.

Research Related Activities

During the past year, the computer area has engaged in a number of research related activities. Among the problems studied were: the question of on-line testing and the use of tests in the ISVD; the question of student expectations and assessment; a test of occupational preferences in terms of self-concept; an analysis of the data base problem; and a study of console configurations.

ON-LINE TESTING

The McSherry and O'Hara *Test of Occupational Knowledge* and its scoring key were implemented on the MIT CTSS system in order to study the feasibility of on-line testing. Some of the issues under observation were: student reaction to taking a test on-line, machine response

time, and cost. An informal console experiment using this test was performed to determine what the basic issues would be if a more formal experiment were performed. Four Newton High School students, two boys and two girls, came to ISVD to take the test.

After the students had taken as much of the test as they wanted, interviews with them suggested that it does not seem advantageous to continue at this time with plans for the more formalized experiment. From this sample of four it was found that: (1) the computer response time was much too slow; (2) the chair was uncomfortable; (3) there was some degree of nervousness; (4) in general, the experience was fun. Most of these responses had been anticipated.

At the present time, there is no way to control the slow response time. On the present MIT hookup, the computer will continue to be slow. As for the attitude towards taking a test administered by the computer, the feelings expressed by the four students would most likely continue to be expressed by others merely because of the novelty of the situation. Therefore, we will wait until ISVD is connected to the RCA Spectra 70/45 before continuing with any other feasibility studies. At that time, such a test will be part of the prototype of the on-going system.

The computer area has been studying a number of tests, among them the Kuder *Vocational Preference Record*, the *Differential Aptitude Test*, the Kelly *Role Repertory Test*, the McSherry and O'Hara *Test of Occupational Knowledge*, and Gribbons's *Readiness for Vocational Planning*. These tests are particularly relevant to ISVD purposes and their study by the computer area is to find out the feasibility of putting them on-line.

Activity in the self concept area has so far been minimal. E. Wilson utilized O'Hara's nine point self rating

scale in the decision-making program at the Bigelow Junior High School. Students were asked to rate themselves on twenty-one characteristics which are related to career development. They were asked to compare themselves with others, and to rank those elements that were most important to them. These materials will become a part of our data base and be used as part of the Inquirer Characteristics information system. They will be compared with test scores as far as this is possible.

STUDENT EXPECTATIONS AND ASSESSMENT

Hutchinson has been working on a MONITOR access routine which will permit the inquirer to specify certain limits on outcome effects in relation to his presence and success in various kinds of groups (such as occupational groups). The routine will provide a report which gives the implications of a specific selection for the student's possibilities, in view of his personal characteristics. In addition, Hutchinson has made arrangements through Project TALENT to get data which will provide a preliminary operational demonstration of the procedure.

TEST OF OCCUPATIONAL PREFERENCES

O'Mahoney has developed a paired-comparison, picture test of occupational self concepts. The inquirers are first required to go through all the pictures one at a time and to specify the dimensions they attribute to people in certain occupational settings. Then, using a paired comparison technique, the test measures self concepts, ideal self concepts, and vocational self concepts in terms of these dimensions. Hopefully, the console unit will make it possible to present the pictures singly as well as in pairs. The General Inquirer will be adapted to process the dimensions from the inquirer responses to individual pictures. Finally, the responses to pictures in pairs will be processed to give the pictures scaled values in the several dimensions of the inquirer's immediate vocational self-concept.

ANALYSIS OF THE DATA BASE PROBLEM

There are two main problems associated with the data bases: (1) the content of these bases; and (2) their structure. The first problem is not included in the computer area's activity; the second definitely is. Before designing a structure for the data files, however, it was necessary to discover approximately what data they will include. With this question in mind, members of the computer area met with members of the information area to discuss the content of the data bases. Analysis and examination of the data provided by Durstine, Wolff, and Clemens was conducted; then work began on the structuring of the data files. Two main questions were raised: (1) What do you want to get out of any of the data bases; and (2) what do you want the student to get out of them.

At this point, a firm called Computer Associates (COMPASS) was hired to serve as consultants to the computer area on a number of problems, particularly file creation and data management. Upon approval of a subcontract by the Office of Education, staff members of COMPASS were given time to familiarize themselves with us and our literature. After that time, a series of meetings were held with members of the computer area and COMPASS for the purpose of working towards a description of Prototype I. We talked first about some of Tiedeman's general goals, so that whatever Prototype I becomes, it will have a built-in capacity for expansion. Because NEEDS has kept a data bank which includes some student characteristics of their member school systems, it is desired that COMPASS work in conjunction with NEEDS and ISVD to form a common overlapping file.

EXAMINATION OF CONSOLE CONFIGURATIONS

Conversations were held between members of the computer area and the rest of ISVD concerning their perceptions of the ideal student-machine interaction. This model of man-machine interaction is necessary in the development of the

computer system for Prototype I and in the development of the subsequent software. It is also very necessary to know this model when talking about possible console configurations.

As a result of these conversations, it was recognized that every effort should be made to include keyboard, audio, CRT display and hard-copy print-out components. In addition, we became involved in a survey of some selected audio-visual materials available for possible inclusion in scripts to be prepared in the immediate future.

DECISION-MAKING AREA

Professional Personnel in Area. Eugene H. Wilson, Director; Robert Aylmer, Nancy Blackmun, Patrick F. Ferrone, Diana J. Kronstadt, Dorothy Kunberger, James McDade, Robert O'Hara, Terence J. O'Mahoney, and David V. Tiedeman; Sub-contractor: Abt Associates

Summary. Activities in this area have fallen into three major categories: (1) development and pilot testing of a curriculum unit on decision-making in the ninth grade at Bigelow Junior High School; (2) gaming and simulation, for which a sub-contract has been let with Abt Associates and in which ISVD activity is resuming; (3) development of the concept of an ISVD curriculum, which will move from planning to implementation during the summer.

DEVELOPMENT AND PILOT-TESTING OF A CURRICULUM UNIT ON DECISION-MAKING

54

During the summer of 1966 Ferrone wrote the first draft of a booklet for the teaching of decision-making. In the fall and winter, 1966-67, this first draft was expanded by Wilson and Kronstadt into a booklet of four chapters called *You, the Decider*. The booklet represents the first attempt to reduce the Tiedeman-O'Hara decision-making paradigm to the language of ninth grade students.

The booklet itself was only part of a unit on decision-making designed to be taught by ninth-grade English/social studies teachers for 16 class periods at Bigelow Junior High School in Newton, Massachusetts. Other materials included catalogues of course requirements from Newton High School and kits of occupational information. A series of weekly workshops involved the teachers and counselors in the planning of the unit with ISVD staff members.

In order to evaluate the unit, a series of test instruments were adapted or developed. Gribbons's *Readiness for Vocational Planning* was originally developed as an individually administered structured interview. For ISVD's purposes it was adapted to a paper and pencil, group administered instrument. The original intent of each of the 47 questions was maintained, however.

O'Hara's "Vocational Self-Concept Index" was changed into an instrument called the "Self-rating of Abilities, Interests, and Values." It consists of an interpersonal rating (comparison with others) and an intrapersonal rating (self-rating) on each dimension. The dimensions include all ten *Kuder* scales, the Allport-Vernon-Lindsey *Study of Values* scales, five of the *Differential Aptitude Test* scales, and the general concept of "Intelligence."

A "Student Evaluation Sheet" was prepared which allowed each student to express his opinions about the decision-making unit, and tested his comprehension of the language of decision-making as taught in the unit.

A "Basis for Choice" sheet was developed to help students make their criteria for choice explicit. The sheet allows a student to specify what factors were considered in a given choice and to weight the factors to indicate their relative importance to him. This process is seen as potentially valuable as part of the MONITOR routine in which a his-

tory of an individual's criteria for choice may be accumulated for subsequent evaluation with him.

After the decision-making unit was taught, a project report, "A Task-Oriented Course in Decision-making," was written to explain the rationale for the unit. The testing instruments used in the unit are currently being evaluated with the results planned for publication as a technical memorandum in the near future.

GAMING AND SIMULATION

One of the first efforts of the staff in this area was to study the possibility of embodying the Tiedeman-O'Hara decision-making paradigm in a game-like activity. Many games were studied and the general structure of a decision game was developed before this activity was halted to allow for work on the curriculum unit described above.

In connection with our activities in simulation, a subcontract was negotiated with Abt Associates, Cambridge, Massachusetts, for the development of a simulation of the decisions involved in the career of a machinist. This work will be completed by July 31, 1967.

We are also carrying on supplemental activities to those of Abt Associates within the ISVD itself. Eventually we envision a group of such simulations which will allow a student to experience the meaning of decisions about work under low-risk conditions just as we plan to allow him to experience the effect of educational decisions.

DEVELOPMENT OF THE CONCEPT OF AN ISVD CURRICULUM

During the summer of 1966, Blackmun made a preliminary study of existing curriculum materials in Newton. Concentrating on social studies curriculum guides for the elementary schools, she searched for existing materials dealing with concepts related to work, occupation, vocation, career, decision-making and so forth. The logical extension of her work would produce a "map" of the curriculum revealing the whereabouts of such relevant concepts. These extensions have been carried out during the 1966-67 academic year as reported by the General Curriculum Area below.

