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ABSTRACT

Four major areas of investigation were undertaken in the course of this study on the training and careers of research and research-related personnel in education. The first area covered the development and testing of a classification system of skills necessary for research, development, diffusion, and evaluation in education. Telephone interviews with 58 employers of research personnel indicated that the most important skills and those in shortest supply involved the exercise of judgment. It was suggested that apprenticeship training might be the best way to develop these skills. The second area concerned employment. Employment service data were examined and the most important conclusion obtained was that whereas the number of applicants remained stable from 1968-1970, the number of positions declined. The third area involved an analysis of characteristics of trainees in Graduate Research Training Programs under Title IV of Elementary and Secondary Education Act of 1965. Conclusions drawn from this study stated that the Title IV programs are worthy of continued support. The last area examined alternative approaches to training educational researchers. The following three training possibilities were considered: (a) a library of cassette tapes on current research topics, (b) transportable packages of training materials, and (c) simulation techniques. The possibilities for simulation techniques were particularly stressed. (MK)

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FINAL REPORT

Grant No. OEG-0-9-180240-3757 (010)

AN EXPLORATORY STUDY OF SELECTED VARIABLES RELATED TO THE TRAINING AND CAREERS OF EDUCATIONAL RESEARCH AND RESEARCH-RELATED PERSONNEL

BLAINE R. WORTHEN

MAUREEN L. BYERS

December, 1970

The project reported herein was conducted pursuant to a grant from the Office of Education, U. S. Department of Health, Education, and Welfare. Grantees undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

Task Force on Training Educational Research and Research-related Personnel

American Educational Research Association

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This study was conducted under the guidance of the AERA Task Force on Training Educational Research and Research-related Personnel. The Task Force not only acted in an advisory capacity throughout the study but also participated directly in some activities reported herein. Members during the period of this grant are listed below.

Abbott L. Ferriss, 1969-70
Myles I. Friedman, 1969
Robert M. Gagne, Chairman, 1969
William J. Gephart, 1969-70
John E. Hopkins, 1969-70
Reginald L. Jones, 1970
Jason Millman, 1969-70
Harold E. Mitzel, 1970
Ellis B. Page, 1969-70
W. James Popham, 1969-70
Ernst Z. Rothkopf, 1969
Sam D. Sieber, 1970
Blaine R. Worthen
Chairman, 1970

Special thanks are due Robert Gagne who not only served as chairman of the Task Force during the first several months of this project but also has continued to support Task Force activities during his tenure as President of AERA.

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The central office staff of AERA has provided valuable assistance in numerous ways. Special thanks are extended to Gary E. Hanna and Michael J. McCormick for effectively coordinating many financial and administrative activities related to the project.

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B.R.W.

M.L.B.

CONTENTS

CHAPTER 1

INTRODUCTION

INTRODUCTION

The need for many kinds of improvement in our educational system and its current practices is widely recognized in our society. Attempts at improvement through applying scientific and technical advances have not yet brought about the changes in educational outcomes originally hoped for. The call for excellence in a system of democratic education (Gardner, 1961) has not yet resulted in marked alterations in the schools or in their manner of operation. The striking facts of turmoil in urban centers have made even more apparent the failure, not of existing schools, but of our system of education, to provide substantial segments of our population of young people with the skills they need to become integral members of our society.

Research and research-related activities (development, diffusion, and evaluation) have an important part to play in efforts to effect changes in our educational system for the purpose of bringing about needed improvements. In many areas, it is systematic knowledge, including theory, that would apparently contribute most to such change--we simply do not know enough about causes of educational effectiveness to be able to take action. In other instances, it is clearly development that is most needed--the new courses already developed scarcely make a dent in the techniques and procedures which will enable the schools to make optimal use of new technological advances. In many fields of educational operation, it has become evident that evaluation is the activity most in need of emphasis--we have not yet fully learned how to test the usefulness of new educational procedures or materials.

In still other areas, it is apparently dissemination of the outcomes of research and development which holds most promise--we know too little as yet about how to bring about utilization of new ideas, techniques, and products.

The importance of research and research-related activities in the field of education has become increasingly clear to many important segments of our society. Indeed, the widespread acceptance of the criticality of these activities in building a knowledge base that can be used to influence school practices has resulted in increasing public and financial support for research and research-related functions during the past decade. This increase in research, development, diffusion and evaluation endeavors has resulted in a parallel demand for qualified persons to participate in the conduct of these activities. Evidences of the need for suitably trained persons to perform essential functions in these areas of effort are many. Public and private schools, Research and Development Centers, Regional Laboratories, independent research agencies, State Departments of Education, and universities and colleges have been hard-pressed during most of the period since 1965 to find sufficient numbers of employable persons qualified in requisite research, development, diffusion and evaluation skills. Based on an examination of persons employed on government projects and a projection of expected funding, Clark and Hopkins (1969) concluded that these combined needs could readily create a discrepancy between the demand and supply of qualified research and research-related personnel in the order of four thousand persons by 1974 unless more effective ways are found to train persons to fill such roles.

Since 1968, deterioration on the economic scene and failure of funding agencies to increase support for research and related activities at projected rates have suggested that the research community may not suffer from an acute shortage of personnel as soon as originally anticipated. In fact, the shortage, in terms of sheer numbers of vacancies unfilled, seems to have been temporarily alleviated by a general depression in the job market. However, this "breathing spell" has allowed a related problem to come into focus more clearly. It is becoming increasingly apparent that educational research, development, diffusion, and evaluation activities suffer from insufficient training of many role occupants in these areas. It is clear that many persons performing in research and research-related roles are severely handicapped by their lack of skill and/or knowledge in relation to substantive and methodological requisites in their areas of investigation. It is equally clear that even the researchers and related personnel who are initially well-trained to engage in their respective activities quickly are faced with obsolescence in a field almost devoid of viable programs designed to keep such persons abreast of new developments in their areas of specialization. As Gage (1967) pointed out, there is a problem of "obsolescence among educational researchers," resulting from the many new substantive and methodological developments in the field, including such technologies as Bayesian Theory, computer simulation, organization theory, flexible scheduling, among many others.

In an attempt to prevent obsolescence, the American Educational Research Association (AERA) has conducted during the past several years a number of Presessions of educational research training, each of several days' duration, prior to its Annual Meeting. Several hundred persons have applied annually for admission into sessions dealing with topics such as experimental design, anthropological field methodology, multivariate design and analysis, research management techniques, instructional product development, evaluation, nonparametric statistics, and computer and natural language. It is evident from the number of applications that educational researchers themselves recognize their need for training in new methods and techniques, and that they are active in seeking such training in organized extra-university settings. The proportion of needs satisfied by such sessions is unknown; but the size and scope of interest suggests a substantial unfulfilled demand.

The AERA Presessions have been evaluated by Glass (1968) and Popham (1969). Their findings emphasize the effectiveness of training sessions, even when relatively brief, in raising the quality of performance of educational researchers in specific areas of new methodology which are recognized as needed by the recipients. However, one cannot be certain from such evidence that all or even most of the needs for postgraduate, upgrading, and contra-obsolescent skills are being adequately met. For one thing, the demands reflected by the topics of the Presessions may be inadequately reflecting needs of schools, districts, and state agencies, as opposed to universities. This is in line with a suggestion strongly presented by Di Lorenzo (1965). And for another, the limitations in length of training provided by presessions may preclude the offering of a number of kinds of training which are of equal or greater importance, but which require more time.

Lack of knowledge about "training variables" is undoubtedly the greatest impediment to planning training programs that will not only provide sufficient initial training to researchers and related personnel but also provide sufficient inservice training to prevent obsolescence and continually upgrade skills. The problem may be stated in brief terms as follows. Although the value of educational research to the broader goal of educational improvement is generally recognized, we do not yet know precisely what kinds of functions must be performed by the educational research community in progressing t this goal. As a corollary, we have not yet systematically defined what kinds of requirements for educational research are generated by schools and other components of the educational system. The central question, arising from the existence of such requirements, is: what are the skills of educational researchers which will meet these needs? If a determination can be made of these skills, the further step can presumably be taken to discover which of these skills are currently possessed by personnel in the field and which are missing. This procedure will yield a list of deficiencies, or needed skills. At such a point, systematic consideration can be given to the question of how these needed skills can best be established. Some of them may already be the focus of emphasis of graduate training or other programs. Other needed skills can perhaps best be supplied by alternative inservice approaches to "upgrading" and "preventing obsolescence" which appear to be an important part of the total complex of educational research and research-related training.

To begin to establish a relevant knowledge base and develop procedures to attack these problems, AERA has established a Task Force on the Training of Research and Research-related Personnel in Education. Under support of the present grant, this first year of Task Force operation represents a pilot year in which several strategies for training.

research and research-related personnel and for collecting data related to training variables are being explored. The emphasis during the first year is not on the development of products or on the conduct of ...ly-controlled research studies; rather, Task Force efforts have been aimed at (a) gathering interim data relating to current training needs and current training procedures in educational research and research-related areas, (b) stimulating the development of quality instructional materials for use in preparing research and research-related personnel, and (c) planning carefully controlled long-range studies of manpower needs in educational research and research-related areas, competencies required of role occupants in such areas, and the effectiveness of existing and projected training programs for preparing sufficient quantities of well-prepared educational researchers and research-related personnel.

Objectives

The objectives of the Task Force project for 1969-70 include both short-term and long-term efforts. Specific objectives and sub-objectives of both types are listed below.[1]

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[1]Early in the project, the Task Force refined and articulated the original set of objectives, resulting in the present objectives. While different from the original set in wording and subordination, they do not represent substantive changes nor did they require procedural modifications. The changes were introduced to increase clarity and better represent the original intent of the Task Force in proposing the activities reported herein.

Long-term Objectives

1. To plan long-range systematic studies to:
   (a) determine functions that research and research-related personnel are required to perform,
   (b) determine skills that research and research-related personnel need to perform such functions,
   (c) project new functions and skills that are likely to be required.
   (d) continuously monitor the relationship between skills needed and skills produced by extant training programs in order to detect any discrepancies between the two.

2. To plan how to develop specifications, models, and criteria for developing instructional materials for use in training research and research-related personnel.

Short-term Objectives

1. To determine necessary functions for research and research-related personnel--i.e., to determine the nature of operational requirements existing for such persons in various educational settings.

2. To determine the skills that research and research-related persons need to perform these functions.

3. To determine which of the needed skills are adequately provided (developed in sufficient quantity) by current training procedures and which skills are not adequately provided by such training procedures--i.e., which skills are lacking.

4. To project new skills that will be needed in the future.

5. To identify alternative training modes and procedures that appear promising for use in (a) upgrading present personnel in areas of lacking skills, and (b) preventing obsolescence.

6. To select two alternatives from among those identified as most likely to achieve the desired goals of upgrading and maintaining the proficiency of research and research-related personnel, develop materials and procedures necessary for implementation of these modes of training, and conduct a tryout and evaluation of these two modes.

7. To use data gathered from attainment of the above objectives to:
   (a) refine the plans for long-range studies focused on the topics encompassed in these objectives, and
   (b) describe and make recommendations about a program for training research and research-related personnel that will be relevant to the desired goals of developing, upgrading and maintaining skills.

During the course of the project, progress toward attainment of the above objectives was reported in a series of technical papers produced by the Task Force. These technical papers represented interim reports and have been incorporated in edited form in this report. To orient the reader to (a) the relationship between the objectives and the remainder of this report, and (b) the relationship of the technical papers[2] to the various sections of this report, the following discussion is included. In it, each objective is discussed and the relevant technical papers and sections of the present report are referenced. Short-term and long-term objectives are discussed separately.

Short-term Objectives

Objectives 1, 2, 3, and 4 are interrelated and can be considered as a group. Procedures directly relevant to the objectives are discussed herein in Chapter 2 (and, previously, in Technical Paper No. 1, 2, 3, and 5). Briefly, this chapter contains a discussion of (a) conceptual efforts to define relevant functions (e.g., research, diffusion) and generate lists of skills necessary to attain each function, (b) development and administration of an interview technique to a representative sample of employers of reserach and research-related personnel to determine which skills were most important, which in shortest supply, and what additional skills might be necessary in the future, and (c) reconceptualization of essential skills and knowledge. Although not prepared under support from the present grant, Technical Paper No. 4 included several

[2]A list of technical papers by number, author(s), and title is included in the list of references that appears later in this report.

notions that influenced these further conceptual efforts reported in Technical Paper No. 5 and in this report and was therefore distributed in the technical paper series to reach a broad readership. Since justification for some positions taken in this report are contained in that paper, it is included as Appendix F herein.

Chapter 3 and Appendix J also contain information that is relevant to objectives 2 and 3 in that specific skills required by employers and possessed by applicants in the past three annual AERA employment services are discussed. These data were previously included in Technical Paper No. 6, 7, 8, 9, 10, and 19.

Procedures relevant to objective 5 are reported in Chapter 5 herein and in Technical Paper No. 11 and 17. Briefly, this chapter contains (a) a survey of other professional associations to identify promising alternative training modes and (b) a consideration of the use of simulation techniques to train researchers, developers, diffusers, and evaluators.

During the course of the study, it became obvious that data on the quality and effectiveness of ESEA Title IV Graduate Research Training Programs were badly needed. Indeed, it was clear that no recent data about this program--obviously the major current vehicle for training educational researchers--were available. Consequently, the Task Force formulated the following objective:

> To analyze characteristics of trainees in Title IV graduate Research Training Programs and characteristics of the programs themselves in order to provide needed baseline data.

This objective was seen as a necessary first step in a series of objectives aimed at collecting data about the competencies being taught in Title IV training programs, subsequent career involvement of Title IV graduates, etc. However, budgetary constraints prohibited the Task Force from pursuing even this one objective in addition to those to which it was already committed. Therefore, the Task Force requested that they be allowed to substitute the "Title IV" objective above for objective 6 in the original list and expend project funds to attain the new objective. This request was approved by the project officer in the National Center for Educational Research and Development in the U. S. Office of Education and appropriate funds originally earmarked for objective 6 were transferred to the collection and analysis of Title IV data. Procedures relevant to this new objective are reported in Chapter 4 herein and in Appendix L, which contains coding formats for all trainee data analyzed. Interim reports of these activities appeared earlier in Technical Paper No. 13 and 14.

Although objective 6 was removed as a formal requirement under terms of the grant, the Task Force had already stimulated the development and evaluation of two training activities that are (at the time of this writing) underway. Specifically, one training idea generated from within the Task Force seemed to have sufficient merit to warrant conducting a tryout and evaluation and was submitted as a separate proposal. Another proposal for developing and evaluating research training materials was cosubmitted by a Task Force member. Although the actual conduct of these projects will not appear in this final report, the original intent of objective 6 seems to have been at least partially fulfilled through the Task Force role in stimulating these activities. These activities are discussed in greater detail in one section of Chapter 5 and Appendix M herein and, earlier, in Technical Paper No. 12.

In objective 7, attainment of subobjective 7a is implicit in the plans for long-range studies presented in Appendix N of this report. Although not discussed explicitly, all data reported in this report have influenced the planning of long-range studies proposed in the continuation proposal. Indeed, many of the short-term objectives and Task Force activities during the pilot year existed solely to probe new data sources and data collection procedures to identify sources and procedures that hold promise for more extensive long-range study. The attainment of subobjective 7b is at least partially represented by this final report. Although the pilot year activities have yielded more new questions than answers to old questions, some characteristics of desirable training programs have been described and interim recommendations made herein.

Long-term Objectives

Objective 1 in this category has been attained; the proposal for continuation which is included here as Appendix N contains a brief description of long-range systematic studies designed to collect all the data specified in that objective. More detailed plans for the studies are on record in Task Force files.

Data presented in Chapter 3 and Appendix J herein also represent an initial step toward establishing the monitoring system called for in subobjective 1d. These data earlier appeared in Technical Paper No. 6, 7, 8, 9, 10, and 19.

Long-range objective 2 has been only partially attained. The Task Force was at one point requested to suggest specifications and criteria for materials development proposals for consideration by the

U. S. Office of Education Research Training Branch. Although the response to this request might technically satisfy the grant requirement, the Task Force views it as only a partially satisfactory response and efforts to develop more adequate specifications, models, and criteria for such endeavors are currently underway.

Overview of this Report

The remainder of this report is organized into (a) four chapters in which Task Force activities, data, and results are reported, (b) a summary and conclusions chapter, and (c) 14 supporting appendices. It should be stressed that this is a report of research and developmental efforts *per se* and, consequently, the conclusions and recommendations included herein are restricted to those that can be inferred rather directly from the data and procedures discussed in this report. Task Force deliberations have resulted, in addition, in a number of positions and recommendations indirectly related to but not a direct outgrowth of the content of this report. These position statements and recommendations that are based more on collective judgements than on data will be presented later in a separate document (*Technical Paper No. 18*, to be distributed in February of 1971).

CHAPTER 2

A CLASSIFICATION SYSTEM FOR RESEARCH-RELATED SKILLS

A CLASSIFICATION SYSTEM FOR RESEARCH-RELATED SKILLS

One of the most serious impediments to efforts to plan training programs for research-related personnel is lack of knowledge about which particular competencies or skills are most important in conducting research and research-related activities. In this chapter, the efforts of the Task Force to obtain such knowledge are reported.

The discussion is in three parts. The development of a classification system for functions and skills required of research-related personnel is presented in the first section. In the second section, the development of a method for obtaining information on certain competencies is described and the data collected by that method are presented. A tentative proposal for refinement and reconsideration of the essential knowledge and skills for educational research and evaluation is presented in the third section.

The Development of a Classification System for Functions and Skills in Educational Research

This section contains a discussion of the initial procedures used in developing the classification system for research and research-related functions and skills. The procedures reported herein included the following: (a) preliminary Task Force discussions of the parameters within which research and research-related functions could be described, the interrelationships among those functions, and skills relevant to each function, (b) synthesis of these concepts into a working draft, and (c) further Task Force discussions to react to and refine the draft into a tentative position paper.

Introduction

Preliminary discussions resulted in several decisions and products. First, it was decided that the focus should be broadened from research, per se, to include all phenomena related to inquiry in education. Thus, whether or not an activity could be shown to be directly related to inquiry became the major criterion for determining whether it should be considered further. Secondly, several functions relevant to this focus were discussed and attempts made to interrelate them. For functions on which there was consensus (research, development, and diffusion), tentative lists of skills were drawn up.

The next step was to draft a synthesis of the conceptual efforts, including efforts to delineate the area of evaluation. The result was a classification system for functions and skills required of research-related personnel in education. This system was modified, definitions of all functions were added, and additional skills were identified for inclusion. What follows is this preliminary attempt of the Task Force to develop a classification scheme for research-related functions and skills that could be examined and reacted to by practitioners in these research-related functions.[1]

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[1]This presentation is in the form in which it was originally distributed to research-related practitioners. Although the necessity of some content revisions was apparent, they were deferred so that the procedures for interviewing the practitioners and the results of the "reality testing" reported in later sections of this chapter could be interpreted in relation to the content actually reviewed by the sample of practitioners.

Functions Required of Research and Research-related Personnel

1. Research
2. Research-based Development
   a. invention and engineering [2]
   b. product testing
3. Diffusion
   a. dissemination [2]
   b. demonstration [2]
   c. facilitating adoption [2]
4. Evaluation [3]
   a. context evaluation/situation analysis
   b. program planning/input analysis
   c. process evaluation/program monitoring
   d. outcome evaluation

Definitions and lists of skills for each function appear on the following pages.

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[2]These functions are largely undefined at present and, pending further development of roles and skills in these areas, the Task Force focus will be on those functions that can be confidently and directly related to disciplined processes of inquiry. In addition to such inquiry skills, the functions referenced here also depend on skills and knowledge that might more appropriately be developed in fields not directly involved in producing research or research-related personnel *per se* (e.g., communications theory, marketing, engineering) and, consequently, training in these non-inquiry skills might be viewed as a rather minor cooperative training responsibility for AERA, with more attention directed to more directly relevant inquiry skills.

[3]The evaluation functions that evolved from Task Force procedures parallel closely types of evaluation previously described by Daniel L. Stufflebeam, and some terms in 4 a, b, and c above are borrowed or adapted from his work.

<u>Research</u> is the activity aimed at obtaining knowledge, either general or specific. This knowledge may be obtained by empirical or other systematic methods and it may or may not have immediate application. This knowledge may result in theoretical models, functional relationships, or descriptions (such as the amount of teacher-talk occurring in a specific classroom).

The process by which such knowledge is produced generally involves: (1) the specification of a question to be answered or a hypothesis to be tested; (2) the delineation of a population of interest and a sample of that population; (3) either the description of experiences shared by <u>or</u> the administration of a treatment to the sample; (4) measurement (including observation and evidence gathering); (5) analysis of evidence; and (6) drawing conclusions and implications.

The major distinction between research and research-related functions (such as research-based development and evaluation) is that in research, utilization of the knowledge is typically not foreseen in the same specific detail as it is in research-related activities.

<u>Example</u>. Several techniques of sequencing problems and generalizations in presenting mathematical concepts are compared in terms of their effect on initial learning, retention, and transfer of the concepts, in order to study the relationships between sequencing in task presentation and valued learning outcomes.

Skills Necessary for Research

1. Drawing research implications from results of prior research studies.

2. Identifying and delineating significant researchable problems.

3. Procuring and/or managing resources (material and human) necessary to reach research objectives.

4. Interpreting, evaluating, and synthesizing relevant literature.

5. Formulating hypotheses or empirical questions to be answered by the study.

6. Specifying data or evidence necessary for a rigorous test of the hypothesis.

7. Identifying the population to which results should be generalized and a sample representative of that population, using appropriate sampling techniques to draw the sample.

8. Formulating alternative generalizations from predicted research outcomes.

9. Identifying appropriate research methods.

10. Understanding experimental, quasi-experimental, and other systematic approaches to inquiry, and drawing on such knowledge in designing a research study appropriate to the problem under consideration.

11. Applying the research design, recognizing, explicating and controlling threats to validity.

12. Identifying classes of behavioral outcomes for measurement.

13. Choosing specific variables and treatments (where appropriate) to be used.

14. Selecting appropriate techniques of measurement.

15. Developing measuring instruments.

16. Assessing the validity of outcome measures.

17. Using a variety of data-gathering methods (tests, interviews, analysis of documents, etc.).

18. Organizing data for analysis.

19. Understanding the general role, types, and assumptions underlying various statistical techniques, and drawing on such knowledge in selecting and using appropriate techniques of data analysis.

20. Using aids in data analyses, such as computer processing.

21. Interpreting and drawing appropriate conclusions and implications from data analyses.

22. Formulating statements of a theory that offers an explanation (cause-effect relationship) of the behavior under study.

23. Reporting research findings and implications, orally and in writing.

Research-based development is that activity which uses the results of systematic, disciplined inquiry to lead to the creation of an educational product (e.g., instructional materials, grading system for a school, design for school building). This is in contrast to development activities which have been brought to final form with very casual or no field testing (e.g., teacher-prepared instructional unit).

Example. The Pittsburgh R and D Center developed learning materials for Individually Prescribed Instruction. The materials were developed to meet performance specifications and were subjected to several revisions as a consequence of field tests with the intended audiences until the performance specifications were attained.

Product testing is that aspect of research-based development which is focused on actual testing of products that are viewed as ready for tryout. Product testing involves the collection and analysis of data to assess discrepancies between product outcomes and objectives. It may take place either in the laboratory or in field settings and is used repeatedly during the developmental phase as the product is further refined or modified on the basis of performance on previous product tests.

Example. Sections of a proposed programmed mathematics text, based on principles of operant conditioning, are evaluated by panels of experts. After the sections are revised to incorporate the experts' suggestions, small samples of students at the level for which the text is aimed use and evaluate these sections. After further revisions prompted by difficulties encountered by the students, the sections are combined and the total text is tested on larger samples in real school situations representative of the audience for whom the text is designed.

Skills Necessary for Research-based Development (including Product Testing)

1. Interpreting information concerning education goals.
2. Drawing on research results in planning developmental activities.
3. Conceptualizing systems, their elements, and interrelations among these elements.
4. Specifying desired performance outcomes (objectives) of instruction.
5. Devising techniques to identify entry capabilities of learners.
6. Identifying alternative instructional and media techniques.
7. Determining appropriate sequences of topics in instruction.
8. Describing the product to be developed.
9. Composing effective oral and written forms of instructional communications.
10. Directing the work of production personnel.
11. Selecting or devising appropriate techniques for measuring outcomes.

12. Designing and managing initial laboratory tests of developed techniques and materials.

13. Designing and managing field tryouts and tests.

14. Reporting evaluation of atucomes.

15. Interpreting evaluation findings.

16. Specifying requirements for revision based upon outcome evaluations.

Diffusion encompasses planning, designing, and conducting activities which insure the application in educational programs of the findings or products of research and development efforts. This may be done by various means, including (a) the use of communication techniques to disseminate information about the product or findings, (b) the conduct of demonstrations to establish the utility and applicability of the product or findings, and (c) procedures which facilitate adoption or application of the product or findings.

Example. In junior-high science teaching, inquiry methods have been developed into methods of question-asking by teachers. It is now necessary to (a) inform appropriate persons and agencies about these methods, (b) demonstrate their utility, and (c) provide help to those who wish to adopt the methods (e.g., provide training in use of the question-asking techniques to accompany the introduction of a new course in science in a particular junior-high school).

Skills Necessary for Diffusion

Dissemination

1. Defining and analyzing characteristics of target group(s).

2. Selecting from all available information about developed packages that which can be most effectively disseminated.

3. Selecting the most effective dissemination vehicles to convey information to target groups.

4. Composing the information, within a chosen format, for accurate and pervasive dissemination.

5. Implementing actual dissemination, including the direction of technical production personnel.

6. Designing and implementing techniques for evaluating the effectiveness of the dissemination effort.

Demonstration

1. Specifying nature of the demonstration.

2. Selecting appropriate setting and personnel for demonstration.

3. Managing and coordinating the demonstration effort.

4. Evaluating the effectiveness of the demonstration.

Facilitating Adoption

1. Identifying features of the adopting organization or system which differ from those in which the product was developed and tested.

2. Designing modifications of the product to fit the adopting organization or system, when necessary.

3. Designing procedures for modifying the adopting system or organization to fit the product, when necessary, including the design of needed training programs.

4. Identifying potential barriers to implementation.

5. Devising and conducting long-range evaluation of the installed package.

Context evaluation/situation analysis is the process of identifying and comparing intended outcomes of a system (what is desired) with actual outcomes (what is) on specified variables in order to (1) identify needs and problems to which the system must attend, and (2) provide information which will help decision-makers to develop relevant objectives which, if attained, will satisfy the need or solve the problem.

Example. Comparison of a current reading achievement level of elementary school children in District X with national norms on the same reading test leads to identification of a discrepancy of one full grade level. Data collected on possible causes reveal that the teachers feel inadequate in teaching reading, hence they spend as little time as possible on it. An objective is set to develop an inservice training program to develop teacher competency in teaching reading.

Skills Necessary for Context Evaluation/Situations Analysis

1. Identifying goals of the system.

2. Assessing the social relevance of those goals.

3. Identifying values that are implicit in the system goals.

4. Identifying the nature of the standards or norms the decision-makers will apply in interpreting the relevant data which may be provided.

5. Clarifying and explicating desired outcomes of the system.

6. Measuring current actual outcomes of the system through techniques such as:

   a. demographic analysis
   b. economic analysis
   c. psychometric analysis
   d. systems analysis
   e. observational techniques

7. Comparing actual and intended system outcomes to identify discrepancies (needs) which exist in the system.

8. Explicating the problems that create the needs and diagnosing the causes of these problems.

9. Helping system personnel to develop objectives which, if attained, will satisfy the needs or solve the problems identified above.

10. Designing a monitoring system that will provide continual data (of the type above) on the status of the operating system.

Program planning/input analysis is the process of identifying and assessing the potential utility of alternative approaches designed to attain specified objectives. Once objectives have been established, the research-related aspects of program planning/input analysis are: (1) identifying what needs to be done to attain those objectives; (2) identifying the financial, political, and personnel limitations that impinge upon attainment of the objectives; (3) identifying alternative approaches and/or materials for use in attaining the objectives; (4) determining the financial, political, and personnel costs for each alternative and the degree to which it contributes to the attainment of the objectives; and (5) assigning relative weights to each of the objectives.