Another activity revealed the disquieting fact that much occupational literature is written in language which is too difficult to be read by workers entering the occupations. McDade studied the readability of the *Occupational Outlook Handbook* and the *Occupational Exploration Kit*, which refer to about 1,000 occupations. His findings showed that in most cases the readability of the literature was two to six grade levels above the average reading ability of students for whom the literature was intended.

As the ISVD staff became aware of these findings the conviction grew that the ISVD curriculum would have to fit into the existing curriculum in a complementary fashion, and that all ISVD materials would need to exist at more than one level of readability. Where occupational literature does not exist at appropriate readability levels, it may have to be generated by ISVD or by other sources.

With this background, staff members have continued to study the curriculum problem. During the winter several "scripts" were written for the computer area as demonstrations of the types of machine-student interactions ultimately to be expected. It is now planned to employ approximately thirty teachers and counselors during the summer of 1967 in the writing of actual script materials.

To provide meaning for these script writers and to generate a list of script titles, a taxonomic classification system for the content areas was developed. It is discussed in detail under Vocational Development Curriculum Area below.

VOCATIONAL DEVELOPMENT CURRICULUM AREA

Professional Personnel in the Area. Robert P. O'Hara, Director; Robert Aylmer, Wallace Fletcher, Charles Gunnoe, Diana Kronstadt, Dorothy Kunberger, Lawrence Lerer,

James McDade, David Tiedeman, Eugene Wilson; Consultant: Warren Gribbons

Summary. The accomplishments in this area include: (1) the creation of a plan for the construction of a vocational development curriculum; (2) the development of a classification system as a context for script titles.

PLAN FOR CREATION OF VOCATIONAL DEVELOPMENT CURRICULUM

Originally, Tiedeman, Gribbons, and O'Hara had worked on this material in isolation. However, the entire guidance staff has now become involved in the preparation of the vocational development curriculum. We are attempting to develop a taxonomic classification system as a context for and generator of script titles. This is an effort to clarify the entire content of the computerized system, so that each script may be seen in some logical relation to other scripts in the system. The choice contexts enumerated in "The Career and Its Choices in the Course of Career Development" (p. 9) above, will provide the overarching contexts for these scripts.

We are presently calling the first level of script writing "the building blocks." For the most part, these will be straight computer-assisted instruction kinds of scripts which will teach students about the various elements involved in the career development process.

The second level of script writing involves the development of linkages among the building blocks. The number and variety of these is very great. The linkage scripts depend upon the prior existence of "building block" scripts.

Finally, the third level of script writing is the MONITOR level which permits an analysis, in terms of the Tiedeman-O'Hara paradigm, of the manner in which the student is interacting with the system.

58

GENERAL CURRICULUM AREA

Professional Personnel in Area. Lawrence Lerer, Director; Wallace Fletcher, Charles E. Gunnoe, David V. Tiedeman

Summary. The accomplishments in this Area during the first year include. (1) the completion of a tentative Career Development Program conceived as a "common curriculum" resource available to all, with direction, clarification, skill development, and progress in elected directions facilitated (a) by general instruction in the art of choosing, (b) by application and further instruction in that art in the specific context of career development, and (c) by reality testing; (2) a survey of the "shop" and "related area" components of Newton Technical High School curriculum to identify (a) specialized "vocational education"—vocational skill linkages, (b) general vocational education-vocational skill linkages, and (c) academic curriculum-vocational skill linkages; (3) the establishment of contacts with industries in developing education-vocation linkages and as follow-up of specialized vocational education programs; (4) the initiation of a report, growing out of the doctoral project of Lerer, concerned with the theoretical framework of the laboratory/experience instructional mode within the context of the "common curriculum."

CAREER DEVELOPMENT PROGRAM

After the completion and issuance of "Toward a Language of Supervision—Part A," which provided a beginning statement of a theoretical framework for the supervisory mode, "A Tentative Career Development Curriculum and Its Implications for the Patterning of Supervisory Responsibilities in the Information System for Vocational Decisions" has been completed and will be issued as Project Report #10. Incorporated in this paper are some curriculum notions applicable to the development of a broad Career Development Program. Following the presentation of the Career Development Program (developed in cooperation with a similar program identified with the Career Development Project, Philadelphia Public Schools, Pa.) at an all day curriculum conference, a working paper was prepared which

included major elements of such a "common curriculum," suggested units, lessons, and "scripts" for inclusion and articulation with the Vocational Development Curriculum of the System.

There has been continued close involvement with personnel of the Decision-Making Curriculum, the Vocational Development Curriculum, and the Psychological Curriculum Areas to facilitate articulation among all curriculum development areas. The Career Development Schema as presented in Project Report #10 is not fully clarified at present. However, a first approximation has been made to facilitate further exposition of the process and technique of "script" preparation and supervision implied within the ISVD.

NEWTON TECHNICAL HIGH SCHOOL SURVEY

In attempting the development and examination of a general curriculum, ISVD conducted a survey of Newton curricula. During the summer of 1966, such a survey of the instructional bulletins and courses of study was begun, followed by an examination of curriculum offerings at Newton Technical High School, in an attempt to determine those elements that explicitly attempt to "socialize" pupils into the "world of work." Careful examination of courses of study of each of the eight shop areas at Newton Technical High School and a series of interviews with the Director and each of the shop teachers resulted in the issuance of an Interim Report for presentation at the staff conferences held January 3 and 4, 1967. To this report, lists of specific skills for each shop area have been added, as well as job lists prepared by teachers of each of the shops. These job lists have been translated into the numerical and arithmetic vocabulary of the *Dictionary of Occupational Titles*, and forwarded to the Forecasting Area for inclusion and articulation with the occupational data bases being prepared. The ISVD now has available lists of explicit jobs for which pupils at Newton Technical High School are pre-

60

pared, and the particular vocational skills required for these jobs (as perceived by the teachers).

Initial interviews with the "related teachers" (teachers of mathematics and science) have begun to determine the student's preparation in (a) specific vocational skills, (b) occupational area skills, and (c) general functional skills applicable to the "world of work." To date, two teachers of "related subjects" have submitted such materials, and two conferences have been conducted with the entire staff of "related teachers" in an initial effort to identify education-vocation linkages between curriculum and functional application to the "world of work."

CONTACTS WITH PRIVATE INDUSTRY

Within the context of developing a "common curriculum" and supervising a work-study program, contacts have been made with private industry. These contacts served two important purposes; first, we were interested in the degree to which the general academic and specialized vocational curricula were preparing pupils for the realities of "the world of work"; secondly, it was realized that industry could make significant contributions to the new "common curriculum" that was to be tentatively developed. These contacts would also serve to confirm or deny the validity of some data being fed into the occupational data bases by the Forecasting Area. Therefore, a questionnaire prepared by the Forecasting Area was submitted to the personnel departments of two large insurance companies in the Boston area to determine the perceptions of those who hire and fire. The results of these questionnaires have been shared with the Forecasting Area for possible inclusion in and revision of data bases.

Personnel managers in the areas of electronics (Baird-Atomic, Cambridge, Mass.), clerical practice (Employers Group Insurance, Boston, Mass., and Star Market, Boston, Mass.), data processing (Honeywell, Wellesley, Mass.) and

wholesale distribution (Graybar Electric, Boston, Mass., and Leman Electronics, Boston, Mass.) have been involved in plans for development of a "common curriculum" with linkages to specialized vocational areas.

Information gleaned from these contacts has been useful in articulating our preparation of the non-college educational data files which is also concerned with attempts to identify education-occupation linkages.

THE PLACE OF EXPERIENCE IN CURRICULUM: A THEORETICAL FRAMEWORK

As a by-product of the doctoral project involving the supervision and development of work-study programs in the Newton Public Schools, an initial approximation is being attempted at the development of a theoretical framework underpinning a laboratory/experience instructional mode for possible incorporation into the context of a "common curriculum." The pupil population exposed to the work-study program has been expanded to include the college-bound as well as the original non-college-bound population, and the inclusion of the work/experience component in the curriculum offered to selected pupils in each curriculum area. To date, material has been selected from the Lerer doctoral project, and an outline prepared for the presentation of a report.

CAREERS OF YOUNG ADULTS

It has been established that we must study the career development needs of 16-25 year olds who are out-of-school, out-of-work and/or out-of-school, in-work. A first draft of a questionnaire has been developed, and contacts have been made with local community action groups for identification of a potential sample.

PSYCHOLOGICAL CURRICULUM AREA

Professional Personnel in Area. Charles E. Gunnoe and David V. Tiedeman, Directors; Gordon A. Dudley

Summary. The ISVD had four lines of curriculum development underway during its first year. One curriculum was in decision-making, a second in vocational development, and a third in educational development. The fourth curriculum area related to psycho-social development in general. From the development, a sense of "agency" and the confidence to use it comes into being. This area has necessarily been delayed in its development during the first year. The curriculum "maps" of the other three areas need to be more definite before this "mapping" of psycho-social development can itself begin to be given definite form.

Obviously, the four lines of curriculum development must become coordinated as the ISVD develops. However, complete coordination is neither possible nor desirable. Integration is something which is experienced, not taught. The ISVD will attempt to facilitate integration on the part of inquirers. However, the ISVD will not itself be integrated; the ISVD will only be coordinated.