Example. A decision has been made that the reading instruction program in grades K-1 is not satisfactory and a new or modified program must go into effect in one year. Data collection about four alternative programs reveals that one is superior to the others on a majority of relevant criteria. The steps listed above were necessary in reaching this conclusion. However, these activities do not include the final choice of the program to be implemented.

Skills Necessary for Program Planning/Input Analysis

1. Helping system personnel to apply criteria to lists of possible objectives in order to select those which are feasible within constraints of the operating context.

2. Helping system personnel to establish priorities for the selected objectives.

3. Identifying and rating alternative strategies for attaining the selected objectives.

4. Identifying and rating available resources (human, material, and financial) and/or potential sources of support.

5. Selecting a strategy for implementation.

6. Selecting a source of support or the available resources which will be used to implement the program.

7. Predicting the potential barriers to success in the proposed course of action and judging the potential of the strategy for overcoming the estimated procedural barriers.

8. Identifying alternative tactics to implement selected strategy and choose those that seem most likely to succeed.

Process evaluation/program monitoring is the process of (1) monitoring an installed program to detect unanticipated problems or deviations from design or specified procedures and (2) providing immediate feedback to program operators for their possible use in making program modifications.

Example. A new reading program scheduled to begin on September 1 requires that overhead slides be used extensively during the first three weeks of instruction to show specific words and pictures. Program monitors might inform the program operator that (a) during the first week of instruction, the projectors were used by only 7 of 16 teachers in the school and (b) this low rate of usage is apparently due to difficulties the teachers have encountered in operating a new, more complex overhead projector.

Skills Necessary for Process Evaluation/Program Monitoring

1. Designing and selecting indicators of progress in educational programs.

2. Monitoring the program to detect deviations from design or specified procedures through techniques such as unobtrusive measures, systems analysis, and observational techniques.

3. Anticipating predicted barriers and remaining alert to unanticipated problems that threaten the success of the program.

4. Providing immediate feedback to program operators for their possible use in making decisions about modifications of the plan, procedures, or resource alloations.

5. Perceiving human relation problems that threaten the success of the program.

<u>Outcome evaluation</u> encompasses the identification, collection, and presentation of information useful to those who must judge the worth of an educational program, product, or procedure, typically at their termination. The data to be collected might include (a) intermediate or terminal evidence on the attainment of objectives, (b) unanticipated problems and beneficial side effects, and (c) costs in both human and material resources. Such information would be used by the decision-maker to determine whether the program or procedure should be continued as is, modified, or terminated.

<u>Example</u>. A team of school-district evaluation personnel design and conduct an experimental investigation to test the relative effectiveness of two competing sets of reading materials in developing specified reading skills in a particular group of disadvantaged children.

Skills Necessary for Outcome Evaluation

1. Applying appropriate designs to evaluation studies.

2. Developing general criteria and designing data collection procedures for application in measuring the effectiveness and efficiency of existing innovative practices and products, i.e., minimum standards and outcomes which indicate successful utilization of practices and products.

3. If necessary, translating objectives into behavioral terms.
4. Identifying situations in which the designated behavior can be observed and recorded.
5. Establishing standards or norms for judging whether objectives have been attained.
6. Selecting (or developing) and using techniques of measurement to yield information relevant to these standards.
7. Assessing the validity of outcome measures.
8. Collecting and organizing the data preparatory to analysis.
9. Selecting an appropriate technique to analyze the data.
10. Analyzing the evidence yielded by the evaluation.
11. Judging the strengths and weaknesses of the plans and procedures employed for meeting the project objectives.
12. Deciding how to explain the outcome as a function of plans, procedures, and resources.
13. Deciding what recommendations to make as a result of the outcomes.
14. Estimating the potential impact of the outcomes on the problem area being served.
15. Providing sufficient information to the decision-maker to enable him to decide whether to continue, modify, or terminate the activity or process evaluated.
16. Specifying changes that need to be made in the context evaluation system due to decisions about program continuation.

The Development of an Interview Technique and Analysis of Interview Results

Following development of the initial classification schema reported above, it was distributed to a sample of persons involved in research-related activities in order to elicit their reactions to it through personal interviews. A second purpose for conducting the interviews was to collect interim data on manpower deficiencies and methods for alleviating such needs. A description of the procedures for designing the interview technique and identifying the interviewees is contained in the first part of this section. The results of the interviews are reported in the second part.

Development of the Interview Technique

The procedures were developed by the Task Force and refined and detailed by the project staff. In general, they included the following steps: (a) identifying an appropriate sample of interviewees to react to the draft of the classification schema and respond to critical questions formulated by the Task Force, (b) developing and testing an interview schedule for use in eliciting and recording interviewee reactions, (c) developing and testing a technique for distributing the classification schema to interviewees and arranging to conduct the interviews, (d) identifying and training interviewers, and (e) distributing the classification shcema and conducting the interviews. Each of these steps is discussed below.

The Interviewees

There were four major considerations in determining how the interviewees would be identified. First, it was apparent that the most relevant interviewees would be persons who administered agencies in which research and research-related activities were conducted and thus employed or supervised others who participated in these activities. Second, it was obviously necessary to include in the sample some interviewees with major responsibility for supervising or employing researchers, some with major responsibility for evaluation, etc. Third, an attempt was made to include interviewees from each of ten institutional settings identified as those in which educational research and research-related activities are conducted. Fourth, 60 was set as a minimal number of interviewees necessary for collecting the needed information.

The ten institutional settings included the following: universities and colleges, research and development centers, regional educational laboratories, independent research agencies, state departments of education, school districts, Federal agencies, military services, business and industry, and professional education associations. A matrix was formed with these ten settings on one dimension and four major functions--research, development, diffusion, and evaluation--on the other, yielding 40 cells in the matrix.

The Task Force nominated as interviewees persons with whose professional responsibilities they were sufficiently acquainted to be certain they met the criteria of (a) employing or supervising persons engaged in one or more of the four major functions, and (b) being sufficiently acquainted with the function(s) to know what competencies are necessary in its (their) performance. The functional area or areas for which each nominee had responsibility and expertise was also identified.

Eighty-two persons were nominated as interviewees. Using their functional area(s) and institutional setting, the 60 persons who distributed most equally across cells were chosen as interviewees. In setting up interview appointments, it was found that eight of the interviewees were ill, out of the country, or otherwise unavailable. Eight new interviewees were selected as replacements. The resultant 60 persons who served as interviewees[4] were distributed by rows, columns, and cells as shown in Table 2.1.

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[4]Appreciation is expressed to the following interviewees for the time and effort they gave to this effort: Marvin Alkin, Alexander Astin, George Baird, Emanuel Berger, John O. Bolvin, Walter Borg, Lee G. Burchinal, Victor Cieutat, David L. Clark, Thomas Clemens, Lewis Crum, Gabriel Della-Piana, Robert A. Dentler, Richard A. Dershimer, John Easter, John C. Flanagan, Warren G. Findley, Robert B. Glaser, Gene V Glass, Keith Goldhammer, William L. Goodwin, Egon G. Guba, Robert L. Hammond, Thomas Hastings, Richard Hills, Paul Hood, Kenneth D. Hopkins, James Jacobs, Herbert Klausmeier, David Krathwohl, Russell Kropp, Norman Kurland, Robert Lankton, Roger Lennon, Ralph Lungren, Susan Markle, Ward Mason, Donald M. Medley, Howard Merriman, Harold Mitzel, Franklin W. Neff, Roland Pellegrin, Malcolm Provus, Arliss Roaden, Glen Robinson, James Robinson, Wade M. Robinson, Robert Scanlon, Charles Schapp, Richard E. Schutz, Harry Shoemaker, Harry F. Silberman, Robert Stake, Theodore R. Storlie, Richard Turner, Risden Weston, Asahel Woodruff, Lorne Woolatt, Louis Wynne, and James Young.

Table 2.1

Distribution of Interviewees by Institutional Setting
and Functional Emphases: Sampling Plan

Institutional Setting	Numbers of Interviewees with Functional Emphasis on:				
	Research	Development	Diffusion	Evaluation	Total
Universities and Colleges	12	8	5	8	17
Research & Development Centers	6	4	1	2	7
Regional Educational Laboratories	3	4	4	4	7
Independent Research Agencies	4	3	2	3	5
State Departments of Education	1	2	3	3	4
School Districts	4	2	4	7	8
Federal Agencies	2	1	2	1	4
Military Services	2	1	0	1	2
Business and Industry	3	3	2	2	3
Professional Educational Associations	2	0	1	0	3
Total Interviewees	39	28	24	31	60

NOTE: In many instances, an interviewee was listed in more than one cell in the same row. Therefore, row totals are not sums of cell totals but represent the total number of interviewees within each institutional setting. Column totals represent the total number of persons across all institutional settings interviewed in relation to each function.

Of the 60 interviewees, it was found that 54 were either present or past participants themselves in the functions for which they were selected. In fact, a perusal of the names of interviewees listed in footnote 1 shows that many of the interviewees are among the leading experts in educational research and research-related activities.

The 60 interviewees were drawn from a broad spectrum of institutions. These institutions and agencies are listed below. Numbers in parentheses are used in instances where more than one interviewee was drawn from an institution.

Universities

Indiana University (3)
Pennsylvania State University
University of Colorado (3)
Bucknell University
Ohio State University (2)
Syracuse University
University of Utah (2)
Florida State University
University of Illinois (3)

Regional Laboratories

Far West Laboratory for Educational Research and Development (2)
Southwest Regional Laboratory for Educational Research and Development
Mid Continent Regional Educational Laboratory
Central Midwestern Regional Educational Laboratory
Center for Urban Education
Research for Better Schools, Inc.

R & D Centers

Learning R & D Center, Pittsburgh (2)
Wisconsin R & D Center on Cognitive Learning
R & D Center in Educational Stimulation, Athens, Georgia
Center for Advanced Study of Education Administration, Eugene, Oregon (2)
R & D Center for the Study of Evaluation of Instructional Programs, Los Angeles

Independent Research Agencies

American Institutes for Research (2)
Educational Testing Service
Educational Research Council of America
Institute of Educational Research

State Education Departments

Illinois State Department of Education
New York State Department of Education (2)
Pennsylvania State Department of Education

School Districts

Detroit Public Schools
Pittsburgh Public Schools
Cincinnati Public Schools
Kearn School District, California
Sequoia Union High School District, California
George Washington High School, Alexandria, Virginia
New York Public Schools
Columbus Public Schools, Ohio

Federal Agencies

U. S. Office of Education (4)

Military Services

USAF Academy
USAF Research Training Command

Business and Industry

Systems Development Corporation
American Telephone & Telegraph
Harcourt, Brace & World

Professional Education Associations

American Council on Education
American Educational Research Assoc.
National Education Association

Instrument Development

An interview schedule was developed, critiqued and revised. The revised schedule was tried out with three educational researchers and revised again to correct ambiguities and problems identified. The result was a highly structured interview schedule constructed so as to provide space for recording responses directly on the instrument. The final interview schedule is reproduced in full in Appendix A.

Contacts with Interviewees

It was not economically feasible to interview each member of the sample personally. Therefore, it was necessary to develop a technique for conducting telephone interviews in all but a few cases where proximity allowed personal interviews to be conducted. To facilitate the conduct of the telephone interviews, a technique was developed where the conceptual schema was sent to each interviewee, with a letter explaining the project and the necessity of contacting him to get 's reactions to specific parts of the schema. A return postcard was included for the interviewee's use in indicating times when he could be reached by telephone or in person by the interviewer. This procedure was also tested with the same three educational researchers as part of the instrument tryout. The cover letter and postcard were then revised; the final form of each is also shown in Appendix A.

Prior to distributing the materials to interviewees, the name of the person serving as interviewer was recorded on both the letter and the return postcard, which was also addressed to return directly to that interviewer. Instructions on these processes also appear in Appendix A. After materials were distributed and return postcards received, appointments were made (using long-distance appointment operators where long-distance interviews were to be conducted).

The Interviewers

Seven Task Force members, the project director, and three project staff members served as interviewers.[5] Thirty-four interviews were conducted by Task Force members and 26 by project staff. Because of (a) the involvement of the Task Force and the present staff in developing and revising the instrument schedule and (b) the highly structured nature of the interview schedule, little training was necessary for these persons

[5] Appreciation is expressed to the following members of the Task Force and fellows in the Laboratory of Educational Research, University of Colorado, for their assistance to the authors in conducting the telephone interviews reported herein: Nancy W. Burton, Abbot L. Ferriss, Robert M. Gagné, William J. Gephart, John E. Hopkins, Jason Millman, Susan J. Oldefendt, W. James Popham, Ernst Z. Rothkopf, and James R. Sanders.

to conduct interviews. Nonetheless, all interviewers were thoroughly trained in all relevant concepts and techniques requisite to conducting the interviews. Instructions were given to all interviewers in an attempt to standardize the way in which the interviews were conducted.

Conducting the Interviews

The interviews were conducted between November 15, 1969 and March 18, 1970. Interviews were completed with all 60 interviewees. In addition to responding to questions, the interviewees made suggestions for modifying the conceptual schema and lists of skills. These suggestions and the data analyses were used in subsequent attempts to modify and improve the conceptual schema tested herein.

Analysis of Interview Results

Interviews were held with 60 persons who either employed or supervised research or research-related personnel in one of ten types of institutional settings. The results of analyses of data collected during these interviews are contained in this section.

Analytic Framework and Techniques

The primary framework within which the data were analyzed consists of two dimensions, institutional setting (10 levels) and function (7 levels). Juxtaposition of these two dimensions results in 70 cell combinations within which the data were analyzed (as shown later in Table 2.2) in relation to elicited responses. The analytic techniques consist solely of simple descriptive techniques, such as frequency distributions, averages and percentages.

Results. Each analysis of data reported in this section is preceded by the item in the interview schedule that was used to collect the data. The items are sometimes abridged or modified here for clarity in presentation.[6]

Necessary Functions

1. Please look at page 3 of the working paper that was sent to you. (See page 19 above) Which of these functions do you see as necessary in your program or institution? (Refer interviewee to definitions and examples if necessary.)

The responses of the interviewees to this item are summarized in Table 2.2.[7]

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[6]Items appear in their original form in Appendix A.

[7]Cell entries in Table 2.2 reflect the number of persons in each institutional setting actually interviewed in relation to each function and include four changes from the earlier presentation of the number of persons within each institutional setting interviewed in relation to each function. (See Table 2.1) First, the interview schedule provided for data collection in relation to seven functions, rather than the four listed in the previous table. (Because of apparent differences in the four activities listed under "evaluation," each was treated as a separate function in the interview schedule, thus increasing the number of functions considered to seven.) Second, two persons had moved from the institution specified for them in the earlier sample plan and, consequently, they were interviewed in relation to their new responsibilities as employers of research-related personnel. Therefore, there was a slight shift from the number of interviewees listed in the sampling plan for each institutional setting and the actual number of persons interviewed in each setting. Third, comparable cell totals in the two tables differ since in the earlier one they represent a priori expectations of functions in which the employers supervised employees, whereas cell totals in Table 2.2 herein represent the functions in which employers were found actually to be supervising employees. Fourth, two interviewees responded incorrectly or inadequately to the questions and their responses were deleted from the analyses; 58 responses are included in all analyses in this report.

Table 2.2

Number of Interviewees Listing Each Function as Necessary in Their Program: By Institutional Setting

Institutional Setting	Research	Development	Diffusion	Context Evaluation	Input Analysis	Process Evaluation	Outcome Evaluation	Total
University	16	15	7	15	12	14	14	19
Regional Laboratory	2	5	3	4	3	3	3	6
R & D Center	5	7	4	4	3	3	3	7
Indep. Res. Organization	3	5	4	4	3	3	3	5
State Dept. of Education	2	1	3	0	2	1	2	3
School District	5	5	4	7	6	6	7	7
Federal Agency	1	1	2	2	2	2	1	3
Military	2	1	1	1	1	1	1	2
Industry	2	2	3	1	1	1	2	3
Prof. Educ. Assoc.	2	0	3	3	2	1	1	3
Total Interviewees	40	42	34	41	35	35	37	58

Note: In many instances an interviewee was listed in more than one cell in the same row. Therefore, row totals are not sums of cell totals, but represent the total number of interviewees within each institutional setting. Column totals represent the total number of persons across all institutional settings interviewed in relation to each function.

When the four functions relating to evaluation are considered together, 47 of the 58 interviewees listed at least one of the four as necessary in their program. Forty-two interviewees listed development as necessary, 40 listed research, and 34 listed diffusion. These totals represent "absolute" necessity with no consideration of which function (when multiple functions were listed as necessary) was most essential. An analysis of the "relative" necessity of functions appears in the next section.

Priorities Among Functions

The interviewees were asked to indicate the relative importance of the functions they listed as necessary in their programs.

a. Please rank the functions you have mentioned in the order of their importance in attaining the goals of your program.

It was difficult to devise any meaningful statistics for use in reporting the results of this part of the interview since the number of functions being ranked varied from one interviewee to the next. For example, a rank of "3" given by one interviewee who listed only three functions relevant to his program could not be assigned the same meaning as a rank of "3" given by an interviewee who listed seven functions. Therefore, the rankings of functions have been presented in three different ways for the reader's information.

First, the ranks assigned to each function (irrespective of the number of functions ranked) were averaged across institutional settings for each function.[8] The results are presented in Table 2.3.

Second, the frequency with which interviewees listed a function as being the most important, by institution, is provided in Table 2.4. The meaning of this table is straightforward and the data may be compared across institutions.

Third, the functions were dichotomized on the basis of their rankings into primary and secondary functions. If a function

[8]If it could be assumed that there were no systematic differences across institutions in the number of functions listed per interviewee, the mean rank of a function could be used comparatively across institutions; unfortunately, it would be dangerous to make such an assumption with the small number of persons interviewed and the obvious differences in numbers of functions ranked. Therefore, data presented in Table 2.3 should be interpreted with caution.

was ranked in the first half of the total number of functions, it was considered to be of primary importance. If the function was ranked in the second half of the total, it was considered to be of secondary importance. The resulting frequencies are presented in Table 2.5.[9]

Table 2.3

Average Rank of Functions in Order of Importance in Attaining Program Goals: By Institutional Setting

Institutional Setting	Research	Development	Diffusion	Context Evaluation	Input Analysis	Process Evaluation	Outcome Evaluation
University	3.25	2.47	4.14	2.71	2.54	2.93	3.33
Regional Lab.	2.50	1.20	1.67	3.25	3.00	2.67	2.00
R & D Center	2.00	1.00	4.25	4.50	4.00	3.50	3.33
Indep. Res. Organ.	1.33	2.00	4.25	2.50	2.00	2.00	1.67
State Educ. Dept.	2.00	6.00	2.00	----	1.50	2.00	1.50
School District	4.60	5.80	3.50	2.29	1.71	1.83	1.86
Federal Agency	1.00	1.00	2.50	1.00	1.00	1.00	1.00
Military	3.50	7.00	5.00	1.00	2.00	4.00	3.00
Industry	4 00	3.00	3.33	1.00	2.00	3.00	4.00
Prof. Ed. Assoc.	1.00	----	2.33	1.33	1.50	3.00	3.50
Average	2.90	2.59	3.38	2.57	2.27	2.55	2.68

[9]There is some question about how meaningful these data are, since the categorizations are, again, correlated with the number of functions listed by the interviewee.

Table 2.4

Frequency of Listing of Each Function as the Most Important Function in Attaining Program Goals: By Institutional Setting

Institutional Setting	Research	Development	Diffusion	Context Evaluation	Input Analysis	Process Evaluation	Outcome Evaluation
University	7	7	1	4	2	3	3
Regional Laboratory	0	4	1	0	0	0	1
R & D Center	3	7	1	0	0	0	0
Indep. Research Organ.	2	3	1	2	2	2	2
State Dept. of Educ.	1	0	0	0	1	0	1
School District	1	0	3	2	2	2	3
Federal Agency	1	1	1	2	2	2	1
Military	1	0	0	1	0	0	0
Industry	1	1	1	1	0	0	0
Prof. Educ. Assoc.	2	0	1	2	1	0	0
Total	19	23	10	13	10	9	11

Note: The number of functions listed as most important exceeds the number of interviewees because of numerous instances where interviewees insisted upon assigned tied ranks of "1" to multiple functions.

Table 2.5

Frequency of Listing Function as Primary or Secondary in Attaining Program Goals: By Institutional Setting [a]

Institutional Setting	Research		Development		Diffusion		Context Evaluation		Input Analysis		Process Evaluation		Outcome Evaluation	
	P	S	P	S	P	S	P	S	P	S	P	S	P	S
University	8	8	9	6	3	4	9	6	8	4	8	6	5	9
Regional Laboratory	1	1	4	1	1	2	0	4	0	3	0	3	1	2
R & D Center	4	1	7	0	1	3	0	4	1	2	1	1	1	2
Indep. Res. Organization	2	1	4	1	1	3	2	2	2	1	2	1	2	1
State Dept. of Educ.	1	1	0	1	1	2	0	0	2	0	1	0	2	0
School District	1	4	0	5	3	3	5	2	6	1	5	1	5	2
Federal Agency	1	0	1	0	1	1	2	0	2	0	2	0	1	0
Military	1	1	0	1	0	1	1	0	1	0	0	1	1	0
Industry	1	1	1	1	1	2	1	0	1	0	1	0	0	1
Prof. Educ. Assoc.	2	0	0	0	1	2	2	1	2	0	0	1	0	2
Total	22	18	26	16	13	23	22	19	25	11	20	14	18	19

[a] P = primary, S = secondary

The data presented in Tables 2.3, 2.4, and 2.5 are difficult to summarize. When the average rank assigned to functions is considered, three of the four evaluation functions were ranked higher (considering "1" as the highest rank) than the other activities, followed in order by development, outcome evaluation, research and diffusion. However, when the frequency with which functions were listed as the most important is considered, the order of importance becomes development, research, context evaluation, product evaluation, diffusion and input analysis (tied), and process evaluation. When functions are dichotomized into primary and secondary importance, development is most frequently listed as a primary function, followed by input analysis, research and context evaluation (tied), process evaluation, product evaluation, and diffusion. If the four functions related to evaluation are considered collectively, evaluation emerges clearly as the function most often listed as most important in attaining the goals of the respective programs. Development is next most important, followed closely by research, and diffusion is the least important function in most of the agencies represented in the interview sample. Diffusion was most often listed as a function of secondary importance.

Additional Research-related Functions

Each interviewee was also asked the following question:

> Are there other research or research-related functions necessary either now or in the future in the conduct of your program that are not included in out list? (If yes) Could you describe them (it) and give an example?

No interviewees responded "yes" to this queston; no additional research-related functions were identified.

Research and Research-related Skills

The remainder of each interview focused primarily on eliciting information about skills[10] necessary to perform the functions the interviewee had listed as relevant to his program. A series of five questions, with additional subdivisions, was presented to each interviewee for each of the functions he listed as relevant (e.g., if the interviewee listed all seven functions as relevant, he would be presented with seven series, each of which contained the five basic questions, modified to refer to the respective functions.)

Some of the questions were focused directly on information about skills necessary to perform the relevant research and research-related functions. Other questions were somewhat ancillary and analyses of responses to such questions are contained in appendices. The five basic questions are presented below, along with an indication of which analyses are summarized in the body and in each appendix.[11]

2. How many people do you employ or supervise who engage in research?

3. Looking at the list of skills on page 5 (see page 21 above), which of them do you consider the most important or critical to the performance of research in your organization? Please identify no more than five or ten. (List below their numbers from page 5.)

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[10]In retrospect, the term "skills" may be less descriptive of the items listed in the first part of this chapter than other terms such as "tasks" or "competencies.". The extent to which knowledge and applicational abilities are intermingled in these "skills" is unclear, but it is obvious that they differ in specificity and clarity. They are considered here as tentative lists that will need further evaluation and empirical testing by the Task Force and project staff.

[11]The example given here is for research, but the questions were comparable for each of the other functions.

a. Are there any of these skills which you consider unimportant in performing this function in your setting? (List by number.)

b. Are there other skills which are not included in the list on page 5, but should be added?

4. Referring to those skills you have identified as necessary to engage in research, which of them are "hard to come by"? In other words, in which of the skills that are necessary do you find deficiencies in your present personnel or in personnel you have attempted to hire? Please identify those that you feel are most inadequate among your present personnel or most difficult to obtain through hiring new personnel. (List by number.)

5. In relation to these skills you have just identified as being in short supply, how difficult do you believe they are to develop? For example, could they be developed in inservice training programs or would long-range training be necessary (e.g., academic year institute or graduate programs)?

a. Do you know of any existing training programs which are designed to develop these skills in trainees?

b. Do you know of anywhere outside of existing training programs where these skills are being developed incidentally to other activities?

c. Can you suggest any new techniques or methods for training personnel in these skills?

6. Are there skills that are not now necessary but which you think will be necessary to engage in research as your program continues, develops, or assumes other functions in the future?

Question 2 was asked as a check to make certain that the interviewee in fact supervised or employed research or research-related personnel and was an appropriate person to interview. The average number of persons supervised or employed by each interviewee is shown in Table 2.6.

Responses to question 3b are summarized in Appendix B and responses to question 6 are summarized in Appendix C. Responses to questions 5, 5a, 5b, and 5c are summarized in Appendix D.

Responses to the questons of most critical concern--3, 3a, and 4--are summarized for each function in the remainder of this section.

Table 2.6

Average Number of Employees Supervised or Employed by Interviewees in Ten Institutional Settings

Institutional Setting	Research	Development	Diffusion	Context. Evaluation	Input Analysis	Process Evaluation	Outcome Evaluation
University	15.87	19.29	12.86	9.13	7.33	10.58	4.47
Regional Laboratory	16.00	78.20	13.50	10.00	6.00	7.00	10.00
R & D Center	48.80	57.50	4.67	68.00	10.00	30.00	10.00
Indep. Research Organ.	55.67	40.60	36.00	4.50	3.67	5.33	8.33
State Dept. of Educ.	3.50	8.50	4.50	----	8.00	3.00	1.00
School District	3.75	2.50	5.00	13.17	11.60	14.00	8.50
Federal Agency	30.00	10.00	16.00	2.50	1.00	3.00	1.00
Military	13.00	2.00	3.00	1.00	3.00	3.00	4.00
Industry	13.50	15.50	27.33	5.00	6.00	5.00	15.50
Prof. Educ. Assoc.	45.00	----	11.67	11.00	7.50	2.00	10.50

Research

Forty interviewees listed the research function as being relevant to their program. These interviewees were asked to list the most important or critical skills for the performance of research in their organization from the list of skills provided them.[12] The resulting frequencies are shown in Table 2.7. The total frequency for each skill and the percent of respondents listing each skill as critical are presented in the last two columns in the table.

An arbitrary criterion for the practical significance of importance for each skill was set at 50 percent of the interviewees listing the skill. Thus research skills 2, 9, 10, 11, 15, 19, 21 and 23 (see foldout Appendix E) may be considered to be comparatively more important or more critical skills than the other skills listed, as indicated by the interviewees.

The telephone interviewees were asked which skills they considered to be unimportant in performing the research function. The results of their responses are given in Table 2.8.

It is evident that there was general agreement that none of the skills could be identified as being unimportant.

Another concern of the Task Force was to identify, from among the skills listed as important for each function, those that are in short supply. The interviewees were asked to consider those research skills,

[12] This list of skills and the lists for the other functions are presented in Appendix E, which can be folded out for the reader's convenience in interpreting the skills that are listed by number throughout this section.

Table 2.7

Frequency of Listing Skills as Most Important or Critical to the Performance of Research: By Institutional Setting

Skill (Correspond to numbers on page E.1)	Universities (n = 16)	Regional Labs (n = 2)	R&D Centers (n = 5)	Indep. Res. Agcn. (n=3)	State Educ. Dept. (n=2)	School Dist. (n = 5)	Federal Agen. (n = 1)	Military (n = 2)	Industry (n = 2)	Prof. Assoc. (n = 2)	Total 40	Percentage
1	3	1	3	2	0	1	0	0	0	2	12	30.0
2	12	1	3	3	0	3	1	1	1	2	27	67.5
3	2	2	3	1	1	1	1	1	1	0	13	32.5
4	6	0	3	3	0	2	0	2	0	0	15	37.5
5	7	0	3	1	0	2	0	2	1	1	17	42.5
6	3	0	2	2	0	2	0	2	0	1	12	30.0
7	3	0	3	2	0	2	0	0	1	0	11	27.5
8	2	1	2	2	0	1	0	0	0	1	9	22.5
9	9	2	2	3	1	3	0	0	1	2	23	57.5
10	8	1	3	1	2	3	0	1	0	1	20	50.0
11	8	1	2	2	0	4	0	0	1	2	20	50.0
12	2	0	2	2	0	4	0	0	0	1	11	27.5
13	3	0	2	1	0	2	0	0	0	2	10	25.0
14	5	0	2	1	1	2	0	1	2	3	17	42.5
15	8	2	3	2	1	2	0	1	2	2	23	57.5
16	3	1	2	2	0	1	0	0	2	1	12	30.0
17	4	0	3	1	0	1	0	1	1	0	11	27.5
18	4	0	2	1	0	1	0	1	0	1	10	25.0
19	7	2	2	2	1	4	0	2	0	1	21	52.5
20	3	1	2	2	1	2	0	0	0	1	12	30.0
21	9	1	3	3	2	4	0	1	2	1	26	65.0
22	8	1	3	2	0	2	0	0	0	1	17	42.5
23	7	1	3	1	1	3	0	1	2	2	21	52.5

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.8

Frequency of Listing Skills as Unimportant to the Performance of Research: By Institutional Setting

Skill (Correspond to numbers on page E.1)	Institutional Setting: Universities (n = 16)	Regional Lab (n = 2)	R&D Centers (n = 5)	Ind. Research Agen. (n=3)	State Educ. Dept. (n=2)	School Dist. (n = 5)	Federal Agen. (n = 1)	Military (n = 2)	Industry (n = 2)	Prof. Assoc. (n = 2)	Total (40)	Percentage
1	1	0	0	0	0	0	0	0	0	0	1	2.5
2	1	0	0	0	0	1	0	1	1	0	4	10.0
3	2	0	0	0	0	1	0	0	0	0	3	7.5
4	0	1	0	0	0	2	0	0	0	0	3	7.5
5	1	1	0	0	0	1	0	0	0	0	3	7.5
6	0	1	0	0	0	0	0	0	0	1	2	5.0
7	1	1	0	0	0	1	0	1	0	0	4	10.0
8	4	0	0	0	0	1	0	1	1	0	7	17.5
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	1	0	0	0	0	0	0	0	0	1	2.5
11	1	0	0	0	0	0	0	1	0	0	2	5.0
12	2	1	0	0	1	0	0	1	1	0	6	15.0
13	1	1	0	0	0	1	0	0	0	0	3	7.5
14	0	1	0	0	0	1	0	1	0	0	3	7.5
15	1	0	0	0	1	2	0	1	0	0	5	12.5
16	2	0	0	0	0	1	0	1	0	0	4	10.0
17	2	1	0	0	0	1	0	1	1	0	6	15.0
18	1	1	0	0	0	0	0	0	0	0	2	5.0
19	0	0	0	0	0	1	0	0	0	0	1	2.5
20	0	0	0	0	1	2	0	1	0	0	4	10.0
21	0	0	0	0	0	0	0	0	0	0	0	0.0
22	2	0	0	0	0	0	0	1	1	0	4	10.0
23	0	0	0	0	0	0	0	0	0	0	0	0.0

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

which they had listed as being critical or important in their program and to indicate which of those important skills are "hard to come by"--i.e., in which of them did the employers find deficiencies in their present personnel or in personnel they attempted to hire. The frequencies of interviewees listing each research skill as important, but in short supply, are given in Table 2.9.

An arbitrary criterion of 25 percent agreement among all interviewees that a skill is important <u>and</u> in short supply was set for determining the pratical significance of the listed percentages. Thus, research skills 2, 10, 15, 21, 22 and 23 were considered to be both important and in short supply.

<u>Development</u>

Forty-two interviewees listed the development function as being relevant to their organization.

The most important skills for the development function, as seen by interviewees, are indicated in Table 2.10. Using again the arbitrary criterion of 50 percent agreement among those interviewees responding to a given skill, four skills were identified as being most important: 3, 4, 11, and 13. In terms of unimportant skills, only skill No. 7 was identified as being relatively unimportant by a sizeable number of interviewees, as shown in Table 2.11.

There were three skills identified as being highly important development skills that are in short supply--skills 3, 4, and 11. The criterion used for identifying these skills was 25 percent agreement among interviewees. The frequencies of response by interviewees are shown in Table 2.12.

Table 2.9

Frequency of Listing Important Research Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.1)	Universities (n = 16)	Regional Labs. (n = 2)	R & D Centers (n = 5)	Indep. Research Agen. (n = 3)	State Educ. Dept. (n = 2)	School Dist. (n = 5)	Fed. Agency (n = 1)	Military (n = 2)	Industry (n = 2)	Prof. Assoc. (n = 2)	Total (40)	Percentage
	Institutional Setting											
1	1	1	2	1	0	0	0	0	0	0	5	12.5
2	10	1	2	2	0	0	0	0	1	0	16	40.0
3	2	2	3	0	0	0	0	0	1	0	8	20.0
4	2	0	1	0	0	1	0	1	0	0	5	12.5
5	2	0	2	0	0	1	0	1	1	1	9	22.5
6	0	0	1	0	0	0	0	1	0	0	2	5.0
7	1	0	1	0	0	1	0	0	0	0	3	7.5
8	0	0	1	1	0	0	0	0	0	0	2	5.0
9	4	0	1	1	0	0	0	0	0	0	6	15.0
10	4	1	2	1	0	1	0	1	0	0	11	27.5
11	3	0	1	0	0	2	0	0	1	0	7	17.5
12	1	0	1	0	0	0	0	0	0	0	2	5.0
13	2	0	1	0	0	1	0	0	0	0	3	7.5
14	4	0	1	0	1	0	0	0	0	0	6	15.0
15	6	1	3	1	1	0	0	0	0	1	13	32.5
16	1	0	1	0	0	0	0	0	0	0	2	5.0
17	1	0	1	0	0	0	0	0	0	0	2	5.0
18	0	0	1	0	0	0	0	0	1	0	2	5.0
19	3	0	1	1	1	1	0	1	0	0	8	20.0
20	1	0	1	0	0	0	0	0	0	0	2	5.0
21	4	1	2	2	1	1	1	1	2	0	15	37.5
22	6	1	2	1	0	0	0	0	0	0	10	25.0
23	4	1	2	1	2	1	0	0	2	2	16	40.0

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.10

Frequency of Listing Skills as Most Important or Critical to the Performance of Development: By Institutional Setting

Skill (Correspond to numbers on page E.2)	Institutional Setting											
	Universities (n = 15)	Regional Labs. (n = 5)	R & D Centers (n = 7)	Indep. Research Agen. (n = 5)	State Educ. Dept. (n = 1)	School Dist. (n = 5)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 0)	Total (42)	Percentage
1	6	0	3	2	1	2	1	0	2	0	17	40.5
2	7	2	3	1	1	1	1	1	1	0	18	42.8
3	7	2	6	3	0	3	1	0	0	0	22	52.4
4	6	4	4	3	1	5	1	1	2	0	27	64.3
5	6	2	3	2	0	2	1	0	1	0	17	40.5
6	6	2	2	2	1	1	1	0	0	0	15	35.7
7	5	1	2	1	1	3	1	0	0	0	14	33.3
8	4	3	3	3	1	2	1	0	2	0	19	45.2
9	3	1	4	3	1	1	1	1	2	0	17	40.5
10	4	4	3	2	0	0	1	0	1	0	15	35.7
11	11	5	4	4	0	3	1	0	2	0	30	71.4
12	5	3	2	1	0	1	1	1	1	0	15	35.7
13	8	2	4	4	1	1	1	0	1	0	22	52.4
14	4	3	5	2	1	2	1	1	1	0	20	47.6
15	6	1	6	2	1	2	1	0	1	0	20	47.6
16	4	4	3	2	1	3	1	0	1	0	19	45.2

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.11

Frequency of Listing Skills as Unimportant to the Performance of Development: By Institutional Setting

Skill (Correspond to numbers on page E.2)	Universities (n = 15)	Regional Labs (n = 5)	R & D Centers (n = 7)	Ind. Research Agen. (n = 5)	State Educ. Dept. (n = 1)	School Dist. (n = 5)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 0)	Total (42)	Percentage
	Institutional Setting											
1	2	5	0	0	0	0	0	0	0	0	7	16.7
2	1	0	0	0	0	0	0	0	0	0	1	2.4
3	1	0	0	0	0	0	0	0	0	0	1	2.4
4	1	1	1	0	0	0	0	0	0	0	3	7.1
5	1	0	3	0	0	1	0	0	0	0	5	11.9
6	1	2	1	1	0	2	0	0	1	0	8	19.0
7	4	2	3	1	0	0	0	0	1	0	11	26.2
8	3	1	0	0	0	0	0	0	0	0	4	9.5
9	1	2	0	0	0	0	0	0	0	0	3	7.1
10	2	0	0	1	0	1	0	0	1	0	5	11.9
11	0	0	1	0	0	1	0	0	0	0	2	4.8
12	2	1	0	0	0	1	0	0	0	0	4	9.5
13	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1	0	0	0	1	0	0	0	0	3	7.1
15	1	0	1	0	0	1	0	0	0	0	3	7.1
16	2	0	1	0	0	0	0	0	0	0	3	7.1

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.12

Frequency of Listing Important Development Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.2)	Institutional Setting											
	Universities (n = 15)	Regional Labs. (n = 5)	R & D Centers (n = 7)	Ind. Research Agen. (n = 5)	State Educ. Dept. (n = 1)	School Dist. (n = 5)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 0)	Total (42)	Percentage
1	5	0	1	0	1	1	0	0	1	0	9	21.4
2	4	1	1	0	0	0	0	0	1	0	7	16.7
3	6	2	2	2	0	3	0	0	0	0	15	35.7
4	3	3	1	2	1	3	0	0	0	0	13	31.0
5	2	2	0	0	0	0	0	0	0	0	4	9.5
6	1	0	0	0	1	0	0	0	0	0	2	4.8
7	4	0	0	0	1	1	0	0	0	0	6	14.3
8	1	2	0	2	1	2	0	0	1	0	9	21.4
9	0	0	1	1	1	1	0	1	1	0	6	14.3
10	1	2	1	2	0	0	0	0	0	0	6	14.3
11	5	4	2	2	0	2	0	0	1	0	16	38.1
12	2	3	0	0	0	1	0	0	0	0	6	14.3
13	1	1	2	0	0	0	0	0	1	0	5	11.9
14	2	2	1	0	0	1	0	0	1	0	7	16.7
15	3	0	3	1	0	1	1	0	0	0	9	21.4
16	2	3	1	0	1	2	0	0	0	0	9	21.4

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Diffusion

Thirty-four interviewees listed diffusion as a function relevant to their program.

The most important skills for engaging in the diffusion function, using the 50 percent agreement criterion, were identified as skills 3, 4, and 6 under the heading "dissemination," skill 4 under "demonstration," and skills 4 and 5 under "facilitating adoption." The frequencies of response for the most critical skills are given in Table 2.13.

Few skills were identified as being unimportant. It is evident from the data presented in Table 2.14, however, that the interviewees tended to consider most of the dissemination skills to be relatively less important than those listed under demonstration and facilitating adoption.

Of those skills identified as being important skills, three were considered to be in short supply: skills 4 and 6 under dissemination and skill 5 under facilitating adoption. The frequencies with which interviewees identified skills as being important and in short supply are given in Table 2.15. The 25 percent agreement criterion was used to identify these three skills.

Context Evaluation/Situations Analysis

Forty-one interviewees listed context evaluation/situations analysis as a function relevant to their program.

Five skills were identified (using the 50 percent agreement criterion) as being the most important skills needed for performing the context evaluation/situations analysis function: skills 1, 5, 6, 7, and 10. Responses on this item are summarized in Table 2.16.

Table 2.13

Frequency of Listing Skills as Most Important or Critical to the Performance of Diffusion: By Institutional Setting

Skill	Universities (n = 7)	Regional Labs (n = 3)	R & D Centers (n = 4)	Ind. Research Agen. (n = 4)	St. Educ. Dept. (n = 3)	School Dist. (n = 4)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 3)	Professional Assoc. (n=3)	Total (34)	Percentage
Dissemination												
1	3	1	2	1	2	1	2	1	2	1	16	47.0
2	1	0	2	2	1	1	2	1	1	1	12	35.3
3	2	2	2	1	2	3	2	0	1	2	17	50.0
4	2	1	2	2	1	2	2	0	2	3	17	50.0
5	2	3	1	2	0	1	2	0	1	0	12	35.3
6	4	3	3	3	0	3	2	0	1	1	20	58.8
Demonstration												
1	1	1	1	1	2	0	1	0	0	0	7	20.6
2	2	1	1	1	1	2	0	0	0	0	8	23.5
3	1	2	1	2	1	2	1	1	0	0	11	32.4
4	4	2	3	3	3	2	1	0	1	0	19	55.9
Facilitating Adoption												
1	3	2	1	2	2	1	0	0	2	0	13	38.2
2	2	0	2	2	1	1	0	1	2	0	11	32.4
3	4	1	1	1	1	1	0	0	2	0	11	32.4
4	3	3	2	2	2	2	1	1	2	0	18	52.9
5	4	2	1	2	2	4	1	0	2	0	18	52.9

(Correspond to numbers on page E.3)

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.14

Frequency of Listing Skills as Unimportant to the Performance of Diffusion: By Institutional Setting

(Correspond to numbers on page E.3)

Skill	Universities (n = 7)	Regional Labs (n = 3)	R & D Centers N = 4)	Ind. Research Agen. (n = 4)	State Educ. Dept. (n = 3)	School Dist. (n = 4)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 3)	Prof. Assoc. (n = 3)	Total (34)	Percentage
Dissemination												
1	1	2	0	0	0	1	0	0	1	0	5	14.7
2	1	3	1	0	1	0	0	0	1	0	7	20.6
3	1	1	2	0	1	0	0	0	1	0	6	17.6
4	0	2	1	0	1	1	0	0	1	0	6	17.6
5	1	0	0	0	1	0	0	0	1	0	3	8.8
6	0	0	1	0	1	0	0	0	2	1	5	14.7
Demonstration												
1	0	1	1	0	0	0	0	0	1	1	4	11.8
2	0	1	1	0	1	0	0	0	1	1	5	14.7
3	0	0	1	0	1	0	0	0	1	1	4	11.8
4	0	0	0	0	0	0	0	0	0	1	1	2.9
Facilitating Adoption												
1	0	0	0	0	0	0	0	0	0	1	1	2.9
2	0	1	0	0	1	0	0	0	0	1	3	8.8
3	0	1	0	0	1	0	0	0	0	1	3	8.8
4	0	0	0	0	1	0	0	0	0	1	2	5.9
5	0	0	0	0	0	0	0	0	0	1	1	2.9

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.15

Frequency of Listing Important Diffusion Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.3)	Universities (n = 7)	Reg. Labs. (n = 3)	R & D Centers (n = 4)	Ind. Research Agen. (n = 4)	State Educ. Dept. (n=3)	School Dist. (n = 4)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 3)	Prof. Assoc. (n = 3)	Total (34)	Percentage
					Institutional Setting							
Dissemination												
1	1	1	1	1	1	0	1	0	0	1	7	20.6
2	2	0	1	1	0	0	1	0	0	1	6	17.6
3	2	0	1	0	0	2	1	0	1	0	7	20.6
4	2	0	1	2	0	1	1	0	2	2	11	32.4
5	2	1	0	1	0	0	1	0	1	0	6	17.6
6	3	2	2	1	1	1	1	0	0	1	12	35.3
Demonstration												
1	1	0	1	0	1	0	0	0	0	0	3	8.8
2	2	0	0	0	0	1	0	0	0	0	3	8.8
3	1	0	1	1	0	1	0	0	0	0	4	11.8
4	3	1	1	0	2	0	0	0	0	0	7	20.6
Facilitating Adoption												
1	2	0	0	0	2	0	0	0	0	0	4	11.8
2	2	0	1	0	0	0	0	0	0	0	3	8.8
3	3	1	0	0	0	0	0	0	1	0	5	14.7
4	1	1	0	1	0	1	0	0	1	0	5	14.7
5	3	2	0	0	1	2	0	0	1	0	9	26.5

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.16

Frequency of Listing Skills as Most Important or Critical to the Performance of Context Evaluation/Situations Analysis: By Insitutional Setting

	Institutional Setting											
Skill (Correspond to numbers on page E.4)	Universities (n = 15)	Reg. Labs. (n = 4)	R & D Centers (n = 4)	Ind. Research Agen. (n = 4)	State Educ. Dept. (n=0)	School Dist. (n = 7)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 3)	Total (41)	Percentage
1	11	3	2	3	0	4	0	0	1	2	26	63.4
2	9	2	1	1	0	3	0	0	0	1	17	41.5
3	7	2	2	2	0	3	0	0	0	1	17	41.5
4	7	1	1	1	0	3	1	1	1	1	17	41.5
5	10	2	2	2	0	5	1	1	1	1	25	61.0
6	8	1	2	2	0	6	1	0	1	3	24	58.5
7	10	1	2	1	0	5	1	1	1	2	24	58.5
8	7	2	1	1	0	5	1	0	1	2	20	48.8
9	8	1	0	1	0	4	1	0	1	0	16	39.0
10	10	2	1	2	0	5	0	1	1	1	23	56.1

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

It is evident from the data in Table 2.17 that few interviewees considered any of the listed context evaluation/situations analysis skills to be unimportant.

Table 2.17

Frequency of Listing Skills as Unimportant to the Performance of Context Evaluation/Situations Analysis: By Institutional Setting

	Institutional Setting											
Skill (Correspond to numbers on page E.4)	Universities (n = 15)	Regional Labs (n = 4)	R & D Centers (n = 4)	Ind. Research Agen. (n = 4)	State Educ. Dept. (n=0)	School Dist. (n = 7)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 3)	Total (41)	Percentage
1	1	0	0	0	0	1	0	0	0	0	2	4.9
2	2	1	0	0	0	1	0	0	0	1	5	12.2
3	1	0	0	0	0	2	1	0	0	1	5	12.2
4	0	0	0	0	0	1	0	0	0	1	2	4.9
5	0	0	0	0	0	0	0	0	0	1	1	2.4
6	1	1	0	0	0	0	1	0	0	0	3	7.3
7	0	1	0	0	0	1	0	0	0	0	2	4.9
8	1	1	0	0	0	0	0	0	0	0	2	4.9
9	1	0	0	0	0	2	0	0	0	1	4	9.8
10	1	0	0	0	0	1	1	0	0	0	3	7.3

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Of the skills identified as being important, most were found to be in short supply, according to the interviewees. Using the 25 percent agreement criterion for purposes of isolating critical skills in short supply, skills 1, 2, 3, 5, 6, 7, 8, 9, and 10 were identified. Responses to this item are summarized in Table 2.18.

Table 2.18

Frequency of Listing Important Context Evaluation/Situations Analysis Skills in Short Supply: By Institutional Setting

	Institutional Setting											
Skill (Correspond to numbers on page E.4)	Universities (n = 15)	Regional Labs (n = 4)	R & D Centers (n = 4)	Ind. Research Agen. (n = 4)	State Educ. Dept. (n=0)	School Dist. (n = 7)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 3)	Total (41)	Percentage
1	5	3	1	2	0	3	0	0	0	0	14	34.1
2	7	1	1	0	0	2	0	0	0	0	11	26.8
3	5	2	2	1	0	2	0	0	0	0	12	29.3
4	4	1	0	0	0	0	0	1	0	0	6	14.6
5	4	1	2	0	0	3	0	0	0	1	11	26.8
6	4	0	1	1	0	2	1	0	1	2	12	29.3
7	7	0	1	1	0	1	0	0	1	1	12	29.3
8	5	2	0	0	0	3	0	0	1	1	12	29.3
9	6	1	0	0	0	3	1	0	1	0	12	29.3
10	8	1	0	0	0	3	2	1	1	0	16	39.0

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this funciton.

Program Planning/Input Analysis

Thirty-five interviewees named program planning/input analysis as a function relevant to their program.

Almost all of the skills listed for program planning/input analysis were identified as being important or critical to the performance of this function. The frequencies of responses by institution are shown in Table 2.19. Using the 50 percent criterion, skills 1, 2, 3, 4, 5, 7

Table 2.19

Frequency of Listing Skills as Most Important or Critical to the Performance of Program Planning/Input Analysis: By Institutional Setting

	Skill	Institutional Setting: Universities (n = 12)	Regional Lab. (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n=2)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 2)	Total (35)	Percentage
(Correspond to numbers on page E.5)	1	7	2	1	2	2	5	1	0	1	0	21	60.0
	2	10	2	1	2	1	5	0	0	1	2	24	68.6
	3	10	2	1	2	1	4	1	0	1	0	22	62.8
	4	6	1	1	1	1	5	1	0	1	1	18	51.4
	5	7	2	1	1	1	4	2	1	1	1	21	60.0
	6	3	2	1	2	1	3	2	0	1	1	16	45.7
	7	7	2	2	1	1	3	1	1	1	1	20	57.1
	8	6	1	1	1	1	4	1	0	1	2	18	51.4

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

and 8 were considered to be the most important skills. No skills were considered to be unimportant, as shown in Table 2.20, although skill 6 was identified more frequently than the others in the list.

Table 2.20

Frequency of Listing Skills as Unimportant to the Performance of Program Planning/Input Analysis: By Institutional Setting

Skill (Correspond to numbers on page E.5)	Universities (n = 12)	Regional Labs (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n=2)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 2)	Total (35)	Percentage
1	0	0	0	0	0	0	0	0	0	1	1	2.8
2	0	1	0	0	0	1	0	0	0	0	2	5.7
3	1	0	0	0	0	1	0	0	0	1	3	8.6
4	2	1	0	0	0	1	0	0	0	0	4	11.4
5	2	0	0	0	0	1	0	0	0	0	3	8.6
6	3	1	0	0	0	3	0	0	0	0	7	20.0
7	1	1	0	0	0	1	0	0	0	0	3	8.6
8	0	1	0	0	0	1	1	0	0	0	3	8.6

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Of those skills considered to be important, three--skills 3, 5 and 7--were identified most frequently to be in short supply, using the 25 percent agreement criterion. The frequencies of responses for each skill are presented in Table 2.21.

Table 2.21

Frequency of Listing Important Program Planning/Input Analysis Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.5)	Institutional Setting: Universities (n = 12)	Regional Labs. (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n=3)	State Educ. Dept. (n=2)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 2)	Total (35)	Percentages
1	3	0	0	0	2	2	0	0	0	0	7	20.0
2	4	1	0	0	1	0	0	0	0	0	6	17.1
3	5	2	0	1	1	2	1	0	1	0	13	37.1
4	2	0	1	0	1	1	0	0	1	0	6	17.1
5	3	0	0	0	1	2	1	1	1	0	9	25.7
6	1	1	0	1	1	0	1	0	0	0	5	14.3
7	4	1	1	1	1	0	1	1	0	0	10	28.6
8	3	0	0	0	1	1	0	0	1	1	7	20.0

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Process Evaluation/Program Monitoring

Thirty-five interviewees listed the process evaluation/program monitoring function as relevant to their program.

Of the five skills listed for process evaluation, each one was identified as being an important skill by more than 50 percent of the interviewees. The frequencies of responses for each skill are given in Table 2.22.

None of the five skills was identified by more than two persons as being unimportant, as can be seen in Table 2.23.

Four of the five skills identified as being important were listed as being in short supply by 25 percent or more of the interviewees. The frequencies of responses for those important skills in short supply are provided in Table 2.24.

Table 2.22

Frequency of Listing Skills as Most Important or Critical to the Performance of Process Evaluation/Program Monitoring: by Institutional Setting

		Institutional Setting											
	Skill	Universities (n = 14)	Regional Labs (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n = 1)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 1)	Total (35)	Percentage
(Correspond to numbers on page E.6)	1	13	3	0	3	1	5	2	1	1	1	30	85.7
	2	11	2	1	2	1	4	2	1	1	1	26	74.3
	3	9	3	0	2	1	4	1	1	1	1	23	65.7
	4	14	2	2	1	1	6	1	1	1	1	30	85.7
	5	11	3	1	3	1	6	1	1	1	1	29	82.8

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.23

Frequency of Listing Skills as Unimportant to the Performance of Process Evaluation/Program Monitoring: By Institutional Setting

Skill (Correspond to numbers on page E.6)	Universities (n = 14)	Regional Labs (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n = 1)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 1)	Total (35)	Percentage
	Institutional Setting											
1	0	0	1	0	0	0	0	0	0	0	1	2.8
2	0	1	0	0	0	0	0	0	0	0	1	2.8
3	0	0	1	0	0	0	0	0	0	0	1	2.8
4	0	1	0	0	0	0	0	0	0	0	1	2.8
5	1	1	0	0	0	0	0	0	0	0	2	5.7

Table 2.24

Frequency of Listing Important Process Evaluation/Program Monitoring Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.6)	Universities (n = 14)	Regional Labs N = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n=1)	School Dist. (n = 6)	Fed. Agency (n = 2)	Military (n = 1)	Industry (n = 1)	Prof. Assoc. (n = 1	Total (35)	Percentage
	Institutional Setting											
1	7	1	0	1	0	2	1	0	1	0	13	37.1
2	3	2	0	1	1	4	2	0	1	1	15	42.8
3	3	0	0	0	1	3	0	0	1	0	8	22.8
4	4	1	2	0	1	3	1	0	0	0	12	34.3
5	7	0	1	2	1	5	1	1	0	0	18	51.4

Note: For Tables 21 and 22: n = the total number of individuals from each institutional setting who responded to the list of skills for this function

Outcome Evaluation

Thirty-seven interviewees listed the outcome evaluation function as relevant to their program.

Seven skills were identified by 50 percent or more of the interviewees as important skills for performing the outcome evaluation function. These skills are 1, 2, 3, 5, 6, 13 and 15 on the list. Responses for this item are summarized in Table 2.25.

It is evident from the data in Table 2.26 that few skills were listed by the interviewees as being unimportant.

Of those skills which were considered to be important, 25 percent or more of the interviewees listed the following skills as in short supply: 1, 2, 3, 6, 12, 13, 14 and 15. The frequencies of responses for each skill are given in Table 2.27.

Discussion

It is difficult to separate for discussion functions which are as closely related as the seven functions considered here. Many of the skills listed under one function could easily have been included under another, and in some cases doubtlessly have been, using different terminology. For this reason it should be recognized that discussing the functions as separate, independent activities ignores interrelationships and overlaps among them. This difficulty aside, some results deserve elaboration.