EDUCATIONAL ORGANIZATION AND SUPERVISION AREA

Professional Personnel in Area. Duncan F. Circle, David B. Clemens, Wallace J. Fletcher, Arthur Kroll, Directors; Charles E. Gunnoe, Edward Landy, Lawrence Lerer, and David V. Tiedeman

Summary. The accomplishments in this Area during the first year include: (1) the preparation of two project reports of a language of supervision; (2) the completion of the Cooperative Work-Study project in the Newton School Department; (3) the completion of interviews and content analysis of interviews of a selected sample of work-study pupils to assess students' attitudes toward a laboratory experience and preparation of a report summarizing the

findings arising from the attitudinal study of the selected work-study sample; and (4) the conduct of liaison activity with the Western Metropolitan Boston Regional Opportunity Council (WEMBROC).

Reference is also made to the General Curriculum Area in which liaison with Newton industries is described. The Information Area also notes the formation of a Career Resource Center in the High Schools of Newton. The Placement Area notes the establishment of Jobs for Youth. All of these organization and relational activities are necessary for the conduct of an Information System for Vocational Decisions which incorporates actual job experience as a dimension of self development through vocational development.

PROJECT REPORTS ON A LANGUAGE OF SUPERVISION

Fletcher, Lerer, and Gunnoe issued two project reports on a language of supervision. The first is "Toward a Language of Supervision—Part A." The second is "A Tentative Career Development Curriculum and Its Implications for the Patterning of Supervisory Responsibilities in the Information System for Vocational Decisions" (cf., General Curriculum Area).

COOPERATIVE WORK-STUDY PROGRAM IN NEWTON

The ISVD has provided major support for the supervision of the work-study program of the Newton School Department during the 1966-67 academic year. The ISVD has available a case report on the intricacies involved in coordinating a vocational development program within the context of a broader Career Development Program, when the range of pupil interest extends from vocational development conceptualizations to vocational experience, and its examination, through the direct supervision of students at work. This project, involving approximately 76 pupils in the areas of Business Education, Child Care, and Electro-Mechanical Devices, has successfully demonstrated the validity of the laboratory/experience instructional mode

for college-bound and non-college-bound, causing the Newton School Department to become increasingly concerned with potential linkages that currently exist (or can be made to exist) between academic curriculum and vocational development curriculum.

ATTITUDINAL STUDY

Closely related to the support provided for the supervision of the work-study programs has been support for the development of a survey of changes in pupil attitudes for 27 work-study enrollees. During the summer of 1966, taped interviews with a small sample of work-study pupils were transcribed and fed into the General Inquirer in an attempt to determine a pattern for the content analysis of future interviews to be conducted during the 1966-67 work-study programs. As a result of these findings, and of a series of interviews with the teacher-supervisor of each area, the following hypotheses were formulated:

1. The laboratory/experience mode of instruction facilitates the development of improved interpersonal relations between the teacher-supervisor and the pupils.

2. The laboratory/experience mode of instruction facilitates more meaningful application of skills and knowledges already learned, and provides a more relevant arena for the introduction of new skills and knowledges.

3. The laboratory/experience instructional mode provides pupils with a more realistic picture of the world of work, leading to more accurate self-analysis and the application of more rational decision-making coping strategies in patterning personal career development processes.

65

A series of questions were developed, the 27 pupils interviewed, and procedures for a hand content analysis developed. The second interviews have been completed, transcribed and analyzed, and a tentative outline for presentation of results prepared.

LIAISON WITH WEMBROC

Fletcher is President of the Western Metropolitan Boston Regional Opportunity Council (WEMBROC). The ISVD has cooperated with the establishment and maintenance of the WEMBROC in order to have access to its clients as the System reaches a point where field testing becomes possible.

REPORTING AND EDUCATION AREA

Professional Personnel in Area. Eugene H. Wilson and Michael J. Wilson, Directors; Sara S. Booth, Gordon A. Dudley, Robert P. O'Hara, David V. Tiedeman

Summary. Educational efforts are twofold: (1) intra-organizational communication to catalyze the ongoing process, and (2) inter-professional communications in which experts share with us and in which we share our accomplishments with the professional world. These objectives have been met by a series of conferences, speeches, meetings, and some writing.

Intra-organizational Communication

The following activities have taken place within the several organizations of the ISVD:

STAFF SEMINARS

A series of informal seminars has been initiated in which members of the ISVD staff discuss the current status of their work with other interested persons in the project. A full staff review of the ISVD was undertaken at mid-year. Durstine, Fletcher, and Lerer have already conducted the more informal seminars. Dr. Douglas Porter has also conducted a seminar on the writing of scripts so that they will conform with standards for programmed instruction.

66

NEWTON SCHOOL DEPARTMENT

Circle, Clemens, Kroll, and Landy have regular meetings with the counselors in Newton. These meetings provide opportunity for the ISVD to report to the counselors and to secure their cooperation in specific activities. Two orienta-

tion meetings have been held to inform the counselors and teachers of their responsibilities for script writing and to alert them to the plan of the ISVD for introduction of console operation during the third year of the ISVD.

GRADUATE SCHOOL OF EDUCATION, HARVARD UNIVERSITY

Several members of the Psychology Area of the Graduate School of Education, Harvard University have met during the Spring Semester in order to consider and to reformulate instruction in the School in relation to courses in assessment, computer technology, measurement, research methods, statistics, and testing. Durstine, Ellis, and Tiedeman met with this group. The report to the Faculty will recommend revision of instruction in the School in relation both to modern time-shared procedures on the computer and to the potential of this capacity for revision in teaching, counseling, testing, and administration.

NEW ENGLAND EDUCATION DATA SYSTEMS

The New England Education Data System conducts meetings for personnel in its member schools on an irregular basis. During the first year of ISVD, NEEDS conducted a meeting for counselors in order to acquaint the counselors with computer potential in relation to counselors' work. NEEDS also has under discussion in its Board of Directors the development of follow-on activities which will permit school systems to take advantage of the basic computer technology being developed for the ISVD.

Inter-Professional Communication

The following inter-professional activities took place during the first year:

SPEECHES AT CONVENTIONS AND PROFESSIONAL MEETINGS

The intention of the ISVD was advanced in meetings of the American Educational Research Association (AERA), the Association of Educational Data Systems (AEDS), the American Personnel and Guidance Association (APGA), the American Vocational Association, and the Greater Boston Personnel and Guidance Association. Tiedeman also met with a conference of vocational educators and

counselor educators in order to discuss the implications of media developments for vocational education and counseling. The conference was sponsored by the U. S. Office of Education. Tiedeman also discussed the ISVD and other computer developments with the Panel on Counseling and Selection, National Manpower Advisory Committee.

INVITATIONAL RESEARCH EXCHANGE CONFERENCE ON SYSTEMS UNDER DEVELOPMENT FOR VOCATIONAL GUIDANCE

The Center for Research and Leadership Development in Vocational and Technical Education of the Ohio State University has originated an invitational Research Exchange Conference on Systems under Development for Vocational Guidance. ISVD personnel have participated in the two meetings of that Conference.

VISITS AND VISITORS

ISVD personnel have visited several projects in order to secure knowledge and material of relevance to the work of the project. There have been several visits to computer development facilities of both the International Business Machines Corporation and the Radio Corporation of America.

The ISVD also entertains visitors referred by the U. S. Office of Education. Personnel experts from two of the Armed Services have visited. Several professional colleagues have also visited. During these visits the ISVD both attempts to inform others who might further the development of computer-based systems for guidance and counseling and attempts to secure criticism and advice from others in relation to the intentions and materials of the ISVD.

THEORY OF THE ISVD

The rudiments of the theory of the ISVD are in the Tiedeman and O'Hara monograph, *Career Development: Choice and Adjustment* (1963). Since then, Dudley, Fletcher, Tiedeman and others have expanded that theoretical basis for the ISVD. During the first year, Dudley and Tiedeman have collected papers relevant to that expansion. Dudley has provided a schema for framing the papers and

written the needed bridging statements. The manuscript is being assembled for publication under the possible title: *Thought, Vocation, and Action: the Grounding of Purpose during Vocational Maturation*. This manuscript will provide an overall theoretical statement for the ISVD.

IV. Plans for 1967-68

TWO PROTOTYPES

The project intends to take the System through two prototypic generations by the end of June 1969. Prototype I is planned for testing by professional personnel themselves as of January 1968. Prototype II is planned for testing by naive inquirers by January 1969. The final report will include field data on Prototype II and suggestions for modification of Prototype II into Prototype III.

The twelve sections of the present work organization will be continued into the 1967-68 project year. The planned events in each of the 12 work areas are as follows:

FORECASTING AREA

Summary. Computer routines for data handling will be developed to implement the already prepared forecasting framework. Estimates will be made in terms of the number of jobs likely to be available and the supply of people qualified to fill them. Changes in job requirements necessitated by changes in technology envisaged in the forecasts will also be estimated.

APPLICATION OF METHODOLOGY (BY THE END OF 1967)

Data for forecasting purposes will come mainly from existing sources. Routines will be developed for merging, interpolating, and analyzing this information. This will in-

clude extensions of conventional methodologies to deepen understanding of special informational needs. Special forecasting studies may be suggested by this work.

ESTIMATES OF DEMAND FOR SELECTED OCCUPATIONS (BY JULY 1, 1968)

Occupations and industries which have particular importance in career development will be identified. Special emphasis will be placed on these in estimating their demand for workers in the next 15 years. This effort will include selected occupations in the military as they relate to important civilian occupations.