It is evident from Tables 2.2 and 2.3 that persons located in each of the institutional settings listed may engage in a wide spectrum of research-related functions. Although no surprise, this may serve as a caution against the common fallacy of stereotyping a position by the type

Table 2.25

Frequency of Listing Skills as Most Important or Critical to the Performance of Outcome Evaluation: By Institutional Setting

Skill (Correspond to numbers on page E.6)	Institutional Setting: Universities (n = 14)	Regional Labs (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n = 2)	School Dist. (n = 7)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 1)	Total (37)	Percentage
1	8	2	1	2	1	4	1	1	1	1	22	59.4
2	9	1	1	3	2	3	1	0	2	1	23	62.2
3	7	2	1	2	2	4	1	1	0	0	20	54.0
4	5	0	1	2	1	3	1	0	1	0	14	37.8
5	9	2	1	1	1	4	1	0	2	1	22	59.4
6	7	1	1	3	2	4	1	0	2	0	21	56.8
7	4	2	1	2	1	4	1	0	2	0	17	45.9
8	2	0	1	2	1	1	1	0	1	1	10	27.0
9	5	0	1	2	2	2	1	0	0	1	14	37.8
10	7	0	1	1	2	2	1	0	2	1	17	45.9
11	4	1	1	1	1	3	1	0	0	1	13	35.1
12	5	0	1	0	1	2	1	1	0	0	11	29.7
13	6	1	1	2	1	6	1	0	1	1	20	54.0
14	3	1	1	2	1	2	1	0	0	1	12	32.4
15	9	3	2	1	2	5	1	0	2	0	25	67.6
16	3	1	1	0	1	4	1	0	0	0	11	29.7

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.26

Frequency of Listing Skills as Unimportant to the Performance of Outcome Evaluation: By Institutional Setting

Skill (Correspond to numbers on page E.7)	Universities (n = 14)	Regional Labs. (n = 3)	R & D Centers (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n = 2)	School Dist. (n = 7)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 1)	Total (37)	Percentage
1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	0	1	0	0	0	0	0	0	0	0	1	2.7
3	0	0	0	0	0	0	0	0	0	0	0	0.0
4	0	2	0	0	0	0	0	0	0	0	2	5.4
5	0	0	1	0	0	0	0	0	0	0	1	2.7
6	0	1	0	0	0	0	0	0	0	0	1	2.7
7	0	0	0	0	0	0	0	0	0	0	0	0.0
8	0	2	0	0	0	0	0	0	0	0	2	5.4
9	0	1	0	0	0	0	0	0	0	0	1	2.7
10	0	2	0	0	0	0	0	0	0	0	2	5.4
11	2	1	0	0	0	0	0	0	0	0	3	8.1
12	2	1	1	0	0	0	0	0	1	0	5	13.5
13	1	1	1	0	0	0	0	0	0	0	3	8.1
14	1	1	0	0	0	0	0	0	0	0	2	5.4
15	0	0	1	0	0	0	0	0	0	0	1	2.7
16	1	0	1	0	0	0	0	0	0	0	2	5.4

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

Table 2.27

Frequency of Listing Important Outcome Evaluation Skills in Short Supply: By Institutional Setting

Skill (Correspond to numbers on page E.7)	Universities (n = 14)	Regional Labs. (n = 3)	R & D Center (n = 3)	Ind. Research Agen. (n = 3)	State Educ. Dept. (n = 2)	School Dist. (n = 7)	Fed. Agency (n = 1)	Military (n = 1)	Industry (n = 2)	Prof. Assoc. (n = 1)	Total (37)	Percentage
	Institutional Setting											
1	3	1	2	1	0	1	0	0	1	1	10	27.0
2	5	1	1	2	0	2	1	0	2	1	15	40.5
3	3	0	1	1	2	1	0	0	1	0	9	24.3
4	1	0	1	0	1	0	0	0	1	0	4	10.8
5	3	0	1	0	1	1	0	0	1	1	8	21.6
6	4	0	1	2	0	1	0	0	2	0	10	27.0
7	2	1	1	0	0	2	0	0	1	0	7	18.9
8	0	0	2	0	0	0	0	0	1	1	4	10.8
9	0	0	1	0	0	0	0	0	1	1	3	8.1
10	2	0	1	0	0	0	0	0	2	1	6	16.2
11	0	0	1	0	1	1	0	0	1	1	5	13.5
12	3	0	2	0	1	1	0	1	1	0	9	24.3
13	3	1	1	1	1	4	0	0	1	1	13	35.1
14	1	1	2	2	1	2	0	0	1	1	11	29.7
15	5	2	1	1	2	4	0	0	1	0	16	43.2
16	1	0	1	0	1	3	0	0	1	0	7	18.9

Note: n = the total number of individuals from each institutional setting who responded to the list of skills for this function.

of institution in which it is located. If the sample chosen by the Task Force is representative, it appears that all research or research-related activities may have a home in any type of institution. The priorities placed on the functions may differ from one type of institution to another (Tables 2.3, 2.4 and 2.5) but it remains that all the research and research-related functions listed in the first section of this chapter are relevant to programs in any of the institutional settings used herein.

The data are clear in supporting the importance of all seven functions suggested to the interviewees. In terms of relative importance, it appears that evaluation, development and research rank in that order but all are high and close together on the scales used. Conversely, diffusion is viewed as relatively less important by a majority of the interviewees. Although this may be partially attributed to the fact that fewer "diffusers" were included in the interview sample than persons with functional emphases in other categories, it is doubtful that this alone would account for the size of the discrepancy. Perhaps the proliferation of roles for diffusers embodied in current literature on educational change is prophetic rather than descriptive of present professional priorities.

It appears that the Task Force was most successful in identifying the important skills for the performance of the context evaluation and process evaluation functions. All of the skills listed for these two functions were considered by the telephone interviewees to be important or critical skills. However, the percents of responses for the importance of each skill for these two functions may be somewhat inflated since the lists were comparatively short, resulting in few (or no) forced choices similar to those required in the ranking of research skills. It remains, however, that the interviewees identified each of the skills on the list quite frequently as being important.

The interviewees identified as one of the most important development skills "selecting or devising appropriate techniques for measuring outcomes." This skill is one that is common to every one of the seven listed research or research-related functions and, because it has been identified as being in short supply, it should perhaps be isolated as a skill that is generalizable to any function and therefore should be a basic part of any training program.

Diffusion skills identified by the interviewees as being important may be placed into two categories, communication skills and evaluation skills. It appears from the data in Tables 2.13-2.15 that both types of skills may be in short supply. Again, these data provide information needed by those interested in developing a training program for diffusion personnel. It may be advisable either to send trainees to communication schools (e.g., journalism, media, public relations) and also train them in evaluation techniques, or to accept communications graduates into diffusion training programs which emphasize evaluation.

The data in Tables 2.16-2.18 indicate that certain context evaluation skills on the list may be more important than others, but almost all of the skills are in short supply. The important skills are both logical and empirical in nature. Methodological skills also appear to be quite important. It is evident, in addition, that skills such as designing a monitoring system require a great deal of training in fundamental tasks and also much practical experience.

Almost all of the input analysis skills were considered to be important by the interviewees. The high percents of responses for each skill may be a function of the small number of skills, but, as before, it remains that few interviewees identified the skills on the list as unimportant. The important skills which were identified as being in short supply are primarily logical skills and may best result from practical experience, supplemented by short-term training.

All of the skills listed for the process evaluation function were identified quite frequently as being important. The high percent of total responses for each skill was probably a function of the number of skills which were considered, but, again, few interviewees labeled these skills as being unimportant. All of the skills were identified as being in short supply by the interviewees, indicating that there is a need for programs designed to produce program monitoring skills.

Several outcome evaluation skills were labeled as being very important. Most of these included both logical and empirical inquiry skills.

It is important to consider the supplemental comments made by interviewees (reported in Appendix D). The perceptions on how persons might be trained in skills that are in short supply were less helpful than had been hoped, but still may be very valuable to the directors of training programs in stimulating creative training ideas and in allocating resources available for training.

It is also clear from the suggestions for additional skills that the lists provided in Appendix E were not complete by any means when they were given to the interviewees. Many of the additional skills suggested by the interviewees were thought to be important in training research and research-related personnel. However, further consideration must be given before the original lists are revised.

It seems desirable to have practitioners in research and research-related activities project training needs for the future, rather than depending on opinions of those removed from the practical realities. Since the interviewees are not only supervisors or employers of research or research-related personnel, but also in most cases are themselves practitioners in these areas, the skills given in Appendix C contribute information which should be considered when training programs are being designed to anticipate future needs.

Two additional observations should be recorded here. First, several interviewees expressed the opinion that evaluation was overrepresented among the functions. Several persons suggested re-combining the four evaluation functions into one; others suggested that "context, input, and process" might better be subsumed under a new rubric, reserving the term "evaluation" to refer to outcome evaluation. Second, it was noted that the list of research skills was biased in favor of behavioral, empirical research skills and failed to include skills relating to research on research methodology <u>per se</u> and philosophical and historical inquiry. Suggestions and comments such as these were considered, along with all data reported herein, in a re-examination of skills necessary for research and research-related activities. The results of that re-examination are presented in the following section.

One decision that was made on the basis of these suggestions was to reduce the seven functions to four by using a single rubric--evaluation--to describe functions previously spread across four categories. The wisdom of this decision will be re-assessed in further Task Force activities.

Essential Knowledge and Skills for Educational Research and Evaluation

Originally, it was proposed that reality-testing of the Task Force lists of research and research-related skills be followed by a discussion of essential knowledge and competencies not only in educational research and evaluation, but also in development and diffusion. In attempting to complete that task, however, the staff found itself to be significantly less sure of the "stuff" of which development and diffusion are made than of research and evaluation and finally reached the conclusion that the specification of knowledge and skills in development and diffusion should be left to other authors who feel more assured about the content of these areas.

This section builds in an essential manner upon two technical papers in the Task Force series, Technical Paper No. 1[13] and Technical Paper No. 4.[14] In the latter paper, educational research and evaluation are defined and examined in detail. The reader must seek in that paper the justification for many of the positions taken here. In Technical Paper No. 1, lists of skills required for educational research and evaluation were presented. Much of the thinking reflected in that earlier paper

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[13] Technical Paper No. 1 is essentially identical with the first part of this chapter, which contains the original lists of research and research-related skills.

[14] Technical Paper No. 4 is presented, in its entirety, as Appendix F to this report. It was prepared under U. S. Office of Education, grant OEG-0-70-4977 for the Conference on Teaching Research of the Oregon System of Higher Education.

is incorporated in this presentation. However, inadequacies in those earlier lists have led to some modifications and altered approach presented here.

Specific criticisms of the earlier lists of skills are of four main types: (a) the skills vary widely, within lists, in their level of generality -- one skill might well subsume several others in the list, (b) the skills vary greatly in importance -- some are critical and others almost trivial, (c) many important skills are omitted, and (d) in research, the skills reflect only those skills important in the conduct of empirical, behavioral research -- skills necessary in other types of research are almost completely neglected.

Some of the criticisms point to weaknesses that may be a result of the manner in which the lists were constructed. No empirical testing was done to identify important skills -- they were generated on a priori grounds through logical analysis. It can be argued that detailed lists of skills might better be developed through task analysis procedures. The Task Force is currently developing such procedures in an attempt to identify other skills not included in prior lists. In the interim, it was decided to modify the earlier lists in ways that respond, at least partially, to the criticisms that have been made. What appears here is not represented as a final revision of the earlier lists; rather, it is an interim step. Some skills that seem trivial have been dropped from earlier lists; and some that, on intuitive grounds, seem important have been added. Skills relevant to research on methodology have been added and more specific skills in the earlier lists have been subsumed under more general ones. Some rationale for inclusion of each skill is provided. In essence, a catalog of inquiry skills has been attempted that is neither so general as to be useless nor so detailed as to be mind-boggling. The result of steering this middle course is a list more general than those proposed in Technical Paper No. 1, and one which will surely appear to many to be too general. In one opinion, however, a more detailed list based only on logical grounds stands little chance of being taken seriously and stimulating discussion among a wide audience of curriculum planners in educational research and evaluation. As further Task Force efforts at task analysis are accomplished, the results might well be more detailed, empirically derived lists that will provide more useful input to persons constructing training methods or planning specific training activities for educational researchers and evaluators.

The remainder of this section is divided into three major parts. In part one, some of the skills necessary for the successful pursuit of research are listed. In part two, skills are listed for evaluation. In part three, essential knowledge about those inquiry methodologies which cut across educational research and evaluation are listed and briefly discussed. It should be noted that the ideas presented in the remainder of this section are proposed here merely as a tentative position statement included in the interest of obtaining reactions from the research community.[15]

Skills Necessary for Educational Research

In considering skills necessary for pursuing educational research, it is important to distinguish at least three types of educational inquiry.

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[15]This position statement was prepared by Gene V Glass and Blaine R. Worthen and should not be construed as necessarily representing the opinions of the entire Task Force.

The first type is characterized as empirical and largely behavioral. Within this domain lie those types of educational inquiry pursued from the perspectives of psychology, sociology, political science and other behavioral social sciences. The second category of educational research is empirical, nonbehavioral inquiry -- such activities as fall under the philosophy of education and history of education. While such endeavors deal most certainly with human behavior, they are classified as nonbehavioral since they attempt to go far beyond the construction of rational systems from the mere observation of overt behaviors. The third type of inquiry is methodological research -- research on methodology itself -- including such well-known sub-areas as research on tests and measurement, psychometrics, statistical methods, and experimental design. The importance of any particular inquiry skill interacts in important ways with these three types of inquiry. What may be a critical skill in historical research may be incidental to the pursuit of successful formal methodological research and vice versa. In the following list of research skills, the importance of that skill for each of these types of educational research is discussed.

1. <u>Drawing implications from results of prior studies</u>. Since research in any area is cumulative and evolutionary, this skill is important in all three areas of educational inquiry. No research endeavor stands alone, and no researcher can afford to ignore or slight the activity of carefully studying the literature of his field and drawing the appropriate inferences for the future course of his own work and the discipline. Whether he be an historian, a philosopher, a psychologist, a sociologist or a statistician, he must be able to interpret, evaluate and synthesize a literature relevant to his area of concern. He must be able to identify significant problems that are posed by the tradition of inquiry in his field and the accumulated works of his predecessors and contemporaries.

2. <u>Formulating hypotheses or empirical questions to be answered by the study</u>. Such skill is the hallmark of rigorous inquiry in any empirical field whether behavioral or nonbehavioral. Hence, this skill is important for both classes of educational research. However, formal research on techniques and methodology seldom involves the formulation of hypotheses or the investigation of empirical questions. Hence, this activity is nearly absent during the working day of methodological educational researchers. It therefore is an unimportant skill for such researchers.

3. <u>Procuring and managing resources (material and human) necessary to reach the research objective.</u> The importance of such a skill obviously depends on the size of the undertaking. By merit of their greater size, empirical behavioral and nonbehavioral research activities (for example, sociological, psychological, historical forms) more often involve the procuring and managing of a significant number of human and material resources than methodological educational research. Such skill could be so important in some areas of empirical educational research -- e.g., sociological survey research -- that explicit training in project management techniques would be necessary. Seldom, however, is an inquiry into psychometrics or research methodology of such size as to necessitate the management of any substantial body of resources. Thus, training such researchers in research management is probably not time well spent.

4. <u>Specifying data or evidence necessary for a rigorous test of the hypothesis</u>. This skill is quite important in the pursuit of any empirical research effort, whether behavioral or nonbehavioral. As regards methodological educational research, the necessity to be so skilled is unimportant.

5. <u>Identifying the population to which results should be generalized, and selecting a sample of the population</u>. Skill in identifying relevant populations and sampling them representatively is crucial to many forms of empirical behavioral research. Sociological survey research is almost totally dependent for its utility upon this step having been successfully completed. The historian, however, seldom has control over those events which provide evidence for his conclusions. The educational historian of the past and, to a lesser extent, the contemporary historian are dependent upon those traces of the past events which were fortuitously left behind (in diaries, private correspondence, etc.) by a handful of extraordinary and nonrepresentative individuals. Although the historian is greatly concerned with the evidence which survives the rigors of time and comes into his hands, he seldom is forced to evaluate the generality of such evidence in the same manner as the sociologist. Whereas we can identify a very limited number of skills from statistical methods for the evaluation of the generality of sociological evidence, within history the generality of evidence must be evaluated far less formally and often on an *ad hoc* basis.[16] Skill #5 is incidental to the methodological researcher, except insofar as he chooses to study the process of generalizability as a formal procedure.

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[16]See Beach, M.,A History of Education, <u>Review of Educational Research</u>, 1969, <u>39</u>, 561-76 (especially 565-69).

6. Applying an experimental design and recognizing and controlling threats to its validity. Most empirical behavioral research conducted in the laboratory depends for its success upon this skill being successfully exercised. The words "applying an experimental design" connote the manipulation of variables as in traditional experimental psychological research. In no real sense is an experimental design applied in nonbehavioral research into the history or the philosophy of education. Hence, this skill has no relevance for such endeavors. In methodological educational research, the application of experimental designs and the recognition and control of threats to the validity of experimental inferences is not a requisite skill. However, for some small number of such formal researchers this skill becomes the object of their direct inquiry.

7. Identifying the classes of variables for measurement. The identification of behaviors for measurement is crucial in psychological and sociological research on education. It is far less crucial for historical and philosophical research, and as a requisite for valid inquiry it is totally nonexistent for methodological research.

8. Selecting or developing techniques of measurement. This skill is a cornerstone of much empirical behavioral research. Coupled with the next skill (#9), it constitutes the most critical stage in the pursuit of empirical behavioral inquiry. The latitude existing for the selection of events in an inquiry is greatly restricted when one moves into the areas of history and philosophy; there one must more often be content with observations which one has not chosen on a basis for pursuit of the study. Since formal educational research as methods and techniques is generally not empirical, this skill is not essential for such types of inquiry.

9. Assessing the validity of measurement techniques. Scarcely any skill could be more important to any empirical inquiry than this one. The validity of the findings depends in large part on the researcher's skill in embodying the general constructs of his inquiry in a set of measurement techniques.

10. Utilizing appropriate data-gathering methods (tests, interviews, analysis of documents, etc.). This skill originally appeared as "Using a variety of data-gathering instruments." If stress is laid on the word "variety" in this statement, the skill probably receives a rating of unimportant for all three areas of educational inquiry. Most educational research ought to be narrowly focussed; one problem that has impeded educational research is that many researchers have a "bag full of methods" and use none of them well. Although all types of empirical researchers must be skilled in the use of some data-gathering techniques, only rarely will a researcher's inquiry range so broadly that a wide variety of data collection methods must be mastered. (Some large and complex areas of sociological research could properly be exempted from such a statement.) However, this is not to argue that researchers should master only a single method and apply it willy-nilly in all contexts; such behavior would fall under the "law of the instrument" fallacy deplored by Kaplan (1964). Researchers must learn well a small number of data-gathering methods appropriate to the problems in their disciplinary base. This skill is important for both types of empirical inquiry.

11. Understanding the general role, types, and assumptions of statistical techniques and drawing on such knowledge in using appropriate techniques of data analysis. This very general skill is relatively unimportant for empirical nonbehavioral researchers, among whom we class philosophers and historians. It becomes important for empirical behavioral researchers such as sociologists and psychologists. It is a critical skill for methodological researchers who are frequently called upon to advise empirical researchers of many persuasions on the proper analysis of research data.

12. Interpreting and drawing appropriate conclusions from data analysis. Such a skill is the heart of good empirical behavioral research. Since data analyses are substantially less formal in philosophical and historical inquiry this skill is only of average importance for such researchers. This skill is given a rating of unimportant for researchers on methodology and techniques; it is assumed that they are exempted from the duty to interpret data for their clients in terms of its substantive importance within the client's field.

13. Reporting research findings and implications. This final skill is of primary importance for all types of educational researcher. Science is necessarily public and hence the act of publication is important in its growth. By exercising this final skill, the researcher brings the inquiry process full cycle. His contribution thus enters the literature to be drawn on by his colleagues in the pursuit of new knowledge.

Skills Necessary for Educational Evaluation

In this section ten general skill areas are identified as important to the successful pursuit of educational evaluation. Some may feel that the list excludes important evaluation skills of the type earlier discussed under such categories as "situation analysis, input evaluation, etc." The unease about whether these are appropriately thought of as <u>evaluation</u> skills <u>per se</u> or as other important (but nonevaluative) inquiry skills is reflected in <u>Technical Paper No. 4</u> (Appendix F). Only those skills which, at present, are felt certain to belong to educational evaluation are included in the list. Decisions about the appropriateness of including other "evaluation" skills from the earlier lists must await further elaboration of interrelationships among inquiry activities.

1. <u>Budgeting and managing human and material resources</u>. Many educational evaluation projects are large, multifaceted endeavors, entailing a financial budget exceeding that of most educational research projects. In such projects, material and human resources must be efficiently managed. It seems necessary that those who would engage in educational evaluation at an administrative level should be trained in some of the techniques of project management and financing.

2. <u>Identifying at appropriate levels of generality the goals of the program to be evaluated</u>. It cannot be assumed that the goals of a program which one wishes to evaluate are known or stated in advance of the evaluation. An important activity in getting an evaluation underway will typically be the attempt to elicit from the responsible persons the goals and objectives toward which the program is directed. The identification of these goals is more than a routine activity of soliciting verbal statements of goals from program personnel. Done properly, it can easily entail some of the most sophisticated technology of survey research and interviewing. What many evaluators experience as frustration in their

attempts to elicit statements of goals from program personnel is actually evidence of their own expertise in such activities.

3. Assessing the value of program goals. This activity is the earliest explicitly evaluative act of an evaluation. In an evaluation, the goals of the program must not be accepted at face value, but must be regarded as elements of the program requiring direct evaluation, much as one evaluates program operations and outcomes. In some instances, the justification of goals must come from empirical research in education or in social sciences. As an example, a program aiming at the inculcation of reading readiness skills in five-year-old children immediately raises the evaluative question of the facilitative effect on reading of the attainment of reading readiness. The evaluator must know how to search for a justification of these goals in empirical research on reading instruction. He may find, for example, that the case for reading readiness has never been adequately established through empirical research. Hence, he may legitimately raise a question of the justification of the program objective. In other instances, one must turn to nonempirical nonbehavioral disciplines such as philosophy and law in seeking to evaluate program goals. A school system may set out as an objective to teach all children in the school the Christian ethic. The evaluator must be sensitive to and should raise the issue, either privately with program personnel or publicly in his report, of the legal and philosophical problems concerned with the separation of church and state in the United States. Assessing the value of program goals is an activity likely to carry the evaluator far beyond typical concerns with behavioral statements of objectives, criterion-referenced tests, and statistical analysis. It requires that

he be educated broadly in the social sciences and philosophy, and that he be responsive to questions of value which are broader than those he can ever hope to investigate within the span of one evaluative study.

4. Translating broad objectives into specific, observable objectives. General goal statements must be operationalized into specific statements of objectives. The onus of making this translation lies clearly with the evaluator who possesses the technical skill for doing so and not on program personnel to whom the language of operationalization and behaviorism is foreign and unfamiliar. Of course, the translated objectives must be redefined by program personnel to prevent unconscious biases of the evaluator from producing operational objectives different in intent from the broad objectives with which he began.

5. Identifying standards or norms for judging worth. The measurements and observations taken in an evaluation cannot be translated into judgments of worth without standards or norms. The formality of these standards and norms may vary greatly, but nonetheless a standard is implied whenever a judgment of worth is derived from an observation. The evaluator must be sensitive to the various standards which different groups use in judging worth. From among these standards, he must choose those which can best be justified. Standards may be either internal or external to a particular evaluation. External standards are represented by collateral data with which observations and measurements are compared in deriving evaluations and judgments of worth. For example: a school system may desire racial balance in its schools and may have attempted to achieve this balance through various means. The observation that 75 percent of

all Negro pupils attend schools where less than 25 percent of the student body is Negro is an observation not yielding immediate evaluative meaning since no standard for judging this degree of racial mixing exists. A standard for judgment could be found external to the evaluation in data in Equality of Educational Opportunity. There it might be found that in a representative sample of school districts across the nation, 95 percent of Negro pupils attend schools which are 90 percent Negro in population. By bringing these external data to bear on the observations from the evaluation, it is clearly seen that a much more satisfactory racial mix was achieved within the school district in question. The whole area of comparative experimental design is a means of establishing internal standards by which the worth of certain activities can be judged. A program is pitted against an alternative program and the worth of the former program is measured vis-a-vis the outcomes of the latter.

6. Monitoring the program to detect deviations from design or specified procedures. It is, of course, important to know what one evaluates. It is insufficient to accept mere labels when one has invested large portions of time and money in the observation and judgment of outcomes. It is necessary that a program be monitored through site visitations, interview techniques, survey research methods, etc., so that the evaluator is clearly aware of the degree to which the program proposed was made operational. It is misleading to pronounce a judgment of "unworthy" on a team teaching program if team teaching was never genuinely attempted.

7. Selecting (or developing) and using valid techniques of measurement to yield information on outcomes. The worth of an educational program lies in its outcomes. It is crucial that the proper outcomes be validly measured. Objective, valid data on program performance is the

sine qua non of any justifiable evaluation. The evaluator must have skill in selecting those techniques that will reveal objective data on outcomes where objective data are possible. He must know when a measurement technique threatens to misrepresent a set of behaviors.

8. Employing appropriate techniques of data analysis. The evaluator must be broadly knowledgeable in the area of statistical data analysis. He must have a clear understanding of the fundamentals of a variety of data analytic techniques. He must know when a factor analysis bears critically on an evaluative question and when it is mere window dressing for a flashy but superficial evaluation.

9. Making recommendations as a result of the evaluation. The evaluator's responsibility to evaluate does not end with the collection, analysis, and reporting of data. The data do not speak for themselves. Surely the perceptive evaluator acquires a valuable perspective on the educational program being evaluated through long and intimate association with it and by merit of the special perspective he brings to the program. To fulfill his total evaluative responsibility, he must make the subtle and personal inferential leaps from those data he has gathered and those results he has observed to his personal recommendations for the conduct or the continuance of a program. This is not a skill easily taught. The activity draws upon the accumulated experience, wisdom and judgment of the evaluator.

10. Writing the evaluation report. Drafting the report of an evaluation for the relevant audience or audiences is an activity quite unlike writing the report of a research project. The format for the report of research tends to be stereotyped within a discipline; publication

manuals clearly spell out the parts of a research report and the conventions one ought to employ. Detail and completeness are valued highly. Subjective opinion is downgraded in a research report. The researcher is communicating with his colleagues who already have considerable experience and background in the area being discussed. The writing of the evaluation report is a different matter altogether. The evaluator is typically communicating to an audience which does not share his perspective, his grasp of technical topics, nor his interest in technical details. The responsibility to communicate findings rests more heavily with the evaluator than with the researcher. The evaluator will have to adopt a nontechnical language. He must refrain from over-reliance on tabular presentation of data analyses. He must avoid discursive commentary on test validity and reliability and other topics which his audience will not find central to their concerns. At this final stage of the evaluation endeavor, the evaluator will play a role much more akin to the journalist than the scientist.

Essential Knowledge about Educational Research and Evaluation Methodology

For the bulk of educational researchers and evaluators, methodological knowledge need consist of little more than the ability to produce three pages of coherent exposition on each of approximately 50 topics. It is an insidious form of the "academic fallacy"[17] to think that all

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[17] Scriven, Michael. Education for survival. Ch. 3 in The Ideal School, Gloria Kinney (ed.). Wilmette, Illinois: Kagg Press, 1969.

educational researchers should have a specialist's grasp of research techniques, acquired through the study of method in its own right. The methodlogical knowledge required to hold office as a practicing educational researcher or evaluator is far less than typically imagined or admitted to by methodologists. Knowledge of the effect of platykurtosis on the distribution of estimated variance components is no more necessary to the instructional researcher than is knowledge of the effect of exposure to nonexemplars on acquisition of disjunctive concepts necessary for the methodologist. To act otherwise hobbles methodological research and retards instructional research. In truth, educational researchers need to know only a little methodology relevant to the disciplinary base from which they launch their investigations: evaluators may need to know a little about more types of methodology, since they are forced to work more across disciplinary bases, but even here depth of knowledge about particular methods is not requisite. If this sounds like an argument for a superficial knowledge of a body of methods and techniques then the message has come through clearly. Irrational insistence in the mastery of methodological esoterica only breeds guilt and avoidance reactions in educational researchers and evaluators. The ability to write a few pages in explanation of each of the following concepts represents the essential core of knowledge of educational research and evaluation methodology.

Statistics

1. Library knowledge: names of major books, their authors, and some familiarity with content.
2. Descriptive techniques, their definition and interpretation, including measures of central tendency, variation, correlation

and prediction (including multiple regression and partial correlation).

3. Contingency table analysis of categorical data.
4. Major schools of thought on statistical inference (Neyman-Pearsonian, Fisherian, Bayesian, likelihood estimation), including principal concepts thereof.
5. Nature and use of the general linear model including least-squares estimation and distributional theory, which includes analysis of variance methods.
6. Fundamental theorems of finite sample space probability theory (addition rule, multiplication rule, etc.).
7. Definitions and properties of the principal continuous (normal, chi-square, t, F) and discrete (binomial, multinomial) probability distributions.
8. Permutation theory and Monte Carlo methods.
9. Nature and purposes of the following variations on simple random sampling in survey research: stratified sampling, cluster sampling, multi-stage sampling.
10. Consequences of failure to meet assumptions of principal parametric inferential techniques.

Experimental Design

1. Library knowledge: names of major books, their authors, and some familiarity with contents.
2. Randomization as a means of experimental control and its relationship to inferential statistical methods.

3. Factors affecting the internal and external validity of experimental and quasi-experimental designs.
4. Definitions of fixed-effects, random-effects and mixed-effects designs; crossed and nested factors.
5. Covarying, blocking and stratifying as means of increasing precision of estimation in experimental designs.
6. Purposes underlying the use of randomized blocks, Latin square, Greco-Latin square, fractional factorial, incomplete block, etc., designs.
7. Nature and problems in the use and analysis of "repeated measures" designs.
8. Effect of measurement error on the precision (power) of an experiment.

Psychometrics

1. Library knowledge: names of major books, their authors, and some familiarity with contents.
2. Fundamental postulates of classical true-score theory (both the "theory of errors" and the "theory of parallel measures").
3. Fundamental theorems of classical true-score theory (reliability coefficient, variance error of measurement, correction for attenuation, relationship of test length to σ_x^2, σ_t^2, σ_e^2 and ρ_{xx}).
4. Types of test reliability and validity.
5. Reliability of sums and difference scores.

6. Measurement of change or "gain" (definition of "gain," reliability and validity).
7. Fundamental postulate and theorems of common-factor analysis.
8. Four "factor analysis" models: components analysis, image analysis, canonical factor analysis, alpha factor analysis.
9. Methods of factor rotation (orthogonal) and transformation (oblique): varimax, equamax, quartimax; oblimax, promax, Harris-Kaiser.

Measurement

1. Library knowledge: names of major books, their authors and some familiarity with contents.
2. Major forms of assessment of knowledge and cognitive skills including multiple-choice, completion, free-response, ranking, matching, etc., formats.
3. Primary methods of assessing attitudes, including Likert and Thurstone scales, interests and social perception, including semantic differential and Q-sort.
4. Fundamental theorems on the differential weighting of test items (particularly Wilks's theorem).
5. Properties of the major test-score scales including T-scores, z-scores, CEEB scores, ration and deviation IQ scores, grade-equivalent scores, and percentile scores.
6. Definitions and properties of nominal, ordinal, interval and ratio measurement scales.

7. The nature and implications for reliability and validity of response sets.
8. Construction and use of rating scales, including methods of assessing rater agreement.

General Considerations in Research and Evaluation

1. The distinction between different types of inquiry -- e.g., basic and applied (conclusion-oriented vs. decision-oriented) research, formative and summative evaluation.
2. The nature of theories, models and paradigms in the social sciences.
3. The ~~nature of the~~ phenomena studied by psychologists, sociologists, economists, cultural anthropologists, political scientists, and philosophers (for example, externally reinforced individual behavior (psychology), social organizations (sociology), exchange of valued commodities (economics), cultural norms (anthropology), authority relationships (political science), and linguistic meaning (philosophy).

Conclusion

The listing of skills and knowledge essential to practicing researchers and evaluators in education has led us to five major conclusions.

1. If one accepts this portrayal of skills and knowledge essential in research and evaluation as even partially correct, it is clear that there is too much to communicate to trainees in the time normally spent in a graduate program (e.g., consider the indepth knowledge of a discipline essential for a researcher). This mandates more attention to recruitment,

since it is obvious that selecting trainees who already have some of the requisite knowledge or skills would largely eliminate this problem. This leads logically to the conclusion that universal recruiting from other disciplines is highly desirable. Even the selection of students with relevant research and evaluation (not teaching) experience or a good liberal arts education would be helpful.

2. Current graduate programs do not effectively train students in many of the skills and much of the knowledge listed here as essential. A tradition exists, primarily in universities, of teaching statistics, measurement, experimental design, and certain other areas listed earlier in this paper. However, many of the essential skills and knowledge are not being well-taught in current training programs and, as a result, many current occupants of evaluation and research roles are poorly trained for those roles.

3. Trainers need to either (a) upgrade graduate training programs to where they will focus on at least the minimum essentials listed herein, or (b) develop more effective alternatives to graduate programs as part of a new long-range strategy for improving the training of educational researchers and evaluators.

4. In the interim period, trainers must depend on ancillary training strategies to teach many of the essentials. Specifically, one might look to short-term training and retraining strategies such as workshops, institutes, and self-contained, exportable, programmed materials. All of these strategies have promise of reaching broad audiences and providing training in skills and knowledge now going begging.

5. Many of the skills listed herein might be best learned through apprenticeship training in educational research and evaluation.[18] For example, "drawing appropriate conclusions from data analysis," "assessing the value of program goals," and "writing the evaluation report" are (perhaps appropriately) not included in formal training programs. Those who possess such skills generally obtained them through experience, often under the tutelage of a senior researcher insightful enough to make of the apprenticeship a genuine training experience.

In the words of Sibley (1963):

> No amount of formal instruction in methods and no amount of discussion of others' research can take the place of the first-hand experience of undertaking to translate an unstructured situation into a problem or problems amenable to scientific investigation, and then proceeding to seek solutions. Every candidate for an advanced degree in a scientific discipline ought to serve an apprenticeship in research, beginning as soon as he has completed a necessary modicum of formal study of methods. The term <u>apprenticeship</u> is used here in default of a better one to denote learning by working under the personal direction of a mature professional person. (Sibley, 1963, p. 37)

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[18] See <u>Technical Paper No. 20</u> in the AERA series, in this regard, as well as Appendix F.

CHAPTER 3

ANALYSES OF AERA EMPLOYMENT SERVICE DATA AND IMPLICATIONS FOR RESEARCH TRAINING

ANALYSES OF AERA EMPLOYMENT SERVICE DATA AND IMPLICATIONS FOR RESEARCH TRAINING

A major objective of the 1969-70 Task Force project was to provide information on supply and demand of educational researchers to those who have responsibility for developing research training programs. Of particular concern were data on areas of specialization in research and research-related activities in which there are shortages of trained personnel. The telephone interviews discussed in the previous chapter were used to collect data on such shortages, as perceived by employers and supervisors of research personnel. It was considered essential, however, that some information be provided on the competencies required by employers for actual positions open and competencies possessed by applicants for those positions. To that end, the Task Force staff examined existing data from the 1968, 1969 and 1970 AERA employment service operated concurrently each year with the Association's annual meeting.

The results of that examination are discussed in this chapter. In the first three sections, analyses are presented, by year, of supply and demand data in particular areas of competence. The fourth section is an examination of geographic data on vacancies and applicants for all three years. The last section of the chapter is an attempt to analyze trends in the data across the three years studied and to relate the employment service data to the information on needed skills which resulted from the telephone interviews.

An Analysis of 1968 AERA Employment Service Data

Employment Service Forms

The "professional order form" used by employers and the "professional application form" used by applicants in the 1968 AERA placement service[1] are shown in Appendix G. Both are standard convention employment service forms supplied by the U. S. Department of Labor. A variety of data was contained on the completed forms; the most pertinent was data on area(s) of competence, recorded on both forms.[2] Specifically, employers were required to list the area(s) of competence necessary for each available position and each applicant was required to list his area(s) of competence. No specific description of the type of response desired was provided to either employers or applicants; consequently, there was considerable variation in the level of specificity in the responses. Most of the responses were quite global (e.g., statistics). Data about applicant competencies were self-report data and, therefore, subject to the difficulties inherent in such data.[3] These limitations notwithstanding, it was felt that comparisons of applicant and employer data would provide useful information to the Task Force.

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[1]This placement service operated during February 8-10, 1968 in Chicago.

[2]Other data on geographic distribution of available positions and geographic preferences of applicants are reported later in this chapter.

[3]An assessment of the reliability of the self-report data from the 1970 AERA employment service is contained in Appendix J, an assessment which also has implications for the 1968 and 1969 data.

Procedures

The procedures for organizing and analyzing the data are reported below.

1. Each applicant form was reviewed and each area of competence mentioned was listed alphabetically in the precise form in which it appeared on the form. Differing statements of areas of competence were all listed separately (e.g., "tests and measurement" was listed separately from "measurement"); identical statements were simply tallied.

2. The resulting listing of applicants' areas of competence was collapsed into the logically derived categories used below to report the results.

3. Each application form was also categorized as to whether the applicant seemed to be seeking a research position, a research facilitative position or a nonresearch position.[4] For this categorization, all relevant information on the form (e.g., areas of competence, special information listed, prior professional duties and career evolution) was used to assist in making a judgment.

4. Each employer form was reviewed and each area of competence listed alphabetically, using the same process as reported above for

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[4]A "research position" was operationally defined as one in which there was some indication that the applicant desired or was primarily prepared for a position in which he would participate in any way in research or a research-related activity (evaluation, development or diffusion). A "research facilitative position" was one in which the applicant did not qualify for the above category but indicated an interest in a position in which he could either teach or administer research, evaluation, development or diffusion content or activities. When none of these indications were present, the applicant was categorized as seeking a nonresearch position. Although this categorization process was not based on clear criteria, agreement between "categorizers" was checked on an eight percent sample of applicant forms and was found to have 86 percent perfect agreement.

applicant forms. The resulting lists of areas of competence required by employers were collapsed into the same set of categories used for applicants.

5. Each employer form was also categorized as to whether the position was a research, research facilitative or nonresearch position.[5]

6. Employer forms were also categorized into ten institutional settings and cross-tabulated against "areas of competence."

Results

Employers registered 769 vacancies with the 1968 employment service; 811 applicants registered with the service. Although this appears to represent a reasonable balance between supply and demand, it is only when the vacancies and applications are analyzed in terms of competencies and institutional settings that specific supply-demand discrepancies can be identified. Such analyses are presented in the tables that follow.

Tabulation of 661 of 769 vacancies, by institutional setting and by a determination of whether the vacancy was for a research, research facilitative or nonresearch position, is shown in Table 3.1.[6]

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[5] Definitions were comparable to those listed for applicants in the previous footnote; however, the employer forms included more specific data about the extent to which research or research-related activities were a part of the position either through direct involvement or facilitation through relevant instructional or administrative roles. The percent of perfect agreement between the two "categorizers" was 96 percent on employer forms.

[6] The total numbers in the tables do not correspond to the total number of vacancies or applicants registered with the employment service for two reasons: (a) some forms were blank, illegible or uninterpretable on critical items, and (b) some items permitted multiple responses for each applicant or employer. Each table includes a note explaining which factor operated to create such discrepancies.

Table 3.1

Tabulation of 661 Vacancies Listed in the 1968 AERA Employment Service: By Institutional Setting and Degree of Relevance to Educational Research and Research-related Activities (RDDE)

Institutional Setting	Area of Competence is: Directly Related to RDDE N	col. %	row %	Facilitative of RDDE N	col. %	row %	Not Related to RDDE N	col. %	row %	Row Totals (% of Total N) N	col. %	row %
1. Univ. & College	83	37.2	17.9	69	69.8	14.9	312	92.0	67.2	464	70.2	100.0
2. Regional Educ. Lab.	26	11.7	56.5	2	2.0	4.3	18	5.3	39.2	46	6.9	100.0
3. R & D Center	4	1.8	25.0	12	12.1	75.0	0	0.0	0.0	16	2.4	100.0
4. Indep. Res. Agency	20	9.0	95.2	1	1.0	4.8	0	0.0	0.0	21	3.2	100.0
5. State Educ. Dept.	42	18.8	95.5	2	2.0	4.5	0	0.0	0.0	44	6.7	100.0
6. School District	17	7.6	70.8	0	0.0	0.0	7	2.1	29.2	24	3.6	100.0
7. Federal Agency	10	4.5	45.5	11	11.1	50.0	1	0.3	4.5	22	3.3	100.0
8. Military	2	0.9	100.0	0	0.0	0.0	0	0.0	0.0	2	0.	00.0
9. Industry	16	7.2	84.2	2	2.0	10.5	1	0.3	5.3	19	2.	00.0
10. Prof. Educ. Assoc.	3	1.3	100.0	0	0.0	0.0	0	0.0	0.0	3	0.5	0.0
Column Totals (% of Total N)	223	100.0	(34.0)	99	100.0	(15.0)	339	100.0	(51.0)	661	(100.0)	

Note: The "area(s) of competence" item on 108 employer forms was either blank, illegible, or uninterpretable; therefore, these 108 forms were not included in this tabulation.

Tabulation of specific areas of competence for the 661 vacancies for which competence information was available is shown in Table 3.2. Note that in this table multiple competencies were listed for most of the 661 vacancies, resulting in a total number of competencies recorded here far in excess of the total number of vacancies. Note also that the same 108 forms excluded from Table 3.1 were excluded from Table 3.2.

Seven hundred seventy-six of the 811 applicants listed areas of competence on their application forms. In Table 3.3 a comparison of specific competencies they listed with competencies listed for vacancies is presented, tabulated by relevance to research and research-related areas. Note again that in this table multiple competencies were listed by many employers and applicants, resulting in a total number of competencies recorded here that is far in excess of the total applicants or vacancies.

A comparison of the number and percentage of vacancies that are research, research facilitative and nonresearch with the number of applicants whose competencies seem to prepare them for such positions is shown in Table 3.4.

Each applicant was also asked to indicate the type of organization in which he preferred employment: academic, government or other. The response was disappointing: 299 of the 811 applicants left the item blank. Another 92 checked all options. This left only 420 for whom the choice among the categories was clear-cut. They were distributed as shown in Table 3.5.

Table 3.2

Areas of Competence Required for 661 Vacancies Listed in the 1968 AERA Employment Service: By Institutional Setting

Area of Competence	Univ. & Colleges	Regional Educ. Labs.	R & D Centers	Indep. Res. Agencies	State Educ. Depts.	School Districts	Federal Agencies	Military	Industry	Prof. Educ. Assocs.	Total
1. <u>Research Methods/Types</u>											
a. Educational Research (general)	48	7	2	6	18	0	0	0	3	0	84
b. Research Methodology	53	1	3	0	15	3	20	1	9	0	105
c. Research Design	66	10	10	3	4	10	14	0	7	2	126
d. Survey/Institutional Research	9	9	0	0	33	6	0	0	0	0	57
2. <u>Educational Development</u>	3	0	3	0	0	0	0	0	0	0	6
3. <u>Educational Diffusion</u>	0	0	0	0	1	0	0	0	0	0	1
4. <u>Evaluation</u>											
a. Evaluation Techniques (general)	39	21	6	12	36	22	3	0	7	0	146
b. Evaluation of Instructional Products	2	24	0	6	0	0	0	0	1	0	33
5. <u>Measurement</u>											
a. Measurement Theory/Psychometrics	87	6	0	9	3	0	3	0	0	0	108
b. Testing/Applied Measurement	57	0	0	0	0	12	0	0	0	0	69
c. Instrument Construction/Development	6	6	0	3	0	0	0	0	12	0	27
6. <u>Statistical Analysis</u>											
a. Elementary Statistical Techniques	95	10	4	2	7	11	13	0	5	0	147
b. Advanced Statistical Techniques	22	0	0	6	0	0	1	0	0	1	30
7. <u>Computer Techniques/Programming</u>	48	6	6	0	3	0	0	1	9	2	75

Table 3.2 (Continued)

Area of Competence	Univ. & Colleges	Regional Educ. Labs.	R & D Centers	Indep. Res. Agencies	State Educ. Depts.	School Districts	Federal Agencies	Military	Industry	Prof. Educ. Assocs.	Total
8. Systems Analysis	2	4	0	3	6	0	0	0	6	0	21
9. Psychology											
a. Educational/School Psychology	39	0	3	0	0	0	0	0	0	0	42
b. Developmental Psychology	42	0	0	0	0	0	0	0	0	0	42
c. Learning/Experimental Psychology	30	0	9	6	0	3	0	0	0	0	48
d. Social Psychology	8	0	3	0	0	1	0	0	0	0	12
e. Clinical Psychology	15	0	0	3	0	0	0	0	0	0	18
10. Guidance and Counseling	8	0	2	0	0	0	0	0	0	0	10
11. Educational Sociology/Economics	9	0	3	0	0	0	0	0	0	0	12
12. Administration											
a. Research Administration/Management	51	6	0	6	0	3	0	0	0	0	66
b. General Administration	22	6	3	0	5	1	14	0	3	3	57
13. Curriculum Development/Analysis	16	2	5	0	0	0	0	0	1	0	24
14. Teacher Education/In-service Training	52	0	20	1	2	0	1	0	2	0	78
15. Vocational Education	2	0	0	0	0	0	1	0	0	0	3
16. Subject Matter Areas (e.g., Soc. Studies)	11	0	4	0	0	0	0	0	0	0	15
17. Special Education	4	0	0	0	0	0	2	0	0	0	6
18. Instructional Media/Technology	6	2	5	0	0	0	0	0	3	0	16
19. Editing	3	0	2	0	0	0	4	0	0	0	9
20. Other[a]	47	24	10	5	23	19	11	1	5	1	146

[a]This category included competencies that were not viewed as useful for the purposes of this paper, e.g., "education," "schooling," "intelligence," "needs to know how to deal with people."

Table 3.3

Areas of Competence Required for 661 Vacancies and Ar.as of Competence Listed by 776 Applicants in the 1968 AERA Employment Service: By Relevance to Educational Research and Research-related Activities (RDDE)

Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
1. Research Methods/Types								
a. Educational Research (general)	41	10	43	31	0	1	84	42
b. Research Methodology	75	169	30	8	0	1	105	178
c. Research Design	61	25	65	16	0	1	126	42
d. Survey/Institutional Research	49	1	8	0	0	0	57	1
2. Educational Development	4	13	2	6	0	0	6	19
3. Educational Diffusion	1	0	0	0	0	0	1	0
4. Evaluation								
a. Evaluation Techniques (general)	78	43	68	11	0	0	146	54
b. Evaluation of Instructional Products	20	0	13	0	0	0	33	0
5. Measurement								
a. Measurement Theory/Psychometrics	54	77	50	29	4	3	108	109
b. Testing/Applied Measurement	22	21	47	17	0	1	69	39
c. Instrument Construction/Development	15	1	10	0	2	0	27	1
6. Statistical Analysis								
a. Elementary Statistical Techniques	51	78	52	41	44	3	147	122
b. Advanced Statistical Techniques	11	2	17	2	2	0	30	4
7. Computer Techniques/Programming	22	32	18	20	35	0	75	52

V - Vacancies
A - Applicants

Table 3.3 (Continued)

Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
8. Systems Analysis	12	0	7	0	2	0	21	0
9. Psychology								
a. Educational/School Psychology	7	56	1	29	34	25	42	110
b. Developmental Psychology	9	27	0	9	33	22	42	58
c. Learning/Experimental Psychology	27	48	6	39	15	0	48	87
d. Social Psychology	5	3	1	0	6	0	12	3
e. Clinical Psychology	1	4	0	1	17	0	18	5
10. Guidance and Counseling	1	51	0	21	9	20	10	92
11. Educational Sociology/Economics	2		1	1	9	0	12	3
12. Administration								
a. Research Administration/Management	0	0	66	22	0	0	66	22
b. General Administration	10	70	0	0	47	23	57	93
13. Curriculum Development/Analysis	2	53	0	7	22	31	24	91
14. Teacher Education/In-service Training	1	72	2	24	75	14	78	110
15. Vocational Education	0	0	0	0	3	0	3	0
16. Subject Matter Areas (e.g., Soc. Studies)	0	8	0	1	15	2	15	11
17. Special Education	2	9	0	2	4	3	6	14
18. Instructional Media/Technology	4	14	1	0	11	2	16	16
19. Editing	3	13	0	1	6	2	9	16
20. Other (e.g., educated, work well with people)		a		a		a	146	185

[a]Competencies in this category could not readily be classified in the categories of research, research-facilitative, and nonresearch; therefore, only the total is reported here.

Table 3.4

Number and Percentages of Vacancies and Applicants in 1968 Employment Service: By Relevance to Educational Research and Research-related Activities (RDDE)

Vacancy or Applicant Competencies are:	Vacancies		Applicants	
	N	%	N	%
1. Directly related to RDDE	223	34.0	469	60.4
2. Facilitative of RDDE	99	15.0	186	24.0
3. Not related to RDDE	339	51.0	121	15.6
Total	661	100.0	776	100.0

Table 3.5

Applicant Preferences for Employment by Institutional Category Compared with Vacancies by Institutional Category

Institutional Setting	Vacancies		Applicants	
	N	%	N	%
1. Academic	464	70.2	409	97.4
2. Government	66	10.0	2	0.5
3. Other	131	19.8	9	2.1
Total	661	100.0	420	100.0

Discussion

Before attempting to derive implications from the data presented above, several factors that limit their interpretability should be mentioned.

First, there is no way to know whether employers and applicants used the same referents in listing areas of competence. Thus, comparisons of competencies listed by employers and applicants may be distorted to an unknown degree. For example, there is an apparent discrepancy between 27 vacancies for which "instrument construction" was listed as an area of competence and one applicant who listed that activity; that discrepancy may be an artifact created by employers using the rubric "instrument construction," while the applicant lists "psychometrics" to describe the same phenomenon.

Second, lack of knowledge about who uses the employment service creates uncertainty as to how to interpret the data. Apparent discrepancies between supply and demand may be attributable to differences between employers and applicants who use the service. For example, the apparent imbalance between vacancies and applicants in curriculum development may merely reflect the fact that persons wishing to fill such positions typically use ASCD or some other organization, while applicants "hedge their bets" by registering in as many employment services as possible.

Despite these limitations, several trends in the data appear strong enough to warrant consideration.

First, it is not surprising that over 70 percent of the vacancies were in academic settings. The AERA annual meeting and other professional association conventions are prime recruiting grounds for academic administrators. It is somewhat surprising, however, to find that over 97 percent of the applicants who expressed unequivocal preferences opted for a position in academia. The large numbers of positions open in government agencies, schools, regional laboratories, etc., seem to have very limited appeal to applicants in the AERA employment service.

Second, in view of the very generous criteria for including a vacancy in the research and research facilitative categories, it is interesting that over half the vacancies were in no way related to research or related activities. Conversely, only 15.6 percent of the applicants were included in the nonresearch category. Applicants seemed to be much more research oriented than did the employers. Stated differently, competition for research and research facilitative positions appears to have been keen in 1968.

Third, some discrepancies between the number of employees listing certain areas of competence and the number of vacancies calling for those competencies are large and seem unlikely to be artifacts of the way the areas of competence are listed or of the type of user of the employment service. For example, there appear to be somewhat more vacancies in research methods than there are qualified applicants to fill them. This is especially true where survey research is concerned. It seems that virtually no persons with specific skills in this area were prepared in 1968, although the need was patently clear. Perhaps persons who listed "educational research" or "research methodology" were skilled in applying sociological survey techniques, thus reducing the discrepancy, but there is no basis for such an assumption in these data.

There were more than three vacancies in evaluation for every applicant prepared in this area. It appears that the evaluation mandates of Titles I and III of the Elementary and Secondary Education Act of 1965 and the increasing trend toward accountability may have had an effect in 1968 and necessitated more attention to training in this area.

Although the discrepancy is not startling, it is interesting to note that the need for an increased supply of developers and diffusers predicted by Clark and Hopkins (1969) had not evidenced itself in 1968, at least among users of the AERA employment service.

Other areas in which far too few people were prepared in 1968 to meet the demand included some areas of measurement, advanced statistical techniques (e.g., factor analysis, multivariate analysis), systems analysis, research management and educational sociology. Conversely, there was an oversupply of persons prepared (in comparison with relevant vacancies) in educational and school psychology, learning and experimental psychology, guidance and counseling, curriculum development and teacher education. However, these latter discrepancies seem more tenuous and more likely to result from the clientele using the AERA employment service. Employers desiring to hire counselors, curriculum directors and school psychologists may well be more inclined to focus their recruitment efforts on conventions of professional associations such as the Association for Supervision and

Curriculum Development, the American Personnel and Guidance Association or the American Psychological Association.

The data and discussion in this paper must be viewed as tentative pending the analysis and reports of comparable data for 1969 and 1970.

An Analysis of 1969 AERA Employment Service Data

Employment Service Forms

The "professional placement order form" used by employers and the "professional placement application form" used by applicants in the 1969 AERA placement service[7] are shown in Appendix H. Both are standard convention employment service forms supplied by the U. S. Department of Labor, although they are different from the forms used during the 1968 and 1970 employment services. A variety of data was contained on the completed forms.[8]

For the purposes of this analysis, the shift from the 1968 form to the 1969 form was unfortunate. In 1968 both employers and applicants had been required to list specific areas of competence they possessed or required for the position. In 1969 neither this information nor information on areas of specialization was specifically requested on the forms. Consequently, such information had to be inferred from other data requested on the forms.

Applicants were asked to indicate the type of position they were seeking. It was assumed that persons possessed relevant competencies in areas in which positions were sought. However, if the description of the position sought was unclear, consideration was given to other information on the form, such as academic major and previous experience, in

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[7]This placement service operated during the AERA annual meeting, February 6-8, 1969 in Los Angeles.

[8]Other data on the geographical distribution of available positions and geographical preferences of applicants are reported later in this chapter.

order to construct the clearest description of the area of specialization in which the applicant was qualified to work.

Employers were asked to give the title of the position opening, a description of the position (including responsibilities), and any special experience requirements.

Although the information gathered from both forms was often not specific, and although the applicant information was subject to limitations of self-report data, it was felt that comparisons of the two sets of data might still provide useful information to the Task Force.[9]

Procedures

The procedures for organizing and analyzing the data are reported below.

1. Each employer form was reviewed and each area of specialization that could be inferred from the responses or that was directly stated was listed alphabetically. Each different area of specialization was listed separately (e.g., "tests and measurement" was listed separately from "measurement"); identical statements were simply tallied.

2. The resulting listings of areas of specialization required by employers were collapsed into the logically derived categories used below to report the results.

3. Each employer form was also categorized as to whether the position described was a research, research facilitative or nonresearch position.[10]

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[9] An assessment of the reliability of the self-report data from the 1970 AERA placement service is contained in Appendix J, an assessment which also has implications for the 1968 and 1969 data.

[10] Research, research facilitative and nonresearch positions were defined in footnotes 4 and 5 above.

4. Finally, employer forms were categorized into seven institutional settings and cross-tabulated against "areas of specialization."

5. Each applicant form was reviewed and each area of specialization was listed alphabetically, using the same process as reported above for the employer forms. The resulting lists of areas of specialization were collapsed into the same set of categories used for the employers.

6. Each application form was also categorized as to whether the applicant seemed to be seeking a research, research facilitative or nonresearch position.

Results

Employers registered 459 vacancies with the 1969 employment service; 569 applicants registered with the service. Overall, this seems to reflect a slight imbalance between supply and demand.[11] However, it is only when the vacancies and applications are analyzed in terms of areas of specialization and institutional settings that specific supply-demand discrepancies can be identified. Such analyses are presented in the tables that follow.

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[11] One limitation to interpreting such supply and demand data stems from the fact that it is impossible to determine precisely what proportion of the applicants occupy continuing positions. For example, 61 percent of the applicants were students evidently completing academic programs and in need of positions upon graduation. However, it is impossible to determine how many of the remaining 39 percent of the applicants -- those employed at the time when they filled out the form -- were holding continuing positions and looking for new positions in the interest of professional advancement, personal considerations, etc., and how many were seeking positions because their positions were phased out (e.g., positions in discontinued RELs). Therefore, absolute supply-demand comparisons from data of this type are tentative at best. If one assumes, however, that such uncertainties in the data are random across areas of specialization, then <u>relative</u> comparisons of supply-demand discrepancies by area of specialization still could be useful.

This same limitation, though not explicated above, is equally applicable to data reported for 1968.

The tabulation of 439 of the total of 459 vacancies, by institutional setting and by a determination of whether the vacancy was for a research, research facilitative, or nonresearch position, is shown in Table 3.6.[12]

The tabulation of specific areas of specialization for the 439 vacancies for which such information was available is shown in Table 3.7. Note that in this table multiple areas of specialization were listed for many of the vacancies, resulting in a total number of entries recorded here far in excess of the total number of vacancies.

There were 569 applicants in 1969. A comparison of areas of specialization they listed with specializations listed for vacancies is presented in Table 3.8, tabulated by relevance to research and research-related areas. Note again that in this table multiple areas of specialization were listed by many employers and applicants, resulting in a total number of entries recorded here that is far in excess of the total number of applicants or vacancies.

A comparison between the number and percentage of vacancies that are research, research facilitative and nonresearch, and the number of applicants whose areas of specialization seem to prepare them for such positions, is shown in Table 3.9.

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[12]One university had 20 new vacancies, but did not specify any areas of specialization desired; therefore, those 20 vacancies are not included here.