FORECASTING BY SPECIAL INTERVIEW (BY JULY 1, 1968)

A less quantitative and structured approach to forecasting is anticipated through interviews with highly placed leaders in fields that offer particular promise for the future. This will be an experimental effort and comprehensive coverage will not be attempted. This approach will be tried with leaders in business, industry, and labor. Materials may be developed in the form of case documents, biographies, and tape recorded and filmed interviews. Format will depend on the variety of modalities in which the information can be used by the System.

FORECASTING OPPORTUNITIES IN BROAD INDUSTRY GROUPS AND FIELDS (BY JULY 1, 1968)

Forecasting will not be confined to specific occupations, but will also include future possibilities in broad industry groups and fields.

ONGOING PERSONAL CONTACTS AND INFORMATION GATHERING (CONTINUOUS DURING 1967-68)

Information sources, both personal and written, wil be maintained and kept up to date throughout.

PLACEMENT AREA

Summary. The stages of exploration and crystallization in placement will be documented for further development of ISVD scripts. Jobs for Youth will be continued but will be expanded to attempt to augment the career opportunities

for applicants. Work during 1966-67 will be reported to the Division of Vocational Education, Department of Education, Commonwealth of Massachusetts.

DOCUMENTATION OF EXPLORATION AND CRYSTALLIZATION IN PLACEMENT (BY JUNE 1968)

The principal activity during the summer will be an attempt to document the exploration and the crystallization prior to the actual decision to seek a specific job placement. This documentation will take the form of scripts usable in the ISVD project. Information gained during the ensuing school year will be used to make necessary modifications in the scripts developed.

JOBS FOR YOUTH (SEPTEMBER 1967-JUNE 1968)

The Jobs for Youth program will be reactivated again in September at the start of the school year. At the high school level it is to operate within a different context. Instead of being a rather isolated and independent program in the area of vocational decision-making it will be merged with two presently operating programs. This activity will be coordinated with the occupational resources project and the follow-up study to form a Career Resources Center, which will be staffed by a professional person to provide a full range of career information to students and faculty in a variety of forms. This will depend heavily upon the accumulation of occupational literature already available. In addition slide-tape programs, films, talks with professional persons, visits to places of work, and actual work experiences will be coordinated to provide a comprehensive informational program.

REPORTING BY SEPTEMBER 1968)

The occupational resource center and the follow-up study have received a major part of their previous funding from Public Law 88-210 through the Massachusetts Division of Vocational Education. Negotiations are presently underway for these activities to be documented in a publication published under these auspices. Also included in this publication will be a section on the job placement activity. Publication is planned for the summer of 1968.

DEVELOPING CAREER OPPORTUNITIES (SEPTEMBER 1967-JUNE 1968)

Within this framework, the Jobs for Youth program will expand into new areas. This year the emphasis has been simply on collecting information on the variety of jobs normally available to teen-agers. However, because of their youth and their lack of maturity and training, they are not normally exposed to many valuable career information opportunities.

Through personal contact with employers an effort will be made to develop opportunities in these areas. Particular emphasis will be placed on research related positions, areas in the various sciences, and opportunities to work with professional persons requiring advanced training.

INFORMATION AREA

Summary. The Division of Vocational Education, Department of Education, Commonwealth of Massachusetts has terminated its support of the Occupational Information Library in the Newton School Department. As a result, the ISVD plans to study the problem of up-dating the occupational library during 1967-68. The library will itself be moved to the Newton High School to become a part of the Career Resources Center there. Pictorial information about occupations will be studied in further detail.

UP-DATING THE OCCUPATIONAL INFORMATION LIBRARY (CONTINUOUS DURING 1967-68)

During 1967-68 the ISVD will study and make its own plan for an up-dating of the Occupational Information Library and its support. The plan will be evolved in conjunction with the ISVD operation of the Career Resources Center in Newton High School.

CAREER RESOURCES CENTER (CONTINUOUS DURING 1967-68)

The ISVD needs inquirer access to an occupational information library. The System needs a continuous system for follow-up studies and for securing cumulative folder data. The ISVD needs the regularization of its placement activities. Finally, the ISVD needs a physical location for a terminal in a high school which will have access to all of

these things. For these reasons, the ISVD has arranged with the Newton School Department to create and maintain a Career Resources Center in Newton High School during 1967-68.

PICTORIAL OCCUPATIONAL INFORMATION (CONTINUOUS DURING 1967-68)

The equipment configuration available to ISVD has now become somewhat more clearly known. The ISVD must therefore take steps during 1967-68 to secure and collate pictorial forms of fact presentation along with written forms. The vocational development curriculum will available as Prototype I by about November 1967. At this time, a concerted effort will be made either to secure available pictures and film strips or to create needed ones by ourselves.

INQUIRER CHARACTERISTICS AREA

Summary. Follow-up studies of Newton students will probably have to be continued in order to receive samples of sufficient size for use in Prototype II. These studies will include both the further study of additional classes of students and the specification of post-secondary school attendance of recent graduates.

FOLLOW-UP (CONTINUOUS DURING 1967-68)

The Newton Follow-up Program will be carried on for ISVD through the Career Resources Center which ISVD will be supporting in the Newton High School. These studies will give the ISVD experience in carrying on this regular form of study and in up-dating the inquirer characteristic files in ways which become necessary because of the addition of new data.

The collection of pupil data from the cumulative records of the Bigelow Junior High School and Newton High School will continue and should be completed during the year. The data will be coded on Digitek forms and transferred to computer tape to provide a student data base

which, thro··gh use of the console, will facilitate student-machine interaction in the decision-making process.

COLLEGE ADMISSIONS DATA (CONTINUOUS DURING 1967-68)

Data gathered by the high school guidance department on the college admission experiences of the class of 1967 will be converted to computer use using the Digitek forms designed for the class of 1966 study. Similar data for any of the classes of 1958 through 1965 could also be converted to computer use.

CONCEPTS OF SELF (BY DECEMBER 1967)

"Building block" scripts are being written by the Vocational Developmental Curriculum Area (see p. 53) during summer 1967. These scripts will contain several routines which will teach inquirers about their concepts of themselves which are of occupational, educational, military, and/or personal relevance. These scripts will give definition to the access and retrieval routines which are needed in the Inquirer Characteristic Area. This definition will be undertaken during autumn, 1967 in order to make this a part of Prototype I.

DATA FILES AREA: (1) OCCUPATIONAL

Summary. The development of the occupational data file will continue. Three blocks of information are now ready for use, as mentioned earlier (cf., p. 31). Further blocks will be developed. The total functioning data file will consist of all these blocks linked and suitably referenced to one another. Quantitative analysis of functions, requirements, and characteristics is planned for those occupations for which sufficient information is available. The results of this analysis will aid in developing career patterns and in providing new concepts of job grouping. Work on the occupational data file will involve close collaboration with the Computer Area, and with all the information sources necessary for keeping the file current.

ONGOING DATA FILE PREPARATION (CONTINUOUS THROUGH 1967-68)

The occupational data file will be a living thing. Blocks of information will be added, deleted, and changed in a way that allows the file as a whole to continue to function without interruption. Provisions for referencing between blocks and for retrieval in a form useful to the inquirer will be an integral part of the data file. In this way a working relation with the MONITOR function will be possible.

ANALYSIS OF JOBS BY FUNCTIONS AND CHARACTERISTICS (BY THE END OF 1967)

The considerable quantitative data now available on the functions, characteristics, and requirements of individual occupations will be processed to seek natural groupings and to identify career patterns. Sorting and reclassification of jobs can be expected as a result of this investigation.

ANALYSIS OF CAREER PATTERNS (BY THE END OF 1967)

The sequential aspect of careers will also be studied through direct examination of experience from the point of view of workers, employers, and interested agencies. Here, we intend to rely on available information.

INDUSTRY DATA BASE (BY JULY 1968)

Information about selected industries will be a functioning part of the occupational data file. This will be prepared and added to the file as an appropriately referenced block of information. The objective is to provide students with information about industries and fields of work as well as about specific occupations.

ONGOING PERSONAL CONTACTS AND INFORMATION GATHERING (CONTINUOUS DURING 1967-68)

Information sources, both personal and written, will be maintained and kept up to date throughout.

DATA FILES AREA: (2) MILITARY

Summary. Coding of information regarding careers in the armed forces is now beginning. This will include the necessary contextual material for the intelligible delivery of information. The relation of military occupations to civilian occupations will receive particular attention.

CODING OF SOURCE MATERIALS (BY THE END OF 1967)

Collection of career materials from the Army, Navy, and Air Force will be completed. This includes information for both officers and enlisted men. Selected information relating to job descriptions, requirements, training, and sequential career patterns will be entered into the data file in coded form. Provisions for retrieval of the information in a form intelligible to the inquirer will be made.

PROJECTION OF CHANGES IN REQUIREMENTS (BY THE END OF 1967)

There will be special attention to future estimates of level of force requirements, development of military technology, and their resulting influence on the size and mix of military manpower in the future.

RELATION TO CIVILIAN OCCUPATIONS (BY THE END OF 1967)

Special attention will be paid to the civilian equivalents of military occupations. Suitable referencing between the two data files will allow the inquirer to integrate military service into his total career pattern.

DATA FILES AREA: (3) EDUCATIONAL

Summary. College Admissions data for the Class of 1966 will be analyzed for planning in the ISVD. A post-secondary planning schema will be adopted for use in the ISVD and educational-occupational linkages will be experimented with.

COLLEGE ADMISSIONS DATA (CONTINUOUS DURING 1967-68)

Work in coding data on the college admissions experiences of the Class of 1966 will continue in the Career Resources Center of Newton High School. When that coding is completed, the Class of 1967 could be similarly done as well as any previous classes back to the Class of 1958. The ISVD will decide on this matter during the next year. The ISVD needs to do only enough to provide an operating prototype.

EDUCATIONAL PLANNING SCHEMA (BY FEBRUARY 1968)

Decisions will be made by February 1968 concerning the kind of educational planning aid that will be developed for the ISVD (i.e., whether the ISVD will adapt a currently available scheme or build its own entirely). This aid must

include schools of less than college rank, and possibly educational opportunities with the armed services and civilian employers. Data from the Newton Follow-Up Program will be helpful in identifying the alternatives most often chosen by Newton students. Data on characteristics of schools of less than college rank will then have to be gathered, coded, and entered into the ISVD.

EDUCATION-OCCUPATION LINKAGES

Experience gained in the Newton Work-Study program will be used for generating data on possible linkages of work with study. Special analysis of colleges which have cooperative work programs could aid analysis for this area as well; as could our use of information from the Newton Placement Project. The Newton Follow-up Program will be used to provide data on relationships between education and occupation. Also, the Newton Career Information Project provides much information on educational requirements for various types of occupations, which must be keyed into the educational planning process.

RETRIEVAL ROUTINES (BY JUNE 1968)

The educational data file needs retrieval routines like those now available for the occupational data file. The occupational data file routine will be used as the model. Specific adaptation to the educational context will be made during the second year.

DATA FILES AREA: (4) PERSONAL AND FAMILY LIVING

78

Summary. The Personal and Family Living data file will be started during summer 1968 and expanded during the regular academic year.

INITIATION OF PERSONAL AND FAMILY LIVING DATA FILE (CONTINUOUS THROUGH 1967-68)

The production of scripts in this area will begin this summer. The form which this Data File area will take will be determined by findings in the Psychological Curriculum Area.

We will emphasize a discovery form of pedagogy, and address ourselves to personal and family forces which influence an individual's acceptance of responsibility for, and activity toward, his own career development.

DATA FILES AREA: (5) INQUIRER CHARACTERISTICS

Summary. The student record file will be up-dated as needed. The test and self concept indexes needed will be specified more exactly. The individual inquirer part of the inquirer characteristics data file will be specified more exactly as the Vocational Development Curriculum becomes more developed.

STUDENT RECORD DATA (CONTINUOUS DURING 1967-68)

The collection and entry of student characteristics into the ISVD will be regularized. The duty for collection will be assigned in the Career Resource Center. The Computer Area will work out programs for the transfer and up-dating of individual records.

During the coming project year, (a) work will continue on retrieving student record information from the Newton files; (b) data already gathered will be coded and entered on Digitek sheets; (c) new Digitek forms will be designed to receive the various kinds of data of interest to the ISVD. As the project moves along and scripts are written for various kinds of information, (d) certain kinds of data not already collected will be gathered. Also, (e) as new data become available (e.g., for the new seventh grade class or the new ninth grade class, or year end marks for students on whom most data were collected last year), procedures will be developed for their retrieval.

TEST SCORES AND SELF-CONCEPT INDEXES (BY JUNE 1968)

The four curriculum development areas of the ISVD will reach a merge point during the next year. When this merger takes place, programs must be developed for the needed access and presentation routines. These linkages

will delineate the decision trees that must be present in MONITOR. The decision trees will in turn give delineation to the test and self-concept indexes which will be needed in the MONITOR.

CONSTRUCTING THE DATA FILE (CONTINUOUS DURING 1967-68)

As curricula are merged and decision trees defined, the desired access routine which we call MONITOR will have sufficient specification so that it can be constructed. This construction will give rise to augmentation and revision of the present data file and its plan.

RETRIEVAL ROUTINES (BY JUNE 1968)

The inquirer characteristics data file needs retrieval routines like those now available for the occupational data file. The occupational data file routines will be used as the model but specific adaptation to the self concepts dictated by the decision-making and vocational development curricula will be made during the second year.

COMPUTER AREA

Summary. The significant activities planned for the year 1967-68 may be considered in terms of three areas: equipment, computer software, and research and related activities.

Equipment

TELETYPEWRITER TERMINALS (BY END OF 1967)

Six of the present model 33 KSR teletypewriters will be replaced by model 35 ASR teletypewriters. This will permit better access as well as the use of paper tape input. The seventh model 33 will remain linked to Harvard's Computing Center, and for most of the year, the 1052 will remain linked to M.I.T.

HARDWARE ACCESS SCHEDULE (BY END OF JANUARY 1968)

At present, NEEDS expects delivery of a Spectra 70/45 in early autumn, with certain additional pieces of equipment to arrive the first week in December. While ISVD will have access to this machine when it arrives, there is some question about whether or not the single disc drive which will be delivered in the September shipment is sufficient.

NEEDS and RCA are discussing the possibility of earlier delivery of the equipment presently scheduled for December. Our ability to complete Prototype I by 31 January 1968 depends heavily upon equipment availability. Should delivery continue as scheduled, ISVD may get relief by using an outside installation (such as the RCA Cherry Hill Labs) temporarily.

CONSOLES (BY END OF 1967)

Although we maintain the hope that Prototype I will have a console with the following capabilities:

Cathode Ray Tube
Keyboard Input
Hardcopy Printer
Random Access Slide Projector
Random Access Tape Playback,

the present arrangements for this are sufficiently unsettled to make anything but the Model 35 teletypewriters an uncertainty. We fully expect, however, that the six RCA 70/752 Cathode Ray Tube/Keyboards which are to be delivered mid-December will become part of Prototype I as it appears in late winter.

Software

For the most part the specification and implementation of Prototype I—the major activity of the computer area for the coming year—is a software problem. To be sure, a number of hardware issues—consoles, number of disc drives, and the like—will continue to be considered. But the following general software areas are by far the most crucial.

R.C.A. BASIC TIME SHARING SYSTEM (BY JUNE 1968)

Because we intend to use the NEEDS RCA Spectra 70/45 computer, we will be able to use the RCA Basic Time Sharing System (BTSS) in Prototype I. It will be necessary, however, to make a number of changes to the system as it now stands.

The present BTSS consists essentially of a Command language, an Edit language, and an interpretive FORTRAN language. The first change the computer area plans to make

is the insertion of intensive random access system maintenance procedures. Following this and some additional, more minor changes, TRAC will be implemented in the system in such a way that the present BTSS languages will come under its control (FORTRAN, for example, will be a TRAC "primitive"). One result of this will be that FORTRAN will bear the burden of computation for the system while TRAC will handle the string manipulation. These two languages, however, will function as one. The addition of a few special primitives will then make MINORCA function not as a language—although outwardly it will appear so—but rather as a TRAC/FORTRAN procedure.

Altering BTSS is by far the most difficult of those tasks which must be done to create Prototype I, and will therefore occupy most of the computer area's time during the year. The spring months following implementation of Prototype I will be spent in refinement and in specification of Prototype II. At this time, the question of Natural Language Processing—which we continue to explore—will become this area's major problem.

MINORCA I (BY END OF JANUARY 1968)

During the summer of 1967, the computer area will take the responsibility for teaching summer script writers how to create MINORCA's scripts, and to instruct them in the principles and techniques of educational materials development and sequencing. Our hope is to get some feedback in return regarding the things that they wanted to do, but could not do in terms of the present capabilities of MINORCA .5. We hope to get from them a clear notion of the capabilities they require such a computer language to have. With this knowledge we will design, in late summer, the structure, content, and functions of MINORCA I. MINORCA I will be implemented by January 1968 as an integral part of Prototype I.

Research and Related Activities

Other less pressing, but nonetheless important, activities in which the computer area plans to engage are included under the general area of research and related activities. Some of these are: computerizing references to our occupational descriptions library; generating statistical predictive models through the analysis of follow-up data; and specifying the statistical capabilities of Prototype I. Included in this last activity will be a consideration of the summary data which the system should provide after each session.

As a way of exploring the notion of MONITOR as it applies to student interaction with the system, the Computer Area will attempt to determine how responses to the *Test of Occupational Knowledge* can be used to provide a student more than a single score. For example, it may be possible, by examining the student answer vector, to determine not only that he has a high or a low score in his knowledge about a specific occupation, but that, in fact, his knowledge suggests a possible interest in some other occupation which he has not mentioned.

CONCLUSION

This report contains a partially itemized schedule with some tentatively specified dates and deadlines. While we have been able to become sufficiently familiar with BTSS to determine properly that it will be the software system of Prototype I, until we have examined the detailed listings of the various subprograms that make up BTSS and assessed the jobs entailed in making the anticipated changes, it will not be possible to give any but a general plan. Furthermore, our ability to meet any schedule is determined to a large extent by problems of hardware delivery which are as yet not fully settled. This does not mean, however, that Prototype I will be excessively delayed, or that we anticipate any difficulties with RCA's meeting their agreement. By midsummer, all the work

which remains to be done before we can establish a firm schedule will have been done and the dates and deadlines of a firmer schedule will then be submitted.

DECISION-MAKING AREA

Summary. In the ensuing year the following activities are planned: (1) the development and further pilot-testing of a curriculum unit on decision-making; (2) the further development of games on careers and the simulation of the high school career; (3) the development of an ISVD curriculum which includes the construction of MONITOR for the "building-block" scripts of the Vocational Development Curriculum, the development of a vocational planning program, and the merging of the curriculum products developed in the several curricular areas of the project.