Table 3.6

Tabulation of 439 Vacancies Listed in the 1969 AERA Employment Service: By Institutional Setting and Degree of Relevance of Major Area of Specialization to Educational Research and Research-related Activities (RDDE)

Institutional Setting	Major Area of Specialization is:									Row Totals (% of Total N)		
	Directly Related to RDDE			Facilitative of RDDE			Not Related to RDDE					
	N	Col. %	Row %	N	Col. %	Row %	N	Col. %	Row %	N	Col. %	Row %
1. University and College	139	55.8	44.3	53	82.8	16.9	122	96.8	38.8	314	71.5	100.0
2. Regional Educ. Lab	29	11.7	85.3	5	7.8	14.7	0	0.0	0.0	34	7.7	100.0
3. Independent Res. Agency	49	19.7	96.0	1	1.6	2.0	1	.8	2.0	51	11.6	100.0
4. State Educ. Dept.	15	6.0	83.3	3	4.7	16.7	0	0.0	0.0	18	4.1	100.0
5. School District	12	4.8	70.6	2	3.1	11.8	3	2.4	17.6	17	3.9	100.0
6. Military	2	.8	100.0	0	0.0	0.0	0	0.0	0.0	2	.5	100.0
7. Industry	3	1.2	100.0	0	0.0	0.0	0	0.0	0.0	3	.7	100.0
Column Totals (% of Total N)	249	100.0	(56.7)	64	100.0	(14.6)	126	100.0	(28.7)	439	(100.0)	

Table 3.7

All Areas of Specialization Required for 439 Vacancies Listed in the 1969 AERA Employment Service: By Institutional Setting

Area of Specialization	Univ. & Colleges	Regional Educ. Labs	Indep. Res. Agencies	State Educ. Depts.	School Districts	Military	Industry	Total
1. Research Methods/Types								
a. Educational Research (general)	26	6	4	3	4	2	3	48
b. Research Methodology	8	0	0	0	0	0	0	8
c. Research Design	12	0	3	0	0	0	0	15
d. Survey/Institutional Research	4	0	1	0	0	0	0	5
2. Educational Development	0	4	14	0	0	0	0	18
3. Educational Diffusion	2	0	0	0	0	0	0	2
4. Evaluation								
a. Evaluation Techniques (general)	11	8	2	5	4	1	0	31
b. Evaluation of Instructional Products	8	5	0	0	0	0	0	13
5. Measurement								
a. Measurement Theory/Psychometrics	18	3	3	0	0	0	0	24
b. Testing/Applied Measurement	17	3	0	0	2	0	0	22
c. Instrument Construction/Development	0	0	4	0	C	0	0	4

Table 3.7 (Continued)

Area of Specialization	Univ. & Colleges	Regional Educ. Lab	Indep. Res. Agencies	State Educ. Depts.	School Districts	Military	Industry	Total
6. Statistical Analysis								
a. Elementary Statistical Techniques	39	0	0	0	0	0	0	39
b. Advanced Statistical Techniques	17	0	12	2	0	0	0	31
7. Computer Techniques/Programming	11	0	1	0	0	0	0	12
8. Systems Analysis	3	3	1	0	0	0	0	7
9. Psychology								
a. Educational/School Psychology	53	0	0	2	3	0	0	58
b. Developmental Psychology	44	0	0	0	0	0	0	44
c. Learning/Experimental Psychology	32	0	8	0	0	0	0	40
d. Social Psychology	3	1	1	0	0	0	0	5
10. Guidance and Counseling	15	0	1	0	0	0	0	16
11. Educational Sociology/Economics/Politics	10	1	0	0	0	0	0	11
12. Administration								
a. Research Administration/Management	17	4	1	5	1	0	0	28
b. General Administration	14	0	0	3	2	0	0	19
13. Curriculum Development/Analysis	17	2	4	0	1	0	0	24
14. Teacher Education/In-Service Training	32	2	2	0	0	0	0	36

Table 3.7 (Continued)

	Area of Specialization	Univ. & Colleges	Regional Educ. Labs	Indep. Res. Agencies	State Educ. Depts.	School Districts	Military	Industry	Total
15.	Vocational Education	1	0	0	0	0	0	0	1
16.	Subject Matter Areas (e.g., Reading, Social Studies)	54	3	1	0	0	0	0	58
17.	Special Education	10	0	0	0	0	0	0	10
18.	Instructional Media/Technology	7	0	0	0	0	0	0	7
19.	Editing/Writing	0	1	1	0	0	0	0	2
20.	Other (e.g., "teaching")	35	3	4	1	2	1	0	46

Table 3.8

All Areas of Specialization Required for 439 Vacancies and All Areas of Specialization Listed by 569 Applicants in the 1969 AERA Employment Service: By Degree of Relevance to Educational Research and Research-related Activities (RDDE)

Areas of Specialization	Area of Specialization is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
1. Research Methods/Types								
a. Educational Research (general)	47	58	1	8	0	0	48	66
b. Research Methodology	1	4	7	0	0	0	8	4
c. Research Design	11	12	4	0	0	0	15	12
d. Survey/Institutional Research	5	2	0	0	0	0	5	2
2. Educational Development	18	17	0	0	0	0	18	17
3. Educational Diffusion	2	0	0	0	0	0	2	0
4. Evaluation								
a. Evaluation Techniques (general)	25	12	6	0	0	0	31	12
b. Evaluation of Instructional Products	11	0	2	0	0	0	13	0
5. Measurement								
a. Measurement Theory/Psychometrics	19	19	4	10	1	4	24	33
b. Testing/Applied Measurement	8	0	5	0	9	2	22	2
c. Instrument Construction/Development	4	0	0	0	0	0	4	0

V - Vacancies
A - Applicants

Table 3.8 (Continued)

Areas of Specialization	Area of Specialization is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
6. Statistical Analysis								
a. Elementary Statistical Techniques	30	28	2	20	7	0	39	48
b. Advanced Statistical Techniques	24	15	3	15	4	0	31	30
7. Computer Techniques/Programming	4	6	3	0	5	0	12	6
8. Systems Analysis	7	4	0	0	0	0	7	4
9. Psychology								
a. Educational/School Psychology	14	40	11	15	33	13	58	68
b. Developmental Psychology	12	0	6	0	26	56	44	56
c. Learning/Experimental Psychology	16	6	3	4	21	20	40	30
d. Social Psychology	3	8	0	2	2	2	5	12
e. Clinical Psychology	0	0	0	0	0	4	0	4
10. Guidance and Counseling	3	19	0	2	13	43	16	64
11. Educational Sociology/Economics/Politics	7	6	1	0	3	2	11	8
12. Administration								
a. Research Administration/Management	2	23	26	0	0	0	28	23
b. General Administration	5	25	1	4	13	35	19	64

Table 3.8 (Continued)

Areas of Specialization	Area of Specialization is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
13. Curriculum Development/Analysis	10	27	8	4	6	33	24	64
14. Teacher Education/In-Service Training	5	8	3	2	28	39	36	49
15. Vocational Education	0	2	1	0	0	0	1	2
16. Subject Matter Areas (e.g. Reading, Social Studies)	19	35	5	6	34	48	58	89
17. Special Education	3	13	0	4	7	0	10	17
18. Instructional Media/Technology	4	12	1	0	2	4	7	16
19. Editing/Writing	0	0	1	0	1	0	2	0
20. Other (e.g., "teaching")	a	--	a	--	a	--	46	98

a Areas of specialization in this category could not readily be classified as research, research facilitative or nonresearch. Therefore, only the total is reported here.

Table 3.9

Numbers and Percentages of Vacancies and Applicants in 1969 Employment Service: By Relevance to Educational Research and Research-related Activities (RDDE)

Vacancy or Applicant Areas of Specialization are:	Vacancies N	Vacancies %	Applicants N	Applicants %
1. Directly Related to RDDE	249	56.7	242	42.5
2. Facilitative of RDDE	64	14.6	48	8.4
3. Not Related to RDDE	126	28.7	279	49.1
Total	439	100.0	569	100.0

Discussion

Before attempting to derive implications from the data presented above, it should be noted that the same factors that operated to limit the interpretability of the 1968 employment service data were also operating here. Despite these limitations, several trends in the data appear strong enough to warrant consideration.

As in 1968, more than 70 percent of the vacancies were in academic settings. Although the 1969 applicant form did not require specific information on the applicant's institutional setting preference, the applicant was asked to list "position desired." The majority of responses was in the form of areas of specialization (e.g., "evaluation") rather than in terms of institutional preference. Of the 126 who did specify the type of institution in which they desired employment, only nine applicants stated that they would take a position outside of the academic setting. Thus, it would seem that relatively few persons who used this placement service were interested in (or perhaps aware of) employment possibilities in RELs, private research agencies and other nonacademic settings.

Contrary to the results reported for 1968, where 49 percent of the vacancies were related to research or research-facilitative activities, 71.3 percent fell in this category in 1969. However, only 50.9 percent (290 persons) of the applicants desired such positions, as opposed to 84.4 percent (655 persons) in 1968. This would suggest that while research and research-related vacancies listed with AERA stayed almost level, from 322 in 1968 to 313 in 1969, far fewer persons with relevant preparation were available in the 1969 employment service.

Some discrepancies between the number of employees listing certain areas of specialization and the number of vacancies in those areas are large enough probably to be indicative of real trends in employment markets. Also, some shifts from the 1968 data are noticeable. For example, there were more vacancies in research methods in 1968 than there were qualified applicants to fill them. This was not true in 1969; there were slightly more applicants with specialization in research methods than vacancies in this area. The number of vacancies in development increased in 1969, with a balance between supply and demand. As in 1968, no applicant specialized in the area of diffusion.

In 1968 there were three openings for every applicant with skill in evaluation. In 1969 this discrepancy rose to almost four to one. This lends further support to the notion proposed earlier that trends toward accountability in evaluation and the evaluation mandates of Titles I and III of the Elementary and Secondary Education Act of 1965 will continue to require that more attention be paid to training evaluation personnel.

Other areas in which it appears that far too few people are being prepared (in relation to the demand) include applied measurement and, to a lesser extent, computer techniques and programming. Conversely, there seemed to be a marked oversupply of persons prepared (in comparison with relevant vacancies) in guidance and counseling, general administration, curriculum development, and subject matter fields. However, these latter discrepancies are likely to result, at least in part, from the type of clientele using the AERA employment service.

Employers desiring to hire counselors, curriculum directors, and general administrators may be more inclined to focus their recruitment efforts on conventions of professional associations in these areas, whereas applicants may utilize all available placement services.

In general, there is a marked correspondence between the 1968 and 1969 data. The need for more persons trained as researchers _per se_ was greater in 1968 and was reduced in 1969 to something approximating a balance between applicants and vacancies. However, the need for more trained personnel in evaluation increased in 1969, as did the need for persons trained in applied measurement. The number of vacancies in development also increased to balance with the supply of persons specializing in this area in 1969. Discrepancies in other areas of specialization were not markedly different from those of the previous year.

An Analysis of 1970 AERA Employment Service Data

Employment Service Forms

The 1970 AERA placement service[13] used the four forms which are shown in Appendix I. The "professional order form" (for employers) and "professional application form" (for applicants) are standard employment service forms supplied by the U. S. Department of Labor. These are identical to the forms used in 1968 and similar to those from 1969.

In addition to the two standard forms, an "employer information form" (for employers) and an "employee information form" (for applicants) were used at the 1970 meeting. These were developed and supplied by the AERA Task Force in an attempt to gain more specific information about research competencies required by employers and those possessed by applicants.

Since the two sets of forms (Department of Labor, on the one hand, and Task Force, on the other) furnish different types of information, they will be discussed separately in the following pages.

Department of Labor Forms

The information on these forms which was of particular interest for this study was that describing areas of competence. Each employer was asked to list the competencies required for the available position, and each applicant was asked to give his areas of competence. Since no specific description was given of the type of response desired, there

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[13] This placement service operated during March 2-6, 1970 in Minneapolis.

was considerable variation in the level of specificity of the responses. In addition, since the information submitted by the applicants was self-report data, it was subject to limitations inherent in such data.[14] These limitations notwithstanding, it was felt that comparisons of applicant and employer data would yield useful information.

Procedures

The procedures for organizing and analyzing the data were as follows:

1. Each applicant form was reviewed and each area of competence mentioned was listed alphabetically in the precise manner in which it appeared on the form. Differing areas of competence were listed separately (e.g., "tests and measurement" was listed separately from "measurement"); identical areas were simply tallied.

2. The resulting listing of applicants' areas of competence was collapsed into the logically derived categories used below to report the results.

3. Each application form was also categorized as to whether the applicant seemed to be seeking a research position, a research facilitative position or a nonresearch position.[15] For this categorization, all relevant information on the form (e.g., areas of competence, special information listed, prior professional duties and career evolution) was used to assist in making a judgment.

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[14]An assessment of the reliability of this self-report data is contained in Appendix J, which concludes that applicant responses were likely free from the confounding effects of an acquiescence set.

[15]Research, research facilitative and nonresearch positions were defined in footnotes 4 and 5 above.

4. Each employer form was reviewed and each area of competence listed alphabetically, using the same process as reported above for applicant forms. The resulting lists of areas of competence required by employers were collapsed into the same set of categories used for applicants.

5. Each employer form was also categorized as to whether the position was a research, research facilitative or nonresearch position.

Results

A total of 412 vacancies were listed with the 1970 employment service; 727 applicants also registered. These figures reveal a substantial inequality between the number of positions open and the number of applicants for those positions.[16] More specific supply-demand information was obtained by comparing areas of competence listed by employers with those of the applicants. Competencies were tabulated, by relevance to research and research-related areas, and are summarized in Table 3.10 Because multiple competencies were listed for both vacancies and applicants, the total number of competencies recorded for each group is greater than the total number of vacancies or applicants. (Altogether, 569 competencies were listed for 412 vacancies; 1,697 competencies were listed by 727 applicants.)

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[16] One limitation to interpreting these figures stems from the fact that it is impossible to determine precisely what proportion of the applicants occupy continuing positions. A large percentage of the applicants were students completing academic programs and in need of positions upon graduation. However, it cannot be said how many of the remaining applicants--those employed at the time when they filled out the form--were holding continuing positions and looking for new positions in the interest of professional advancement, personal considerations, etc., and how many were seeking positions because their positions were phased out (e.g., positions in discontinued RELs). Therefore absolute supply-demand comparisons from data of this type are tentative at best. If one assumes, however, that such uncertainties in the data are random across areas of specialization, then relative comparisons of supply-demand discrepancies by area of specialization still could be useful.

Table 3:10

Areas of Competence Required for 412 Vacancies and Areas of Competence Listed by 727 Applicants in the 1970 AERA Employment Service: By Relevance to Educational Research and Research-related Activities (RDDE)

Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
1. Research Methods/Types								
a. Educational Research	14	118	10	56	1	2	25	176
b. Research Methodology	8	7	5	21	0	0	13	28
c. Research Design	17	56	6	37	0	0	23	93
d. Survey Research	5	1	0	1	0	0	5	2
2. Educational Development	8	20	5	12	0	1	13	33
3. Evaluation								
a. Evaluation Techniques (general)	10	45	18	41	1	6	29	92
b. Evaluation of Instructional Products	0	4	2	3	1	1	3	8

(Continued)

Table 3.10 (Continued)

Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
4. Measurement								
a. Measurement Theory Psychometrics	15	36	16	64	1	0	32	100
b. Testing/Applied Measurement	4	20	2	10	1	3	7	33
c. Instrument Construction/Development	3	6	0	2	0	0	3	8
5. Statistical Analysis								
a. Elementary Statistical Techniques	3	65	5	75	0	0	8	140
b. Advanced Statistical Techniques	0	14	3	10	0	0	3	24
6. Computer Techniques/Programming	8	36	16	24	1	2	25	62
7. Systems Analysis	0	9	4	6	0	1	4	16
8. Psychology								
a. Educational/School Psychology	24	41	15	41	18	32	57	114

(Continued)

Table 3.10 (Continued)

Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
	V	A	V	A	V	A	V	A
b. Developmental Psychology	5	11	3	11	8	17	16	39
c. Learning/Experimental Psychology	10	47	5	41	4	24	19	112
d. Social Psychology	8	3	0	4	1	4	9	11
e. Clinical Psychology	0	0	0	0	1	3	1	3
9. Guidance and Counseling	3	28	3	15	7	36	13	79
10. Educational Sociology/ Economics	7	5	3	3	5	8	15	16
11. Administration								
a. Research Administration/ Management	2	7	10	17	0	0	12	24
b. General Administration	3	15	6	40	5	48	14	103
12. Curriculum Development/ Analysis	11	21	7	18	4	35	22	74

(Continued)

Table 3.10 (Continued)

	Area of Competence	Area of Competence is: Directly Related to RDDE		Facilitative of RDDE		Not Related to RDDE		Total	
		V	A	V	A	V	A	V	A
13.	Teacher Education/ In-service Training	16	27	16	19	12	28	44	74
14.	Vocational Education	0	2	0	0	3	0	3	2
15.	Subject Matter Areas (e.g., Social Studies)	11	21	13	17	19	31	43	69
16.	Special Education	11	13	6	9	13	12	30	34
17.	Instructional Media/ Technology	12	28	11	10	8	13	31	51
18.	Writing Ability/Editing	5	1	4	7	0	1	9	9
19.	Other (e.g., comparative education, philosophy)	9	20	19	15	10	33	38	68

Discussion

Again, the factors (discussed earlier) that limited the interpretability of the 1968 and 1969 employment service data applied here.

In spite of these limitations, some trends are strongly indicated by the data. First, for all except three categories (survey research, vocational education and writing ability), there were more applicants with specific competencies listed than vacancies in which such competencies were relevant. Although this is accounted for, in part, by the fact that there were more applicants than vacancies, this fact alone cannot explain the size of the discrepancy in a number of categories. While the ratio of applicants to vacancies is 1.76:1, in the following areas this proportion is greatly exceeded:[17]

Elementary Statistical Techniques (140-8)	17.5:1
Advanced Statistical Techniques (24-3)	8.0:1
General Administration (103-14)	7.4:1
Educational Research (176-25)	7.0:1

[17] Note, however, that the ratio of the total number of competencies listed by applicants (1,697) to the number listed by employers (569) is 2.98:1. The average number of competencies reported by applicants was 2.3, whereas the average number required for positions was 1.4.

Guidance and Counseling (79-13)	6.1:1
Learning/Experimental Psychology (112-19)	5.9:1
Testing/Applied Measurement (33-7)	4.7:1
Research Design (93-23)	4.0:1
Systems Analysis (16-4)	4.0:1

Contrasted to the data reported earlier for 1968, there now appears to be an <u>over</u>supply of personnel trained in the areas of statistical techniques, educational research and research design, testing and applied measurement, and systems analysis. (As mentioned earlier, apparent oversupplies in psychology, counseling and administration may be artifacts of the way in which employers in these areas utilize the AERA employment service.)

The reversal of trends between 1969 and 1970 is startling. The market for research and research-related personnel is down in virtually all areas, doubtlessly due to reduced funding of critical research programs. This has resulted in less demand in research, development and diffusion than even the least optimistic projections of Clark and Hopkins (1969).

<u>AERA Task Force Forms</u>

In an attempt to gather more specific information about skills required for research, development, diffusion and evaluation, the Task Force staff constructed a set of employer/employee information forms based on the skills identified in the first part of Chapter 2. The seven lists of skills presented there were logically collapsed into 39 "skills" that were thought to include the most important items from each list. A three-point scale for rating "degree of competence" was attached to each item and the instrument was piloted with a convenience sample of 11 persons. The final instrument (shown in Appendix I) was used in both employee and employer information forms.

All employers and all applicants were furnished with a copy of the relevant form and asked to indicate on the three-point scale the degree of each of the 39 skills required or possessed. It was thought that comparing responses of employers and applicants might provide additional insight into the need for and the availability of important research skills.

Procedures

For each of the 39 items on the information form, the frequency and relative percentage of responses for the three skill levels were computed for both the employers and the employees (hereafter, applicants). It was assumed that the skill level indicated by the applicant corresponded to the level of skill possessed.

Two chi-square analyses were performed as follows:

(1) An inter-group comparison of skill levels required by employers vs skill levels possessed by applicants.

(2) An intra-group comparison of skill levels required by employers for university vs non-university positions.

Those items for which significant values were obtained are given in tabular form in the tables which follow.[18] (The full tables, including

[18] The skill items are presented only by number in Tables 3.11 and 3.12. The reader may refer to either the employer or the employee information form in Appendix I for a full statement of each skill. In this way he may also note those skills for which the chi-square values were not significant.

results for all 39 items, are on file in the Task Force office at the Laboratory of Educational Research, University of Colorado, Boulder.) The frequency and relative percentage are reported by group for each "significant" item included. Tables were collapsed for those cases in which the expected cell size was five or less. A footnote is included for those items for which the contingency tables were collapsed. All analyses were performed using the Biomedical 02S--Contingency Table Analysis--computer program.

Results and Discussion

Although Task Force information forms were provided to all employers and applicants who registered with the 1970 AERA employment service, a large number of registrants did not complete them. Forms were returned by 81 of the 412 employers and by 361 of the 727 applicants.[19]

In the sections which follow, for each analysis the discussion is organized around the major functions of research, research-based development, diffusion and evaluation.

Comparison between Employer and Applicant

The responses of employers and applicants were compared by computing a between-groups chi square for each item. These analyses are summarized, for the significant items, in Table 3.11.

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[19]This represents an applicant response rate of 50 percent and an employer response rate of 20 percent. In the absence of sufficient information to complete an adequate non-response check, it could not be determined what factors may have resulted in differential responding. Therefore, the fact that these responses may be biased in some unknown way should be kept in mind when interpreting the results presented herein.

Table 3.11

Comparison of Level of Skill Required for 81 Vacancies and Level of Skill Listed by 361 Applicants in the 1970 AERA Employment Service

Item		Degree of Skill						X^2	df	p
		No Skill		Somewhat Skilled		Highly Skilled				
		f	%	f	%	f	%			
1	V	5	6.5	44	57.1	28	36.4	10.96	1[a]	<.01
	A	5	1.4	149	41.5	205	57.1			
2	V	19	23.7	41	51.2	20	25.0	19.3	2	<.01
	A	27	7.5	200	55.7	132	36.8			
4	V	3	3.8	39	50.0	36	46.2	8.81	1[a]	<.01
	A	5	1.4	123	34.4	230	64.2			
12	V	19	23.7	25	31.3	36	45.0	16.57	2	<.01
	A	63	17.7	199	55.9	94	26.4			
13	V	5	6.3	25	31.3	50	62.5	6.01	1[a]	<.05
	A	20	5.6	168	47.1	169	47.3			
14	V	14	17.7	27	34.2	38	48.1	14.80	2	<.01
	A	55	15.4	203	56.7	100	27.9			
15	V	11	13.9	23	29.1	45	57.0	19.84	2	<.01
	A	37	10.3	202	56.4	119	33.2			
16	V	18	23.1	21	26.9	39	50.0	42.15	2	<.01
	A	100	28.6	192	54.9	58	16.6			
20	V	24	31.2	30	39.0	23	29.9	11.78	2	<.01
	A	133	37.5	173	48.7	49	13.8			
34	V	24	30.4	31	39.2	24	30.4	8.13	2	<.05
	A	65	18.5	195	55.6	91	25.9			

[a]Chi square computed from collapsed table obtained by combining "no skill" and "somewhat skilled" levels.

Research: Significant differences between the employer's requirement for a specific skill and the applicant's possession of that skill were found in only three cases. For items 1, 2 and 4 the skill level possessed by the applicant was significantly greater than that required by the employer. Items 1 and 4 relate to the identification and delineation of a researchable problem. The significance achieved on item 2 may indicate that few employers were looking for people to work in research-administrative positions; thus such skills were not highly rated by the employer group. No significant differences were found for the remaining eight research-related items. For these items, both the skill required by the employers and the skill possessed by the applicants were rated somewhat high, with only a small proportion indicating no skill.

Research-based Development: Five of the seven items related to research-based development yielded significant chi-square values. For items 12, 13, 14, 15, and 16, most employers required a high skill level whereas most applicants were only somewhat skilled. It is noteworthy that the significance level of item 13 is lower than the others (.05 vs .01). This observation may suggest that evaluation-related skills within research-based development are not as well delineated as those skills more closely related to the developmental aspects of instructional systems.[20]

[20]Setting the alpha level at p=.05 may result in some spuriously significant results due to the large number of chi tests run. Given the exploratory nature of these analyses, however, it was thought desirable to identify any differences which might exist.

Diffusion: Only one item yielded a significant chi square between the employer's requirement of a specific skill and the applicant's possession of that skill. For item 20, the level required by the employer was significantly greater than that possessed by the applicant. (However, the greater proportion of both groups indicated no skill to moderate skill.) No significant differences were found for the remaining seven items related to diffusion.

Evaluation: Of the thirteen items related to evaluation, only item 34 yielded a significant chi-square value. For this item, related to process evaluation, the greatest percentage of applicants rated themselves as somewhat skilled whereas the degree of skill required by employers was more evenly distributed across all three skill levels.

Comparison between University and Non-University Positions

The skill levels required by university-based employers and by non-university-based employers were compared by computing a between-groups chi square for each item. For the purposes of this analysis, positions available in universities or R & D centers were categorized as university positions; positions available in regional laboratories, independent research agencies, school districts, state education departments, federal agencies, the military and industry were categorized as non-university positions. The analyses for those items for which significant differences were found are summarized in Table 3.12.

Research: Significant differences between the skill level required for university positions and that required for non-university positions were found in only two items. For items 2 and 8 the non-university level was significantly greater than that required for university positions. The absence of administrative positions at the university

Table 3.12

Comparison of Levels of Skill Required for University-based and Non-university-based Vacancies in the 1970 AERA Employment Service

Item		No Skill		Somewhat Skilled		Highly Skilled		X^2	df	p
		f	%	f	%	f	%			
2	U	14	24.1	36	62.1	8	13.8	15.43	2	<.01
	NU	5	22.7	5	22.7	12	54.5			
8	U	5	8.6	31	53.4	22	37.9	11.42	1[a]	<.01
	NU	0	0.0	4	19.0	17	81.0			
17	U	9	16.4	32	58.2	14	25.5	4.32	1[a]	<.05
	NU	1	4.5	10	45.5	11	50.0			
26	U	22	39.3	24	42.9	10	17.9	7.40	2	<.05
	NU	4	19.0	7	33.3	10	47.6			
28	U	14	25.5	31	56.4	10	18.2	4.94	1[a]	<.05
	NU	1	4.8	11	52.4	9	42.9			
29	U	15	26.8	33	58.9	8	14.3	23.81	1[a]	<.01
	NU	1	4.8	5	23.8	15	71.4			
30	U	13	23.2	22	39.3	21	37.5	7.06	1[a]	<.01
	NU	1	4.8	5	23.8	15	71.4			
31	U	28	50.9	23	41.8	4	7.3	8.44	1[b]	<.01
	NU	3	14.3	8	38.1	10	47.6			
36	U	7	12.7	30	54.5	18	32.7	11.61	1	<.01
	NU	1	4.8	4	19.0	16	76.2			
37	U	5	8.8	25	43.9	27	47.4	9.24	1[a]	<.01
	NU	0	0.0	3	14.3	18	85.7			
38	U	8	14.0	27	47.4	22	38.6	6.63	1[a]	<.05
	NU	0	0.0	6	28.6	15	47.4			
39	U	5	8.8	32	56.1	20	35.1	12.95	1[a]	<.01
	NU	1	4.8	3	14.3	17	81.0			

[a]Chi square computed from collapsed table obtained by combining "no skill" and "somewhat skilled" levels.

[b]Chi square computed from collapsed table obtained by combining "somewhat skilled" and "highly skilled" levels.

level accounts for this discrepancy for item 2; no explanation is readily apparent for the discrepancy on item 8. No significant differences were found for the remaining nine research-related items in this comparison. For these items the skill required for university positions and non-university positions was rated moderate to high, with only a small proportion requiring no skill.

Research-based Development: Only one development item yielded a significant chi square between the skill level required for university positions and that required for non-university positions. For item 17, the non-university positions required a higher degree of skill than university positions. This difference may be attributed to the composition of the non-university group, which includes positions at state educational agencies, school districts and federal agencies, all of which have considerable contact with schools and classrooms and reflect a more practical than theoretical emphasis. No significant differences were found for the remaining items related to research-based development. For these items, both university positions and non-university positions required moderate to high skill.

Diffusion: Item 26 yielded a significant chi-square value revealing that the skill level required for university positions was lower than that for non-university positions. This difference may be attributable to the practical emphasis of the non-university group. No significant differences were found for the other diffusion-related items.

Evaluation: Significant differences between the university employer's requirement of a specific skill and the non-university employer's requirement of that skill were found in eight cases. For items 28, 29, 30 and 31, each related to context evaluation, and for items 36, 37, 38 and 39, each related to outcome evaluation, the skill level required for non-university positions was significantly greater than that required for university positions. This may result from the greater concern with "public schools" manifested by members of the non-university group. No significant differences were found for the items related to program planning and process evaluation.