DEVELOPMENT AND PILOT-TESTING OF A CURRICULUM UNIT ON DECISION-MAKING (BY DECEMBER 1967)

As soon as the evaluation of the decision-making unit is completed, a Technical Memorandum will be published setting forth conclusions and recommendations. This is scheduled for September, 1967. The decision-making unit and the evaluative experience associated with its development and implementation will be utilized to provide a basis for understandings about the necessary and sufficient conditions of teaching decision-making. Implications for the vocational development curriculum as a whole will be drawn resulting in script titles which will fit into the Vocational Planning Program.

GAMING AND SIMULATION (CONTINUOUS DURING 1967-68)

Computerization of Machinist Career Game. Upon completion of the simulation of the career of a machinist now being produced under subcontract with Abt Associates, the staff of this area will assist the staff of the Computer Area in producing a programmed version for use with high school students and young adults.

Simulation of a High School Career. Since the curriculum unit has now been completed, interest in the development of an educational simulation has been revived. The original gamelike activity involved the student in solving single discontinuities by using the decision-making process. Such important concepts as time-allotment, goal-setting, and planning for feedback and adjustment, were not included. It was seen as a series of discrete, separate discontinuities to be solved.

Our current plans call for the development of a capacity for simulation which will range from the discrete, single discontinuity, to a complete, life-long career. As an example of a simulation somewhere between these two extremes we will describe a simulation of three years of Newton High School which was proposed recently in a working paper by Wilson.

Students will enter the simulation through an orientation script which will describe the resources available to them and specify the rules governing the initial choices that are to be made. The student will be able to seek information at all times but with or without this information he will be required to (1) predict performance, (2) choose a program from the possible alternatives, (3) choose extracurricular activities, (4) prepare a schedule which makes a time allotment to each chosen activity. Once the first stage program has been selected, the computer will produce a "report card" calculated from a formula which includes ability, prior achievement, time allotments, plus a "chance" factor. At this point the student will be allowed to make adjustments in his program within the limits of the rules of the school before the computer produces another report card. At any point the student may ask for an evaluation of his progress to that point in relation to his stated goals. The sys-

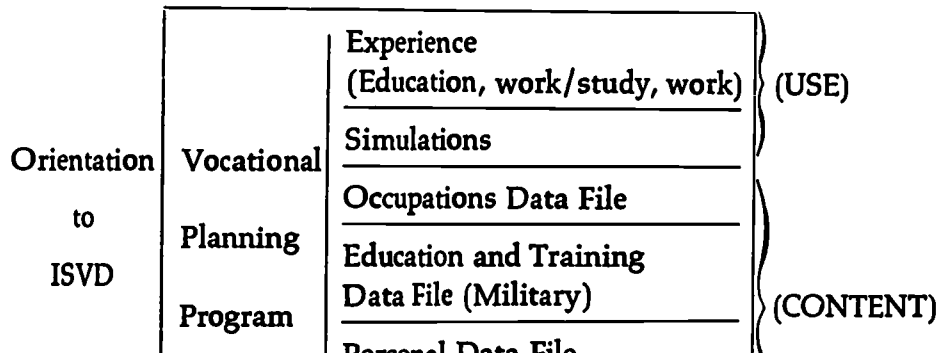
tem MONITOR will provide such an evaluation. Also, the same MONITOR system will let him know if he goes too far off to achieve his stated goals. When this happens the student will be given the option of revising his goal or going back to some point where he was within the limits of possibility for that goal. At the completion of the total simulation the student will be given a description of the person who has "graduated" from high school with an evaluation of the *player*'s decision-making abilities. The MONITOR will evaluate his behavior in terms of risk-taking, information-seeking, goal-setting, time-allocation, planning, adjustment of program to feedback, and ability to perceive linkages of information between person and situation. This simulation will allow an ordinarily high-risk, time-consuming activity (three years) to take place under low-risk, time-compressed (possibly about three hours) conditions.

Development of the Concept of an ISVD Curriculum (continuous during 1967-68)

Building Monitor from Vocational Development Curriculum Scripts. During the summer, 1967, our staff will act as consultants to the teachers and counselors who will be writing the actual scripts. In addition, they will devote a portion of time to consideration of the problems involved in writing higher-order linking scripts which will provide flexibility to students using the system. Finally, in the fall, our staff will write these second order scripts and then attack the problem of building a MONITOR routine which will mediate the interaction between the system and its users.

VOCATIONAL PLANNING PROGRAM

An important contribution of the Decision-Making Area will be the development of a "Vocational Planning Program" which will link the "content" and "use" categories of the ISVD curriculum. A schematic representation of the total system of scripts might look as follows:



The Vocational Planning Program will consist of a series of scripts which will teach the student about the language and process of decision-making, including such concepts as: decision-point, alternative, exploration, crystallization, choice, clarification, and information. It will allow each student to use the decision-making process to create plans which may then be simulated on the ISVD computer or experienced in the real world under the supervision of ISVD.

MERGING CURRICULA

As the concept of a curriculum for ISVD is enlarged and its detail is filled out, it becomes apparent that the various "areas" must overlap and fit together. For this reason it is planned to merge the different areas now listed separately. This integrated Curriculum Area will develop a comprehensive classification system and description of all of the interactive sub-systems.

VOCATIONAL DEVELOPMENT CURRICULUM AREA

Summary. Significant events anticipated in this area include: (1) the vocational development curriculum will enter the implementation stage during the summer, 1967, with the construction of a number of "building block"

scripts; (2) second level scripts which will involve linking the "building block" scripts will be written in the fall of 1967; (3) third level scripting, involving the monitoring function, will begin in the winter of 1967-68; (4) during the first quarter of 1968, it is expected that the available scripts will be compiled on the computer.

"BUILDING-BLOCK" SCRIPTS (BY SEPTEMBER 1967)

Thirty-three guidance counselors and social studies teachers from Newton and Lexington have been employed for the summer of 1967 to develop the inquirer-machine interaction material. These are all experienced counselors and teachers, on whose knowledge of students we shall draw for scripts that will appeal to students in all grade levels K through 16. The scripts will cover the general areas of personal characteristics, educational information and development, occupational information, and vocational program planning. An attempt will be made to build a series of sequential materials that will lead the student increasingly deeper in his pursuit of vocational maturity.

LINKING THE "BUILDING-BLOCK" SCRIPTS (BY JANUARY 1968)

Although we are aware that complete coverage with "building block" scripts in all areas in our proposed curriculum cannot be made during the six weeks of the summer, it is expedient for us for the sake of Prototype I to move on in the fall to linking scripts utilizing those building block scripts which have been developed during the summer. These scripts are intended to provide the inquirer with greater freedom to move from one topic to another in accordance with his perception of the relevance of the various topics to which he has access. It is hoped that a number of such scripts will be completed by 31 December 1967.

MONITORING SCRIPTS (SEPTEMBER 1967-JUNE 1968)

Subsequent to, or perhaps concomitant with, the development of linking scripts, it is necessary to prepare those that monitor the paths which the students pursue as they interact with our career development program.

Analysis of student activity in this mode will take place within the Tiedeman and O'Hara paradigm of EXPLORATION, CRYSTALLIZATION, CHOICE, CLARIFICATION, INDUCTION, REFORMATION, and INTEGRATION. These scripts will assist the student to understand the process through which he is moving, both in terms of decisions already made, and in terms of decisions to be made in the future.

SYSTEM IMPLEMENTATION (BY JUNE 1968)

With the completion of scripts at all three levels, our materials will then be made available to the computer staff who will implement them on the computer. Our present optimistic estimate for the completion of this task is the spring of 1968.

GENERAL CURRICULUM AREA

Summary. Projected plans in this area include: (1) continued exploration and delineation of a finalized version of a Career Development Program growing out of continued articulation with work being done in the other curriculum development areas; (2) completion of the survey of "related teachers" and other academic teachers identified with Newton Technical High School in identification of vocational—general education-occupation synonyms; (3) another survey of work-study pupils in Newton Public Schools to examine attitudinal changes as well as validity of laboratory/experience instructional mode in relation to "common curriculum's" availability to all; (4) completion of theoretical framework underpinning cooperative work-study instructional mode and preparation of a project report; (5) close articulation with Decision-Making and Vocational Planning Groups in examination of scripts developed during the summer 1967, and development and revision of additional scripts; (6) the further study of the

careers of young adults so that materials can be adapted in appropriate ways.

CAREER DEVELOPMENT PROGRAM (BY MAY 1968)

It is tentatively planned that as a result of the work being done by script writers during the summer of 1967 and the contributions that will be made by this group to the general area of "guidance curriculum and career development," a final version of a Career Development Program should be available for analysis after January, 1968. It is planned, however, that a project report, directed toward an analysis of a more firm Career Development Program, will be prepared for completion by May, 1968.

NEWTON TECHNICAL HIGH SCHOOL SURVEY (BY MAY 1968)

Conferences with the teachers of "related areas" and other academic areas (English and social studies) should be completed by December, 1967, and an examination of curriculum materials and course of study completed by February, 1967. Following this, a report will be prepared incorporating materials included in the Interim Report of January, 1966 with those gleaned from the above-noted survey. This should provide ISVD with a picture of the overall explicit educational program to which vocational high school pupils in Newton, Massachusetts are exposed—the program that "socializes" vocational high school pupils into the "world of work." It is anticipated that this report will be available by May, 1968.

WORK-STUDY SURVEY (BY MAY 1968)

A meeting with work-study teacher-supervisors is planned for early in September, 1967 to discuss the results of the previous survey, and secure cooperation and mutual assistance in planning directions for a follow-up study. Lerer plans to identify psychological and/or personality characteristics that have appeared to indicate success or failure in the previous programs in order to consider such traits during the 1967-68 program. It is also important that contacts be established with the academic teachers of selected work-study pupils to identify vocational-academic syn-

onyms—what are the functions of the academic program that link to functions found in the work experience, either directly or indirectly? Hypotheses and an outline for such a report should be completed by January, 1968, with the final report completed by May, 1968.

THEORY OF WORK-STUDY CURRICULUM (BY FALL 1967)

In conjunction with the teacher-supervisors of work-study programs and based upon case material in the Lerer project, tentative approximations of a theoretical framework delineating the role of laboratory/experience work-study as part of the curriculum should be ready as a working paper by the end of the summer 1967, for inclusion as part of the attitudinal study planned for November, 1967.

ARTICULATION WITH TOTAL CURRICULUM DEVELOPMENT PROGRAM (CONTINUOUS DURING 1967-68)

Particular participation by the General Curriculum Area will proceed according to the time schedule and plans of those who have assumed responsibility for the development of an overall theoretical framework with which the Decision-Making, Vocational Development and Psychological Curriculums are to articulate. Therefore, this will be manifested as another continuous on-going operation providing information and thought for consideration in the final report.

CAREERS OF YOUNG ADULTS (BY APRIL 1968)

Little, if any, information exists for students who do not go on to college. Therefore, it is planned to initiate a survey of a small sample of 16-25 year olds who are out-of-school, out-of-work, and/or out-of-school, in-work. As tentatively planned, the survey will include only those who have not had any formal education beyond grade 12 and are identified with that portion of the population considered to be "academically and/or economically disadvantaged." A first draft of the questionnaire has been developed, and contact made with local community action groups for identification of a potential sample.

Plans for initiating the survey will be completed during the summer, and completion of data gathering activities

are scheduled for December, 1967. The Forecasting Area is also concerned with patterns of "career ladders," and close articulation will occur with their operation. The issuance of a final report summarizing the results of the data gathering activities is scheduled for April, 1968.

PSYCHOLOGICAL CURRICULUM AREA

Summary. The plans for this Area will be laid during summer 1967. Work on implementation will continue during the second year. This work is essential for an emerging design of MONITOR.

INITIAL PLANNING (BY OCTOBER 1967)

The area of psychological curriculum is now in the planning stages and will develop rapidly over the summer quarter. The basic issues which will be given attention are those which contribute to an individual's development of a "sense of agency" with regard to his career activities and a "sense of purposing" to guide these activities. Of particular importance will be the movement of an individual through an environment which approves dependent, controlled and nonresponsible behavior (childhood) into an environment which sanctions independence, initiative and responsibility (adulthood).

The objectives are to delineate forces and processes which facilitate this movement and create methods for focusing their effects. In applying a developmental approach to our study of these forces it will be possible to determine optimal programs for the articulation of information sources with a growing, changing individual.

These findings will, to a large extent, influence the form and content of materials developed in other areas of the project. They will also influence the supervisory techniques we will implement in the form of MONITOR. More specifically, however, we envision as a prime re-

sponsibility for this area, the creation of a program of psycho-social information with which a client interacts. The interaction will ideally contribute to the client's understanding of himself, his family, his peer group, and the relationships these have with each other and with society at large. To this end, our efforts will culminate in the production of scripts which will become a part of the Personal and Family Living data file.

During the summer, in addition to Tiedeman and Gunnoe, we will have as consultants Stanley J. Segal, Esther Matthews, and Chris D. Kehas.

IMPLEMENTATION (NOVEMBER 1967-JUNE 1968)

When a plan for this curriculum is developed, it will become possible to articulate that plan with those in the other three curriculum areas which should be completed about the same time. This articulation will be critical for the planning of MONITOR.

EDUCATIONAL ORGANIZATION AND SUPERVISION

Summary. Projected plans in this Area include (1) documentation of formation of Career Resources Center at Newton High School; (2) completion of attitudinal study of work-study program, 1966-67 and preparation of a report; (3) continued and extended contacts with the private industrial community in identification of specialized vocational-general educational linkages and articulation with Forecasting Area; and (4) continuation of liaison with WEMBROC.

ORGANIZATION OF CAREER RESOURCES CENTER IN NEWTON HIGH SCHOOL (CONTINUOUS THROUGH 1967-68)

In the sub-section on the Placement Area, we noted the formation of a Career Resources Center in which the placement activities of the ISVD will be organized during 1967-68. This re-organization of guidance services in the Newton High School will be documented as it evolves.

ATTITUDINAL STUDY (BY NOVEMBER 1967)

The first draft of the final report of the attitudinal study will be completed by the end of August, 1967, and distributed to staff members for comments, following which, if it is acceptable, a Project Report will be prepared for distribution by November, 1967.

CONTACTS WITH PRIVATE INDUSTRY (CONTINUOUS DURING 1967-68)

Current contacts will be maintained and new ones made as interests and needs of the Forecasting Area indicate. This activity will be continuous and on-going in nature and will link private industry with the System.

LIAISON WITH WEMBROC (CONTINUOUS THROUGH 1967-68)

The liaison with the Western Metropolitan Boston Regional Opportunity Council (WEMBROC) will be continued during the second year in order to assure easy collaboration when we need the clientele of WEMBROC for field testing.

REPORTING AND EDUCATION AREA

Summary. The twofold efforts at intra-organizational and inter-professional communication will be continued during the second year. *Ad hoc* invitational conferences on particular topics of interest will be held as needed.

Intra-Organizational Communication (continuous during 1967-68)

The informal staff seminars will be continued. Ellis, Hutchinson, O'Hara, and E. Wilson plan to present in the near future. Frequent meetings will be held during summer 1967 in order to keep the script writers generally informed about overall developments in the several curriculum areas.

STAFF SEMINARS

Another series of seminars is planned in which experts will be brought in to share their experience with our staff. Current plans include people such as: Dr. Norman Sprinthall, decision-making; Dr. Alfred Alschuler, need-achievement motivation training; Dr. Douglas Porter, programmed instruction; and Dr. Clark Abt, games and simulation.

NEWTON SCHOOL DEPARTMENT

The Career Resources Center in the Newton High School and Jobs for Youth will be the ISVD's principal points of contact in Newton during 1967-68.

GRADUATE SCHOOL OF EDUCATION, HARVARD UNIVERSITY

The recommendations for revision of the curriculum in computer technology and measurement will be discussed in the Faculty of Education during 1967-68.

NEW ENGLAND EDUCATION DATA SYSTEMS

Plans are being laid for possible re-organization of NEEDS and its financially responsible body, the New England School Development Council. As this re-organization takes place, NEEDS will also initiate further educational developments in relation to instruction or administration or both.

Inter-Professional Communication (continuous during 1967-68)

Efforts to share the ISVD's knowledge with relevant professional groups will occur largely through staff members who will present papers and participate in local, regional, and national conventions. Current plans include such presentations during the coming year at the following conferences: New England Personnel and Guidance Conference, National Vocational Guidance Association, American Educational Research Association, and American Association of School Administrators.

PROFESSIONAL MEETINGS

INVITATIONAL CONFERENCES

Other *ad hoc* invitational and informal group conferences will be held. Two such conferences are now being planned. ISVD plans to host the informal association of computer-based educational research projects which met last fall at Ohio State University and at Santa Monica in the spring. Secondly, an invitational conference on the teaching of decision-making is planned in which prominent scholars who have significant contributions to make in this area will be invited to participate. Finally, Teachers College, Columbia University and the Graduate School of Education, Harvard University, will seek support for a joint Institute to be held during the summer 1968. The Institute

will be primarily managed by Teachers College but the participants will be in New York for the first of the Institute's two weeks and in Cambridge for the second of its two weeks. Instruction in New York will be in relation to the IBM Guidance and Counseling Support System on which Professors Myers and Super of Teachers College as well as Tiedeman are consulting with Dr. Frank Minor, IBM Advanced Systems Development Division. The instruction at Cambridge will be in relation to the ISVD, which should have Prototype I on-line by that time. Thus, the counselor educators can help the planned revisions for Prototype II as they experiment with, and criticize, Prototype I.

VISITS AND VISITORS

Personnel of the ISVD will need to visit several relevant installations in order to inform themselves and to acquire needed materials. The ISVD will also continue to entertain visitors with relevant professional interests.

THEORY OF THE ISVD (BY DECEMBER 1967)

A draft of the manuscript *Thought, Vocation, and Action* is expected to be ready by December 1967.

SYSTEM, INQUIRER, AND USE TESTING AREA

Summary. Prototype I of the Information System for Vocational Decisions should be implemented on or around 1 February 1968. Prototype I will be extensively tested during February-June 1968 by the professional personnel of the ISVD. As these tests begin to indicate that the System is operable, inquirers of several categories will be brought in small numbers to provide an initial field testing of the ISVD.