Conclusions

It was stated earlier that it would be presumptuous to attempt to draw firm conclusions from the data presented in this paper. Nonetheless, the above discussions of results from the two sets of forms may suggest the following:

1. At present, there appears to be an oversupply of persons trained in educational research and research design, statistical techniques, testing and applied measurement, and systems analysis.

2. The demand for persons trained in development and diffusion which was predicted by Clark and Hopkins (1969), is not now evident in the AERA employment service.

3. The "no skill" response on the Task Force forms was chosen more often--by both employers and applicants--on those items not related to research or to outcome evaluation.[21] This may indicate that develop-

[21]The "no skill" response on research and outcome evaluation items was about 8 percent for employers and 5 percent for applicants. On development, diffusion, and formative evaluation items, the "no skill" response was about 23 percent for employers and 22 percent for applicants.

ment, diffusion and formative evaluation skills are not well defined, or it may suggest further (see 2 above) that such skills are not in great demand.

4. Evaluation skills are required in a higher degree for non-university positions than for those inside the university.[22]

[22]Seventy-eight percent of the university employer responses on evaluation items required either some skill (49 percent) or a high degree of skill (29 percent). The comparable figures for the non-university group are 33 percent for some skill, 59 percent for a high degree of skill--a total of 92 percent.

Geographic Distribution of Positions and Applicants, 1968-1970

The "professional application forms" used in the AERA employment services in 1968, 1969 and 1970 all included an item on which the applicant could list any preference he had for geographical location of the job he was seeking. At the same time, the geographical location of each position registered with the employment service was available from the address required on the "professional order forms." It was thought that comparing the locations of jobs with locations preferred by applicants would show whether there were obvious supply-demand imbalances in particular geographic areas. Such findings could reveal trends in geographic job mobility that might have implications for the geographical distribution of new research training programs. Therefore, a tabulation of geographic data from the forms[23] was conducted to see if such trends existed.

Procedures

The location of each position registered with the employment service was placed in one of eight regional categories as shown in Figure 3.1.

The "geographic preference" data from the employee application forms was initially copied down in the exact manner in which it appeared on the form. Responses were later collapsed into the same categories as those listed in Figure 3.1. However, many applicants stated "no preference" or "any location," and some applicants omitted the item completely. "Omits" were counted as also having no preference.

Single preferences (e.g., "Midwest," "Florida," or "Boston") could generally be categorized accurately, except for those that were either nonspecific or nonregional in character (e.g., "U. S. A.,"

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[23]Copies of the application and order forms used in 1968, 1969 and 1970 will be found in Appendices G, H and I.

New England

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

Middle Atlantic States

Delaware
Maryland
New Jersey
New York
Pennsylvania
Washington, D.C.

South

Alabama
Arkansas
Florida
Georgia
Kentucky
Louisiana
Mississippi
North Carolina
South Carolina
Tennessee
Virginia
West Virginia

Midwest

Illinois
Indiana
Iowa
Kansas
Michigan
Minnesota
Missouri
Nebraska
North Dakota
Ohio
South Dakota
Wisconsin

Southwest

Arizona
New Mexico
Oklahoma
Texas

Mountain States

Colorado
Idaho
Montana
Nevada
Utah
Wyoming

Pacific/West Coast

Alaska
California
Hawaii
Oregon
Washington

Canada

Figure 3.1: States Included in Each Region

"warm climate," "urban area," "near husband's job," "abroad." Nonspecific and nonregional responses were assigned to the category of "other." Multiple preferences were more difficult. Where the multiple preferences were in the same region, the response was simply tallied in that regional category. However, when multiple preferences were in different regions (e.g., "Midwest or West Coast") one tally was assigned to each of the two regional categories.[24, 25]

Geographical Location of Jobs and Preferences in 1968

Tabulations of available positions and geographical preferences of applicants for 1968 are summarized in the following three tables. Frequencies and percentages are given for each region; positions are also broken down by the type of institution in which they are located.

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[24]The inflation in number of apparent applicants was not viewed as a problem here. Comparisons of national supply-demand discrepancies, in actual numbers, have been reported above. Here the interest is in the relative number of applicants receptive to employment possilities in each region.

[25]There may be some inaccuracies in assigning responses to categories since it is impossible to know whether respondents intended the same area where they used referents (e.g., "Midwest") as that area listed under the same referent in Figure 3.1. Also, assumptions were made in assigning the relatively small number of responses that could not readily be fit into the categories used in this paper. For example, persons who indicated a preference for the "East Coast" were arbitrarily placed in the "Middle Atlantic States" category. While this is likely to be a correct categorization in most instances, it probably results in a slight underestimate in the "New England" and "South" categories. However, relatively few assumptions of this type are reflected in the data reported here.

Table 3.13

Geographical Locations of 769 Vacancies Listed in the 1968 AERA Employment Service: By Institutional Setting

Geographical Region	Universities & Colleges	Regional Educ. Laboratories	R & D Center	Indep. Research Agencies	State Educ. Departments	School Districts	Federal Agencies	Military	Industry	Other	Total N	Total %
New England	23	0	0	0	6	0	0	0	1	0	30	4
Middle Atlantic States	137	17	4	23	31	28	24	0	18	0	282	37
South	70	9	0	1	0	3	5	0	0	0	88	11
Midwest	213	17	3	5	4	6	1	2	0	1	252	33
Southwest	18	0	0	0	1	0	0	0	0	0	19	2
Mountain States	6	0	0	0	0	0	0	0	0	0	6	1
Pacific/West Coast	17	3	9	1	8	2	0	0	0	0	40	5
Canada	45	0	0	1	0	0	6	0	0	0	52	7
Total	529	46	16	31	50	39	36	2	19	1	769	100

Table 3.14

Locations of 769 Vacancies Listed in the 1968 AERA Employment Service: By Regions and States

New England	
Connecticut	2
Maine	5
Massachusetts	14
New Hampshire	2
Rhode Island	1
Vermont	6
Middle Atlantic State	
Delaware	0
Maryland	9
New Jersey	10
New York	101
Pennsylvania	85
Washington, D.C.	77
South	
Alabama	0
Arkansas	0
Florida	10
Georgia	3
Kentucky	14
Louisiana	2
Mississippi	2
North Carolina	10
South Carolina	1
Tennessee	7
Virginia	5
West Virginia	34
Midwest	
Illinois	70
Indiana	48
Iowa	5
Kansas	6
Michigan	28
Minnesota	17
Missouri	35
Nebraska	1
North Dakota	2
Ohio	25
South Dakota	3
Wisconsin	12
Southwest	
Arizona	2
New Mexico	5
Oklahoma	0
Texas	12
Mountain States	
Colorado	4
Idaho	0
Montana	0
Nevada	0
Utah	2
Wyoming	0

(Table Continued)

Table 3.14 (Continued)

Pacific/West Coast		Canada	52
Alaska	0		
California	15		
Hawaii	9		
Oregon	7		
Washington	9		

Table 3.15

Geographical Preferences of 776 Applicants in the 1968 AERA Employment Service

Geographical Area	N	%
No Preference	350	41
New England	24	3
Middle Atlantic States	104	12
South	37	4
Midwest	72	9
Southwest	12	1.5
Rocky Mountain States	29	3.5
Pacific/West Coast	101	12
Other	120	14
Total	849	100

Note: The total exceeds 776 due to multiple preferences listed by some applicants.

Since 350 of the 776 applicants stated no geographic preference whatever, and since 14 percent of the responses were for "other" locations which could not be categorized, it is difficult to make meaningful comparisons between the vacancy and applicant data. Nonetheless, some apparent imbalance appears between Tables 3.13 and 3.15. For example, in the Middle Atlantic States there were 2.5 vacancies for every applicant who stated a preference for that area. The ratio in the South was about 2 to 1, in the Midwest about 3.5 to 1. In contrast, the Mountain States region appeared to attract almost 5 applicants for each opening, while the Pacific/West Coast drew 2.5 applicants for each vacancy. Note also the considerable number of openings in Canada with no apparent applicant preferences for that area.

Geographical Location of Jobs and Preferences in 1969

The summary of geographical data gathered from the 1969 AERA placement service employer and applicant forms is presented in Tables 3.16, 3.17 and 3.18.

In the 1969 employment service, 351 out of 569 applicants stated no preference for the geographic location of the jobs they sought. Apparently many applicants were unconcerned about the area in which they were located; as some of them said, "The type of job is more important than the location." For those who did express a preference, however, some statements may be made about their preferences in relation to actual job openings.

First, there was more overall supply-demand balance than had been observed in 1968. Secondly, however, a gross imbalance existed in the South (13 vacancies for each applicant preference) and in the Midwest (a ratio of 5 to 1). In addition, there were more applicant preferences in

Table 3.16

Geographical Locations of 459 Vacancies Listed in the 1969 AERA Employment Service: By Institutional Setting

Geographical Region	Universities & Colleges	Regional Educ. Laboratories	Indep. Research Agencies	State Education Departments	School Districts	Military	Industry	Total N	Total %
New England	12	0	0	0	0	0	0	12	3
Middle Atlantic States	58	12	14	11	6	2	3	106	23
South	50	0	0	0	4	0	0	54	12
Midwest	144	6	4	5	3	0	0	162	35
Southwest	18	3	0	0	0	0	0	21	5
Mountain States	9	0	0	0	0	0	0	9	2
Pacific/West Coast	16	13	31	2	3	0	0	65	14
Canada	25	0	2	0	1	0	0	28	6
Other (Overseas)	0	0	2	0	0	0	0	2	--
Total	332	34	53	18	17	2	3	459	100

Table 3.17

Locations of 459 Vacancies Listed in the 1969 AERA Employment Service: By Regions and States

New England		**Midwest**	
Connecticut	0	Illinois	54
Maine	0	Indiana	30
Massachusetts	8	Iowa	0
New Hampshire	0	Kansas	8
Rhode Island	4	Michigan	7
Vermont	0	Minnesota	5
		Missouri	19
Middle Atlantic States		Nebraska	0
Delaware	0	North Dakota	4
Maryland	9	Ohio	18
New Jersey	20	South Dakota	9
New York	52	Wisconsin	8
Pennsylvania	19		
Washington, D.C.	6	**Southwest**	
		Arizona	2
South		New Mexico	4
Alabama	2	Oklahoma	0
Arkansas	0	Texas	15
Florida	15		
Georgia	2	**Mountain States**	
Kentucky	13	Colorado	3
Louisiana	0	Idaho	0
Mississippi	1	Montana	0
North Carolina	1	Nevada	5
South Carolina	6	Utah	1
Tennessee	8	Wyoming	0
Virginia	4		
West Virginia	2		

(Table Continued)

Table 3.17 (Continued)

Pacific/West Coast		Canada	28
Alaska	0	Other	2
California	45		
Hawaii	0		
Oregon	14		
Washington	6		

Table 3.18

Geographical Preferences of 569 Applicants in the 1969 AERA Employment Service

Geographical Area	N	%
No Preference	351	55
New England	12	2
Middle Atlantic States	95	15
South	4	0.5
Midwest	33	5
Southwest	6	1
Mountain States	10	1.5
Pacific/West Coast	97	15
Other	30	5
Total	638	100

Note: The total exceeds 569 due to multiple preferences listed by some applicants.

the Pacific/West Coast region than there were openings, although the imbalance was not great. Again note that no applicant expressed a preference for Canada.

Geographical Location of Jobs and Preferences in 1970

The summaries of geographical data gathered from the 1970 AERA placement service forms are presented in Tables 3.19, 3.20 and 3.21.

In 1970 as in previous years, a large number of applicants (405 out of 727) did not state a preference for the geographic location of their jobs. Among those who did, however, some observations may be made. The South had 3.5 openings for every applicant who preferred a job in that region. In the Midwest the ratio was a little less than 3 to 1, in the Southwest about 2 to 1. The Mountain States, on the other hand, had far more applicants than vacancies (about 10 to 1), as did the Pacific/West Coast (about 2 to 1). For the first time, a small number of applicants indicated a specific preference for Canada.

Conclusion

Table 3.22 was prepared in order to facilitate examination of data for the three years covered in this paper. For each year, the frequency and percentage of job openings and applicant preferences are listed for each region; for applicants, the "no preference" figures are also given.

The most conspicuous fact which emerges from this table--though probably not the most surprising--is the large number of "no preference" indications by employment service applicants. There is no easy way, of course,

Table 3.19

Geographical Locations of 412 Vacancies Listed in the 1970 AERA Employment Service: By Institutional Setting

Geographical Region	Universities & Colleges	Regional Educ. Laboratories	Indep. Research Agencies	School Districts	Federal Agencies	Military	Industry	Total N	Total %
New England	30	0	0	0	0	0	1	31	7
Middle Atlantic States	55	0	11	0	10	2	2	80	20
South	47	7	2	0	0	0	0	56	14
Midwest	118	1	16	7	0	0	0	142	34
Southwest	24	0	0	2	0	0	0	26	6
Mountain States	2	0	0	0	0	0	0	2	0.5
Pacific/West Coast	34	0	0	17	0	0	0	51	13
Canada	20	0	0	1	0	0	0	21	5
Other	2	0	1	0	0	0	0	3	0.5
Total	332	8	30	27	10	2	3	412	100

Table 3.20

Location of 412 Vacancies Listed in the 1970 AERA Employment Service: By Regions and States

New England		**Midwest**	
Connecticut	1	Illinois	50
Maine	7	Indiana	11
Massachusetts	15	Iowa	2
New Hampshire	0	Kansas	3
Rhode Island	8	Michigan	12
Vermont	0	Minnesota	25
		Missouri	2
Middle Atlantic States		Nebraska	0
Delaware	2	North Dakota	0
Maryland	4	Ohio	18
New Jersey	14	South Dakota	5
New York	40	Wisconsin	14
Pennsylvania	10		
Washington, D.C.	10	**Southwest**	
		Arizona	1
South		New Mexico	1
Alabama	4	Oklahoma	6
Arkansas	2	Texas	18
Florida	4		
Georgia	8	**Mountain States**	
Kentucky	9	Colorado	2
Louisiana	0	Idaho	0
Mississippi	0	Montana	0
North Carolina	13	Nevada	0
South Carolina	4	Utah	0
Tennessee	2	Wyoming	0
Virginia	8		
West Virginia	2		

(Table Continued)

Table 3.20 (Continued)

Pacific/West Coast		Canada	21
Alaska	0		
California	43	Other	3
Hawaii	1		
Oregon	0		
Washington	7		

Table 3.21

Geographical Preferences of 727 Applicants in the 1970 AERA Employment Service

Geographical Area	N	%
No Preference	405	52.5
New England	26	3
Middle Atlantic States	78	10
South	16	2
Midwest	54	7
Southwest	11	1.5
Mountain States	21	3
Pacific/West Coast	98	13
Canada	4	0.5
Other	59	7.5
Total	772	100

Note: The total exceeds 727 due to multiple preferences listed by some applicants.

Table 3.22

Geographical Location of Vacancies and Geographical Preferences of Applicants in the 1968, 1969 and 1970 AERA Employment Services

Geographical Area	1968				1969				1970			
	vacancies		applicants		vacancies		applicants		vacancies		applicants	
	N	%	N	%	N	%	N	%	N	%	N	%
No Preference	---	---	350	41	---	---	351	55	---	---	405	52.5
New England	30	4	24	3	12	3	12	2	31	7	26	3
Middle Atlantic States	282	37	104	12	106	23	95	15	80	20	78	10
South	88	11	37	4	54	12	4	0.5	56	14	16	2
Midwest	252	33	72	9	162	35	33	5	142	34	54	7
Southwest	19	2	12	1.5	21	5	6	1	26	6	11	1.5
Mountain States	6	1	29	3.5	9	2	10	1.5	2	0.5	21	3
Pacific/West Coast	40	5	101	12	65	14	97	15	51	13	98	13
Canada	52	7	---	---	28	6	---	---	21	5	4	.5
Other	---	---	120	14	2	---	30	5	3	0.5	59	7.5
Total	769	100	849	100	459	100	638	100	412	100	772	100

to determine whether these persons, in fact, have no geographic preference regarding job location. Some applicants may feel that by stating a preference for a specific area they will exclude themselves from consideration for openings outside that area. For others, geographic location may be an important criterion if they have more than one job offer to consider. (It may be more important than salary level, for example.) In any case, it is difficult to interpret these "no preference" data with any real degree of assurance.

An examination of Table 3.22, by region, discloses some interesting trends.[26] First, there is a fairly good balance between supply and demand in New England across all three years. Second, the large disparity between vacancies and applicants in the Middle Atlantic States in 1968 (more than 2.5 vacancies for each applicant) completely disappeared by 1970. Third, there is a marked imbalance in the South for all three years, with many more vacancies listed than applicant preferences. This is also true in the Midwest, where a large number of openings is typically available. The Southwest also shows more vacancies than applicant preferences across the years, but in this case the numbers involved are relatively small. Fourth, only

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[26] All statements about regional supply-demand trends are true for persons using the AERA employment service. While it seems reasonable to assume that these trends are representative of other vacancies and applicants in research-related areas, there is no good way to know if this is so.

An additional caution should be kept in mind in interpreting these statements. The fact that roughly every second applicant seems open to recruitment in any region suggests that the low applicant interest in some geographical regions may not be a problem; the positions could be filled from those who express no preference.

the Mountain States and the Pacific/West Coast region show more applicant preferences than vacancies, and in both cases this is true for all three years. Finally, in all three years there are considerable "other" applicant preferences, as well as numerous vacancies in Canada for which few or no applicant preferences are expressed.

It is doubtful whether any significance can be attached to the last two observations. The "other" listings, because of their nonspecific and/or nonregional character, defy interpretation. In the case of the Canadian vacancies, it is felt that the near absence of applicant preferences is, for the most part, the result of oversight.

Some consideration must be given, however, to the situation in the Midwest and South, on the one hand, and in the Pacific/West Coast region, on the other. Because of the number of vacancies and applicants involved, and because of the consistency and size of the supply-demand imbalance, the job market in these regions deserves wider and more critical study than has been possible here.

Implications for Supply and Demand and Emphases in Research and Research-related Roles

Introduction

In previous sections of this report, the importance of current data on the supply and demand of educational research and research-related personnel has been elaborated. The primary purpose of this section is to examine four of the previous analyses and to look for correspondences and trends across time that are contained therein. Specifically, the 1969-70 telephone interviews of employers (Chapter 2) as well as the data from the 1968, 1969 and 1970 AERA employment services will be considered. The task is undertaken by first summarizing briefly for the convenience of the reader the analyses from which data are drawn and reiterating limitations of these analyses. Subsequently, the data are interpreted in terms of general supply and demand trends and also in relation to changes over time in the particular skills required by employers compared with those skills reportedly possessed by applicants. Finally, a few salient implications are derived that seem to be substantiated by the data.

Analyses Providing the Data Base

In the 1969-70 telephone interviews, 60 employers from 10 institutional settings were contacted and asked questions on the relative importance of certain research, development, diffusion and evaluation (RDDE) skills. The 60 respondents reacted to a moderately extensive list of skills covering seven functional areas (research, research-based development, diffusion, context evaluation, program planning/input analysis, process evaluation, and outcome evaluation). Employers responded to the list of skills in each of the seven functional areas by (1) suggesting whether or not the list of skills was inclusive, (2) indicating those skills within each function that were important in the respondent's line of endeavor, (3) indicating those skills that were unimportant, (4) indicating new skills that had not been included on the list, (5) identifying skills that were "hard to come by" and in short supply, (6) indicating their knowledge of existing training programs designed to develop in trainees the "hard to come by" skills (as well as sites where such skills were being developed incidental to other activities), (7) describing new techniques or methods for training personnel in the relevant short-supply skills, and (8) suggesting skills which the employers felt would become necessary in their research programs at some future point in time. Fifty-eight of the 60 interviews were usable and data generated therein were reported in detail in Chapter 2.

The three studies concerning the AERA employment service are varied, partly because of variations in the employment forms used each year and partly by design, particularly in the case of the 1970 employment service. In the 1968 and 1969 AERA employment services, data were available on areas of competence reported by applicants and areas of competence called for by employers, although considerable analysis and categorization were necessary. The basic strategy, as reported earlier in this chapter, was to compare the self-reported competencies of the applicants with the competencies required for the vacancies listed by employers. In the 1970 AERA employment service, additional information was obtained from both employers and applicants via forms designed by the Task Force. The information forms for employees requested that the applicant indicate whether he was highly skilled, somewhat skilled, or unskilled in 39 specific competencies in research, evaluation, development and diffusion. Employers indicated on their information sheet whether a person highly skilled, somewhat skilled, or unskilled (for each of the 39 listed competencies) was needed to fill the positions for which they were seeking applicants. The details and outcomes of each study are reported in Chapter 2 and in earlier parts of this chapter.

Limitations of the Data-Based Studies

It was pointed out in the previous discussions that there are several inherent limitations in the data which provide the base for this study. These limitations are briefly summarized in order to emphasize certain inadequacies of the data that are relevant to interpretations made here.

1. One major limitation is that all the data from applicants (and employers, for that matter) is substantially self-report data; the possible biases that can appear in data collected through self-reports are well documented and will not be re-examined here.

2. A second limiting factor is that no detailed description of desired response formats was provided to either employers or applicants; therefore, there was considerable variation in the degree of specificity of the responses with many of the responses quite global in nature.

3. A third limitation is that there is no way to know for certain whether employers and applicants used the same referents in listing areas of competence. Distortion likely resulted from this but it is difficult to estimate the degree to which it occurred.

4. Another difficulty with the data resides in the fact that it is not possible to determine precisely what proportion of applicants

occupied continuing positions. Although the greatest percentage of applicants were students completing advanced degrees, the service obviously was used by many other individuals as well.

5. The shift to different employment service forms in 1969 seriously reduced the comparability of the data obtained over time.

6. There is a lack of knowledge about (a) who uses the employment service and (b) variations that might be expected in numbers and types of user as the convention site moved from city to city. (Data will be presented later to document large variations that occurred in many categories when the site moved from Chicago in 1968 to Los Angeles in 1969 to Minneapolis in 1970.)

7. A final limitation that should be noted is the difficulty in determining the orientation of the employers using the AERA employment service or shifts in their orientation over time. It is assumed that for many of the areas of competence listed in the tables below employers would be likely to recruit prospective employees at conventions other than AERA.

Trends in Supply and Demand

In spite of the limitations of the data enumerated above, it is felt that there is merit in examining the data in an attempt to determine general trends in supply and demand. The number of applicants and the number of vacancies listed by employers in 1968, 1969 and 1970 are indicated in Table 3.23; in addition, the total number of vacancies and applicants is graphically displayed in Figure 3.2 in order to facilitate examination of trends.

Table 3.23

Number of Vacancies and Applicants in the AERA Employment Service: By Year and by Relevance to Educational Research and Research-related Activities (RDDE)

Vacancy or Applicant Competencies are:	1968		1969		1970	
	Vacancies	Applicants	Vacancies	Applicants	Vacancies	Applicants
Directly Related to RDDE	223	469	249	242	154	280
Facilitative of RDDE	99	186	64	48	134	236
Not Related to RDDE	339	121	126	279	124	210
Total Usable Forms	661	776	439	569	412	726
Unusable Forms Submitted	108	35	20	0	0	1
Total Forms Submitted	769	811	459	569	412	727

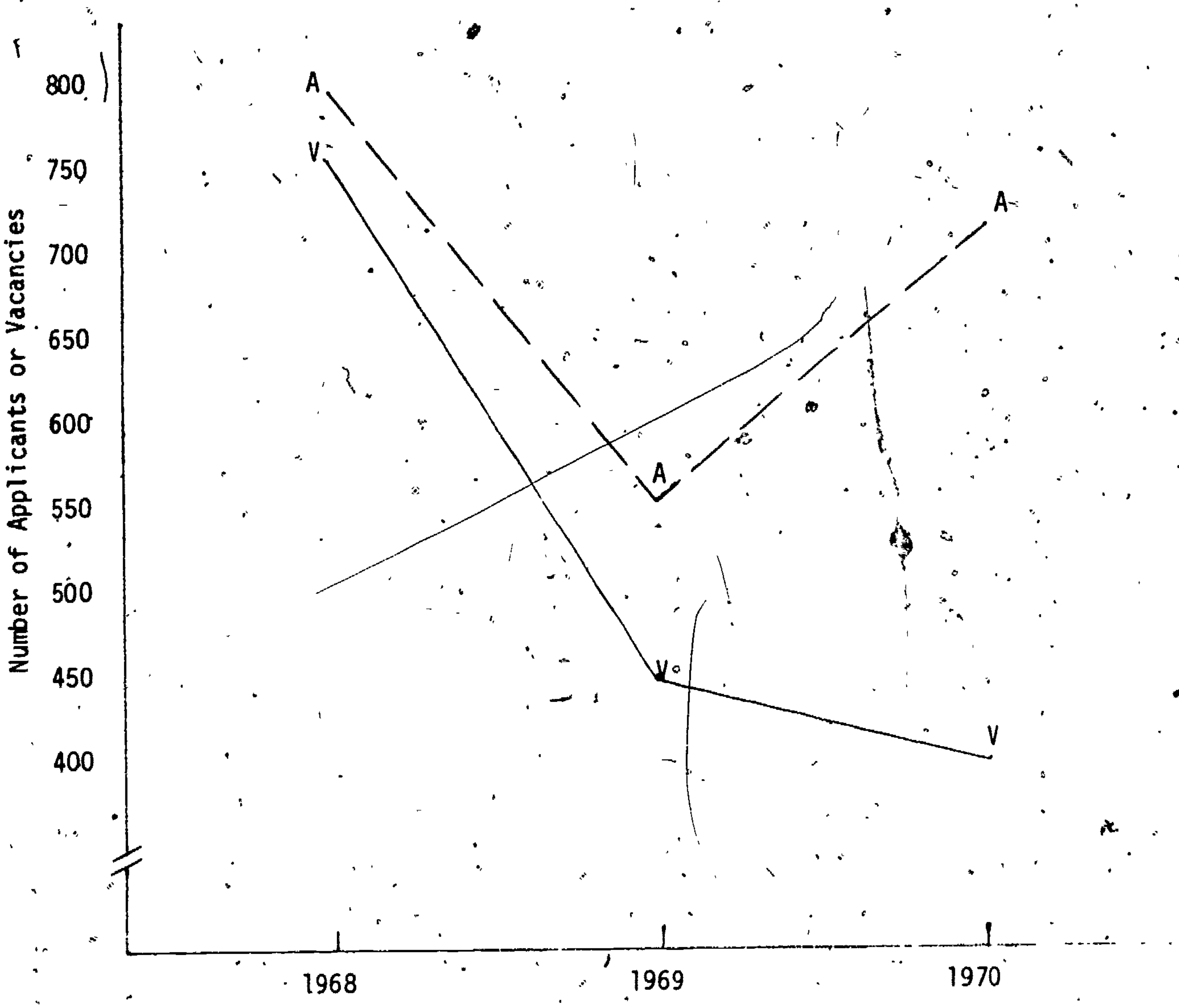

Figure 3.2 -Number of Vacancies (V) and Applicants (A) in the AERA Employment Service: By Year

It is apparent in the table and the figure that the number of vacancies listed with the placement service fell dramatically in the 25-month period from February 1968 to March 1970 (from 769 to 459 to 412). The number of applicants, on the other hand, fell in 1969 (from 811 to 569) but then returned in 1970 to 727--a level comparable to that of 1968.

In attempts to interpret the sharp reduction from 1968 to 1969 in both applicants and vacancies, it was noted that the percentage reduction was greater for vacancies. Also, the rate of vacancy reduction was much more pronounced in the 1968-1969 comparison than in the 1969-1970 comparison. Although it is not possible to be certain, one factor which quite likely influenced the reduction is the site selected for the convention. AERA draws larger proportions of its membership from the upper Midwest than from other sections of the country. In 1968 Chicago hosted the AERA convention--as it had done in most previous years--and 4,509 persons attended. The 1969 annual meeting was held on the West Coast for the first time in AERA's history and attendance at Los Angeles fell to 3,600. Additionally, it is probable that members from the Midwest and East were those less able to attend because of time and cost factors. This restriction was probably particularly true for graduate students (other than those going to school in California), the largest single group normally appearing as applicants in the placement service.[27] On the other hand, one would not expect that persons recruiting new employees

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[27]It should be noted, however, that some applicants are listed with the employment service even though they do not attend the AERA convention.

would be as significantly restricted in attending the California meeting if personnel vacancies existed and recruiting was underway.