The Principal Investigators plan to conduct a more extensive field test during summer 1968. The results of this field test will then be used to change Prototype I into Pro-

totype II. Prototype II is supposed to be operable in February 1969. A field test of Prototype II will then be conducted during February, March, April, and May 1969. June 1969 will be devoted to preparation of the final report of the ISVD and to preparation of specifications for Prototype III.

V. Authority and Personnel of the Information System for Vocational Decisions

AUTHORITY OF THE INFORMATION SYSTEM FOR VOCATIONAL DECISIONS

IN LIAISON THROUGH THE UNITED STATES OFFICE OF EDUCATION

R. Louis Bright, Associate Commissioner of Research, Office of Education

David E. Bushnell, Director, Division of Adult and Vocational Research

Eunice Jones, Project Officer, Human Resources Branch, Division of Adult and Vocational Research (through November, 1966)

Richard B. Otte, Project Officer, Human Resources Branch, Division of Adult and Vocational Research

Alice Y. Scates, Director, Human Resources Branch, Division of Adult and Vocational Research

IN LIAISON, DIVISION OF VOCATIONAL EDUCATION, DEPARTMENT OF EDUCATION, COMMONWEALTH OF MASSACHUSETTS

Walter Markham, Director of Bureau of Vocational Education

John P. Morine, Member of Advisory Committee, and Senior Supervisor, Occupational Information and Vocational Guidance

IN LIAISON THROUGH THE OFFICE OF THE DEAN, HARVARD GRADUATE SCHOOL OF EDUCATION

Jane C. Batchelder, Administrative Assistant in charge of Personnel
Herman F. Eschenbacher, Member, *ex officio*, of Advisory Committee (resigned June 1967), Librarian, and Lecturer in Education

Dorothy A. Johnson, Administrative Assistant in the Office of the Dean
Edward G. Kaelber, Associate Dean
Paul A. Perry, Assistant Dean
William J. Reilly, Financial Assistant to the Dean
Theodore R. Sizer, Member, *ex officio*, Executive Committee, and Dean

ADVISORY COMMITTEE

∫*E. Gil Boyer (resigned April, 1966), Administrator, NEEDS (June, 1963-June, 1966)
Charles T. W. Curle, Professor of Education and Development, Harvard Graduate School of Education
∫*Russell G. Davis, Professor of Education and Development; Research Associate in Center for Studies in Education and Development, Harvard Graduate School of Education
Howard W. Dillon (appointed June, 1967), Acting Librarian, Harvard Graduate School of Education
∫*Richard M. Durstine, Research Associate in Center for Studies in Education and Development; Lecturer in Education, Harvard Graduate School of Education
∫*Allan B. Ellis, Director of Research, NEEDS; Assistant Professor of Education, Harvard Graduate School of Education
Herman F. Eschenbacher (resigned June, 1967), Librarian, Harvard Graduate School of Education (July, 1965-July, 1967)
∫*Wallace J. Fletcher, Consultant in Technical, Vocational and Adult Education for the Newton Public School System
Thomas E. Kurtz (appointed June, 1967), Director, Kiewit Computation Center, Dartmouth College
∫*Edward Landy, Assistant Superintendent of the Newton Public School System and Director of Pupil Personnel Services and Special Education, Newton Public School Department

Emmanuel G. Mesthene, Executive Director, University Program on Technology and Society, Harvard University
John D. Morine, Senior Supervisor, Occupational Information and Vocational Guidance, Division of Vocational Education, Department of Education, Commonwealth of Massachusetts
∫*Robert P. O'Hara, Executive Director, Information System for Vocational Decisions
*Theodore R. Sizer, *ex officio;* Dean, Harvard Graduate School of Education
∫*David V. Tiedeman, Chairman; Professor of Education, Harvard Graduate School of Education; Chairman, Executive Committee, Information System for Vocational Decisions
∫*Michael J. Wilson, Executive Officer, New England Education Data Systems
Norman Zachary (resigned April, 1967), Director, Harvard Computing Center

∫ Principal Investigator
* member of Executive Committee

RESEARCH ASSOCIATES
Duncan F. Circle
David B. Clemens
Arthur M. Krcll
Lawrence Lerer
Noel F. McGinn
Eugene H. Wilson

SYSTEMS SPECIALISTS
Barbara Howley
Roy E. Norris, Jr.
Ann W. Taylor

COUNSELORS (NEWTON SCHOOL DEPARTMENT)
Roger Brown
James Hartman
Dorothy Kunberger
James McDade
Archibald Stark

SUPERVISOR AND PRINCIPAL (NEWTON SCHOOL DEPARTMENT)
Robert Frost
Edward C. Martin

ADMINISTRATIVE ASSISTANT	Sara S. Booth
RESEARCH ASSISTANTS AND TECHNICIANS	Robert Aylmer Nancy Blackmun (summer 1966) Gordon A. Dudley Patrick F. Ferrone Lynne Fitzhugh Charles E. Gunnoe Thomas E. Hutchinson Diana J. Kronstadt Sandra Morse (summer 1966) Terence J. O'Mahoney Margaret E. Pincus Dana E. Quitslund Richard A. Roman Johanna Seltzer Stanley A. Schainker Thomas E. Swithenbank Charles S. Wetherell Laurence Wolff Barbara L. Zurer
LIBRARIAN AND PUBLICATIONS ASSISTANT	Priscilla A. Little
COMMUNICATIONS TECHNICIAN	Richard F. Topping
SECRETARIES	Patricia Capen Dorothy-Julia Emerson Karen Ann Guillette Marietta L. Haley Jacqueline Hargrove (resigned July, 1966) Nadia Hurt (resigned February, 1967) Jean MacQuiddy (resigned April, 1967)

Felice A. Merritt
Deborah Richardson
Nona D. Strauss
Helen E. Topping

CLERKS
Jayne Lyons
Annette B. Miller
Mary A. O'Doherty

COURIER
James P. Dean

CONSULTANTS
Warren Gribbons, Regis College (summer 1965)
Paul Lohnes, Project TALENT (summer and fall 1967)
Frank J. Minor (time contributed by International Business Machines Corporation, Inc.)
Calvin Mooers, Rockford Research Institute, Inc. (summer and fall 1966)

SUB-CONTRACTORS
Abt Associates (spring 1967)
Computer Associates (spring and summer 1967)

VI. References

Carroll, John B., and Ellis, Allan B. *Planning and Utilization of a Regional Data Bank for Educational Research Purposes*, Contract No. OE-5-10-097 with Cooperative Research Program, Office of Education, U. S. Department of Health, Education, and Welfare. Cambridge, Massachusetts: Laboratory for Research in Instruction, Graduate School of Education, Harvard University, December, 1965.

Field, Frank L. *Toward an Operational Goal for Guidance-in-Education: A Working Paper for Program Development.* (Mimeo.) Santa Barbara, California: School of Education, University of California, 1964.

Mooers, Calvin. "TRAC, a Text Handling Language," *Proceedings of the ACM, 20th National Conference.* Cleveland, 1965, 229-246.

Tiedeman, David V., Landy, Edward, Fletcher, Wallace J., Ellis, Allan B., Davis, Russell G., Boyer, E. Gil (Principal Investigators). *An Information System for Vocational Decisions.* (A Development Program submitted to the U. S. Commissioner of Education under the Provisions of Section 4 (c) of the Vocational Education Act of 1963). Cambridge, Mass.: Office for Research Contracts, Harvard University, 1965.

——, and O'Hara, Robert P. *Career Development: Choice and Adjustment.* New York: College Entrance Examination Board, 1963.

United States Government, Department of Labor, Bureau of Employment Security. *Dictionary of Occupational Titles, I*

and II (3rd ed.) Washington, D. C.: United States Government Printing Office, 1965.

Wrenn, C. Gilbert. *The Counselor in a Changing World.* Washington, D. C.: The American Personnel and Guidance Association, 1962.

VII. Technical and Project Reports

TECHNICAL REPORTS

No. 1—"The Computer and Career Decisions" by Allan B. Ellis and Charles S. Wetherell.

No. 2—"Forecasting for Computer Aided Career Decisions: Survey of Methodology" by Russell G. Davis.

No. 3—"Level of Aspiration and Models Applicable to the Problem of Choice of Career" by Thomas E. Hutchinson.

PROJECT REPORTS

No. 1—"The Organization and Intention of a Proposed Data and Educational System for Vocational Decision-Making" by David V. Tiedeman.

No. 2—"An Information System for Vocational Decisions (ISVD): Cultivating the Possibility for Career through Operations" by David V. Tiedeman.

No. 3—"A Theoretical Foundation for the Use of Occupational Information in Guidance" by Robert P. O'Hara.

No. 4—"Suggestions for Treatment of Information about Occupations" by Richard M. Durstine.

No. 5—"Self Esteem Because of Collegiate Admission and Education" by David V. Tiedeman.

No. 6—"Forecasting for Computer Aided Decisions: Prospects and Procedures" by Richard M. Durstine.

No. 7—"A Task Oriented Course in Decision-Making" by Eugene H. Wilson.

No. 8—"Toward a Language of Supervision" by Wallace J. Fletcher, Lawrence Lerer, and Charles Gunnoe.

No. 9—"Recent Developments and Current Prospects in Occupational Fact Mediation" by David V. Tiedeman.

No. 10—"A Tentative Career Development Curriculum and its Implications for the Patterning of Supervisory Responsibilities in the Information System for Vocational Decisions" by Wallace J. Fletcher, Lawrence Lerer, and Charles Gunnoe.