It would appear then that reductions in vacancies and applicants from 1968 to 1969 can be attributed in part to the site selected. Further, the reduction in applicants probably was more affected by the site and therefore probably is less indicative of a true decline than is the case for the vacancies. Employment recruiters presumably would be less restricted in attending a convention because of financial considerations; therefore the large percentage reduction in vacancies must arise from factors other than convention location alone.

The discrepancy between vacancies and applicants increases markedly from 1969 to 1970 (Figure 3.2). It should be noted that the attendance at the March 1970 annual meeting in Minneapolis was even lower than at California the previous year (3,400 compared to 3,600). Despite the reduced attendance, however, the number of applicants at the placement service increased substantially.

In Figure 3.3, the information from the placement service is presented in another way. The number of vacancies and applicants registered is presented by year and by degree of relevance to educational research (direct, facilitative, and not related).[28] Particularly apparent is the crossover occurring from 1968 to 1969 in the "not related to RDDE" category; the number of applicants increased sharply while the number of vacancies

[28] It should be noted, particularly for 1968, that the numbers of applicants and vacancies in Figures 3.3 and 3.4 do not sum exactly to the numbers in Figure 3.2; this is because descriptions of certain vacancies and applicants were insufficient to classify them as directly related to, facilitative of, or not related to RDDE.

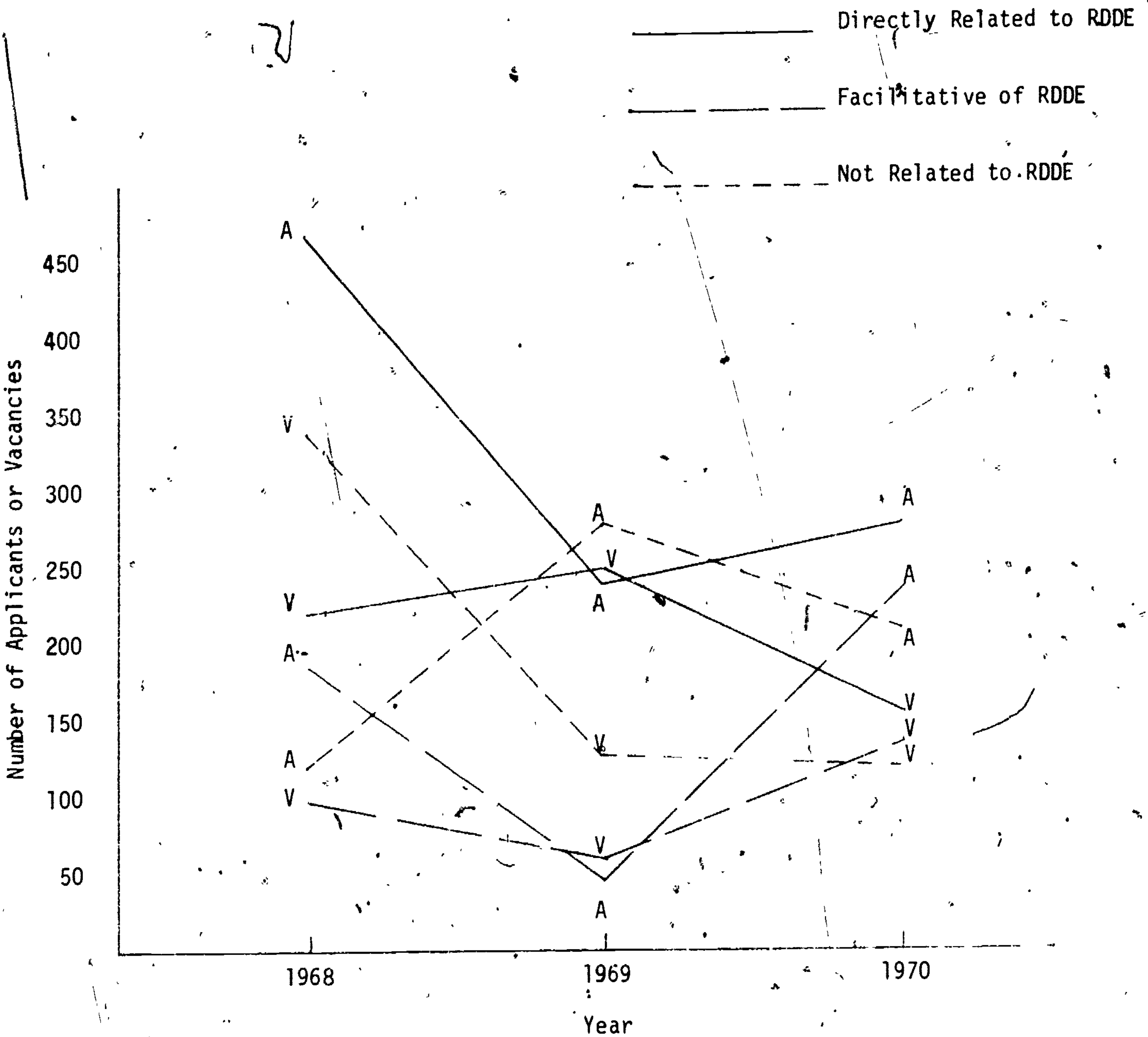

Figure 3.3 - Number of Vacancies (V) and Applicants (A) in the AERA Employment Service: By Year and by Relevance to Educational Research and Research-related Activities (RDDE)

moved in the reverse direction. Also noteworthy are the pronounced reduction from 1968 to 1969 in applicants for positions directly related to research, and the increase in applicants for RDDE facilitative positions from 1969 to 1970.

The information presented in Figure 3.3 seemed to reinforce the authors' opinion that the 1969 data tended to obscure supply and demand trends. This is due in part to a feeling that the participants at the 1969 annual meeting may have been substantially different as a group than the more "usual" AERA annual meeting population (assuming that the 1968 Chicago and the 1970 Minneapolis meetings more likely were attended by the "usual" population). A second reason is the dramatic reversal from 1968 to 1969 in the number of vacancies and applicants for positions <u>not</u> related to RDDE. Additionally, the large reduction in applicants for positions directly related to research reinforces this concern.

For these reasons Figure 3.4 was prepared to show the data from the 1968 and 1970 AERA employment services only.[29] In this figure it can be noted that for positions <u>directly related</u> to RDDE the ratio of applicants to vacancies has remained relatively constant over the two-year period, although there has been a reduction in the absolute number of each. The reductions in absolute numbers can be explained in part by the reduced convention attendance in 1970 as compared with 1968. Also in Figure 3.4, the ratio of vacancies to applicants for positions <u>facilitative</u> of RDDE has remained nearly constant, with numbers of applicants and vacancies

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[29]It was assumed that (a) trends could be best identified if populations remain fairly stable and (b) supply-demand trends for one population (e.g., upper Midwest) would be similar to trends for another population (e.g., West Coast).

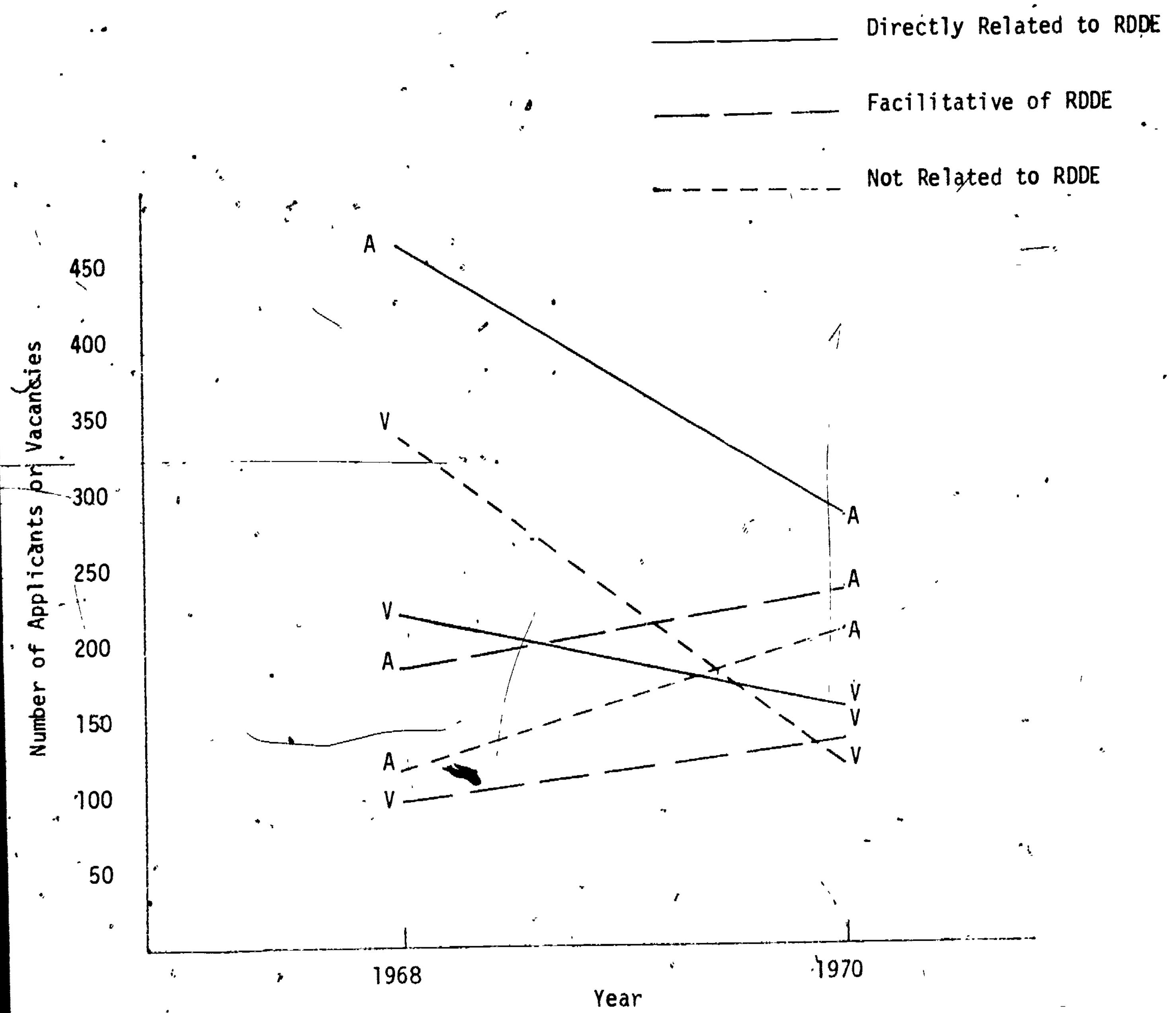

Figure 3.4 - Number of Vacancies (V) and Applicants (A) in the AERA Employment Service: By Year and by Relevance to Educational Research and Research-related Activities (RDDE)

increasing slightly over the two-year period. Finally, for the positions not related to RDDE, it is apparent that vacancies have reduced sharply while applicants have increased moderately.

One final presentation was undertaken to highlight the areas of most concern to the AERA Task Force: the vacancies and applicants for 1968 and 1970 were plotted after the two categories more relevant to research (directly related to, and facilitative of RDDE) were combined. In Figure 3.5, the relative stability of the applicant to vacancy ratio in research and research facilitative categories is displayed. The crossover between numbers of vacancies and applicants in the non-RDDE category is, of course, identical to that in Figure 3.4.

Upon reviewing the data and figures in this section, it is difficult to present definitive statements on supply and demand in RDDE, based on the 1968-1970 AERA employment service data. The limitations of the data enumerated in the opening remarks of this paper, plus the vagaries in the data introduced by changing annual meeting sites and the time of year for the meeting, make interpretation difficult. Note, too, the pressure on apprehensive job-seekers as they complete self-report forms that they know prospective employers will read.

General statements and conclusions will be presented in abbreviated form in the last section of this chapter. With this general overview of supply and demand in mind, consideration is now given to trends in the skills required by employers as compared with skills "possessed" by applicants.

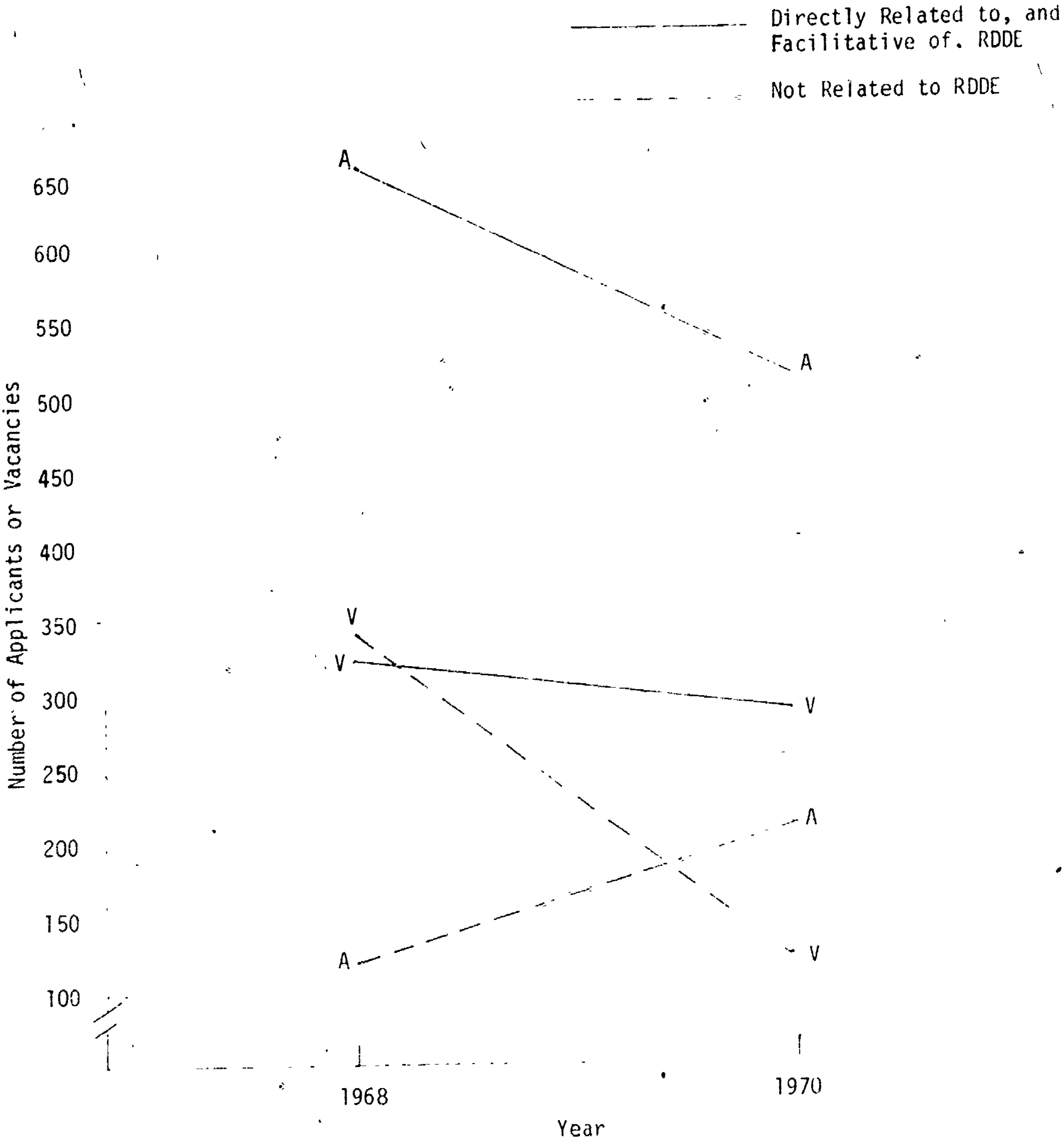

Figure 3.5 - Number of Vacancies (V) and Applicants (A) in the AERA Employment Service: By Year and by Research-related and Non-research-related Categories

Trends in Skills Required by Employers as Compared with Skills Possessed by Applicants

In this section, the same data will be considered from two different perspectives. The first treatment of the data is relatively straightforward and consists of reporting the 1968 and 1970 percentages of applicants listing a particular competency and of employers requesting a given competency. The second treatment is less direct. In effect, the same initial data are adjusted to reflect vacancies per applicant and applicants per vacancy in comparable units for both 1968 and 1970. Results from the 1970 phone interviews are then compared to outcomes of the two treatments. The two resultant analyses, as one would expect, produce similar findings, yet these findings are expressed from quite different perspectives.

Changes in Percentages of Employer-required Competencies and Applicant-listed Competencies.

In Table 3.24 data are reported for 1968 and 1970 on the percentage of vacancies requiring specific areas of competence and the percentage of applicants listing specific areas of competence. For each year the percentages add to 100 percent within each category.[30] (For example, the first column represents the percentage of vacancies that required each area of competence in 1968; the column adds to 100 percent.)

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[30]To perform this analysis, the last area of competence reported for 1968 and 1970 (namely, the category expressively dubbed "Other") was omitted, as the 1968 "Other" responses could not be categorized as research-related, research facilitative or nonresearch-related.

Table 3.24

Percent of Vacancies Requiring Specific Areas of Competence and Percent of Applicants Claiming Specific Competencies in the AERA Employment Service: By Year, by Area of Competence, and by Relevance to Educational Research and Research-related Activities (RDDE)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC
Research Methods/Types																
Educational Research	6.9	1.1	8.5	9.1	0	0.6	5.6	3.0	6.3	16.7	5.2	9.1	0.9	0.6	4.7	10.8
Research Methodology	12.7	18.7	5.9	2.4	0	0.6	7.0	12.8	3.6	1.0	2.6	3.4	0	0	2.4	1.7
Research Design	10.3	2.8	12.8	4.7	0	0.6	8.4	3.0	7.6	7.9	3.1	6.0	0	0	4.3	5.7
Survey/Institutional Research	8.3	0.1	1.6	0	0	0	3.8	0.1	2.2	0.1	0	0.2	0	0	0.9	0.1
Educational Development	0.7	1.4	0.4	1.8	0	0	0.4	1.4	3.6	2.8	2.6	2.0	0	0.3	2.4	2.0
Educational Diffusion	0.2	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
Evaluation																
Evaluation Techniques (general)	13.2	4.8	13.4	3.3	0	0	9.8	3.9	4.5	6.4	9.3	6.7	0.9	1.9	5.5	5.6
Evaluation of Instructional Products	3.4	0	2.6	0	0	0	2.2	0	0	0.6	1.0	0.5	0.9	0.3	0.6	0.5

DR-RDDE: Directly Related to RDDE
F-RDDE: Facilitative of RDDE
NR-RDDE: Not Related to RDDE
Total: All categories

(Continued)

VRC: Percent of Vacancies Requiring the Competency.
ACC: Percent of Applicants Claiming the Competency.

Table 3.24 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC
Measurement																
Measurement Theory/ Psychometrics	9.1	8.5	9.8	8.6	1.0	1.9	7.2	7.8	6.7	5.1	8.2	10.4	0.9	0	6.0	6.1
Testing/Applied Measurement	3.7	2.3	9.3	5.0	0	0.6	4.6	2.8	1.8	2.8	1.0	1.6	0.9	1.0	1.3	2.0
Instrument Construction/ Development	2.5	0.1	2.0	0	0.5	0	1.8	0.1	1.3	0.8	0	0.3	0	0	0.6	0.5
Statistical Analysis																
Elementary Statistical Techniques	8.6	8.6	10.2	12.1	11.1	1.9	9.8	8.8	1.3	9.2	2.6	12.2	0	0	1.5	8.6
Advanced Statistical Techniques	1.9	0.2	3.3	0.6	0.5	0	2.0	0.3	0	2.0	1.5	1.6	0	0	0.6	1.5
Computer Techniques/ Programming	3.7	3.5	3.5	5.9	8.9	0	5.0	3.7	3.6	5.1	8.2	3.9	0.9	0.5	4.7	3.8
Systems Analysis	2.0	0	1.4	0	0.5	0	1.4	0	0	1.3	2.1	1.0	0	0.3	0.8	1.0
Psychology																
Educational/School Psychology	1.2	6.2	0.2	8.6	8.6	16.2	2.8	7.9	10.8	5.8	7.7	6.7	15.8	10.4	10.7	7.0

(Continued)

Table 3.24 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC
Developmental Psychology	1.5	3.0	0	2.7	8.4	14.3	2.8	4.2	2.2	1.6	1.5	1.8	7.0	5.5	3.0	2.4
Learning/Experimental Psychology	4.6	5.3	1.2	11.5	3.8	0	3.2	6.2	4.5	6.6	2.6	6.7	3.5	7.8	3.6	6.9
Social Psychology	0.8	0.3	0.2	0	1.5	0	0.8	0.2	3.6	0.4	0	0.7	0.9	1.3	1.7	0.7
Clinical Psychology	0.2	0.4	0	0.3	4.3	0	1.2	0.4	0	0	0	0	0.9	1.0	0.2	0.2
Guidance and Counseling	0.2	5.7	0	6.2	2.3	13.0	0.7	6.6	1.3	4.0	1.5	2.4	6.1	11.7	2.4	4.8
Educational Sociology/ Economics	0.	0.2	0.2	0.3	2.3	0	0.8	0.2	3.1	0.7	1.5	0.5	4.4	2.6	2.8	1.0
Administration																
Research Administration/ Management	0	0	13.0	6.5	0	0	4.4	1.6	0.9	1.0	5.2	2.8	0	0	2.3	1.5
General Administration	1.7	7.8	0	0	11.9	14.9	3.8	6.7	1.3	2.1	3.1	6.5	4.4	15.6	2.6	6.3
Curriculum Development/ Analysis	0.3	5.9	0	2.1	5.6	20.1	1.6	6 5	4.9	3.0	3.6	2.9	3.5	11.4	4.1	4.5
Teacher Education/ Inservice Training	0.2	8.0	0.4	7.1	19.0	9.1	5.2	7.9	7.2	3.8	8.2	3.1	10.5	9.1	8.3	4.5

(Continued)

Table 3.24 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC	%V RC	%A CC
Vocational Education	0	0	0	0	0.8	0	0.2	0	0	0.3	0	0	2.6	0	0.6	0.1
Subject Matter Areas (e.g., Social Studies)	0	0.9	0	0.3	3.8	1.3	1.0	0.8	4.9	3.0	6.7	2.8	16.7	10.1	8.1	4.2
Special Education	0.3	1.0	0	0.6	1.0	1.9	0.4	1.0	4.9	1.8	3.1	1.5	11.4	3.9	5.6	2.1
Instructional Media/ Technology	0.7	1.6	0.2	0	2.8	1.3	1.1	1.1	5.4	4.0	5.7	1.6	7.0	4.2	5.8	3.1
Writing Ability/ Editing	0.5	1.4	0	0.3	1.5	1.3	0.6	1.1	2.2	0.1	2.1	1.1	0	0.3	1.7	0.6

Several dramatic shifts from 1968 to 1970 may be noted in the vacancies. Consider first those competencies listed in which a 2 percent or larger decrease occurred in the "total" category (2 percent having been chosen arbitrarily as an indicator of marked change).

	decrease from:
Research methodology	7.0 to 2.4%
Research design	8.4 to 4.3%
Survey/institutional research	3.8 to 0.9%
Evaluation techniques (general)	9.8 to 5.5%
Testing/applied measurement	4.6 to 1.3%
Elementary statistical techniques	9.8 to 1.5%
Research administration/management	4.4 to 2.3%

Summing over the subcategories within research, evaluation, measurement, and statistical analysis makes the downward trends even more apparent. In 1968, for example, 24.8 percent of the vacancies required competency in research methods/types, while this figure dropped to 12.3 percent of the vacancies in 1970. The total trend over both evaluation categories was also markedly down (from 12.0 percent in 1968 to 6.1 percent in 1970), especially for positions directly related to research (16.6 percent in 1968, 4.5 percent in 1970). The overall decrease in measurement from 13.6 percent to 7.9 percent was particularly evident in the research-related and research-facilitative categories. A dramatic reduction also occurred in the percentage of vacancies requiring competence in statistical analysis (11.8 percent in 1968 to 2.1 percent in 1970). It should be noted in passing that diffusion as an area of competence essentially was ignored by employers or applicants over the two years examined.[31]

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[31] As was noted in Chapter 2, "perhaps the proliferation of roles for diffusers embodied in current literature on educational change is prophetic rather than descriptive of present professional priorities." This conclusion was based on the 1970 phone interview of employers and

Obviously, given the pronounced decreases above in the research/evaluation/statistics domain, there had to be corresponding increases in other areas. The types of competencies for which there was a marked increase (2 percent or more) in demand in 1970 vacancies over 1968 included:

	increase from:
Educational development	0.4 to 2.4%
Education/school psychology	2.8 to 10.7%
Educational sociology/economics	0.8 to 2.8%
Curriculum development/analysis	1.6 to 4.1%
Teacher education/inservice training	5.2 to 8.3%
Subject matter areas	1.0 to 8.1%
Special education	0.4 to 5.6%
Instructional media/technology	1.1 to 5.8%

It is noteworthy that many of these increases came about via vacancies listed in the categories of directly related to, and facilitative of research. Also note that several of the increases involve development to a greater or lesser degree.

Turning the focus to competencies reportedly possessed by applicants to the AERA employment services, total decreases of 2 percent or more from 1968 to 1970 were seen in:

	decrease from
Research methodology	12.8 to 1.7
Curriculum development/analysis	6.5 to 4.5%
Teacher education/inservice training	7.9 to 4.5%

31(continued) their view of diffusion, on the average, as relatively less important than other functional areas of RDDE. Nothing in the 1968 or 1970 AERA employment service data refutes the position suggested by this quote, unless it is the increases in the areas of instructional media/technology and writing/editing skills (in research-related areas).

The number of competencies for which pronounced percentage decreases were observed is smaller for applicants than for vacancies. In addition, the shifts downward are less dramatic, with the exception of research methodology. Note also that only in the case of research methodology is a pronounced decrease in vacancy competencies matched by a decrease in applicant competencies. In the other two areas of decreased applicant emphasis, there was increased demand on the part of employers.

Those areas in which an <u>increased</u> percentage of applicants reported competence include the following:

	increase from:
Educational research	3.0 to 10.8%
Research design	3.0 to 5.7%
Evaluation techniques (general)	3.9 to 5.6%
Subject matter areas	0.8 to 4.2%
Instructional media/technology	1.1 to 3.1%

Two of the five areas (subject matter areas and instructional media/technology) agree with the changing demands represented by the vacancies listed. However, the other three competency areas (educational research, research design, and evaluation techniques) represent movement in directions opposite to the demand trends.

Although some portion of these percentage shifts is probably due to the changes in the personnel using the employment service over time, the very large shifts must have some additional explanation. In the sections which follow, the results of this analysis will be compared with the 1970 telephone interview survey to determine points of commonality and disagreement. Consideration will now be given to the second analysis, which adjusts the competency data in order to make comparisons.

Changes in the Number of Vacancies per Applicant from 1968 to 1970 in Relation to Area of Competence.

It is a straightforward matter to use the vacancy and applicant data from the 1968 and 1970 employment services to compute ratios of vacancies to applicants and of applicants to vacancies for each area of competence. This has been done in Table 3.25.

Unfortunately, interpretation of the table is not nearly so straightforward. Two basic problems are apparent. First, the table is not divided by relevance to RDDE; in fact it is not possible to construct Table 3.25 to include such a division, since 185 applicant forms and 146 vacancy forms for 1968 could not be coded on this dimension.

A second problem might be stated as lack of comparability of units in Table 3.25; i.e., vacancy units and applicant units are comparable neither within years nor across years. Recall that each applicant could list one or more areas of competence on his self-description form and that an employer could list one or more competencies required for each vacancy. Given this option, the number of competencies indicated varied considerably and the totals from Table 3.25 are far greater than the actual number of vacancies or applicants. In Figure 3.6, the average number of competencies listed by applicants and employers is plotted for 1968 and 1970 and for the three categories indicating degree of relationship to RDDE.[32]

In Figure 3.6 the pattern is clear. From 1968 to 1970 and in each category, the average number of competencies required for vacancies decreased while the average number of competencies reportedly possessed

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[32]Comparable data for 1969 are available but are not presented for the reasons given previously, i.e., the assumed unrepresentative nature of that annual meeting and--more important--the difference in the employment service forms for that year.

Table 3.25

Number of Vacancies and Applicants, Vacancy to Applicant Ratios, and Applicant to Vacancy Ratios for the AERA Employment Service: By Year and by Area of Competence

Area of Competence	1968 Employment Service				1970 Employment Service			
	V	A	#VA	#AV	V	A	#VA	#AV
Research Methods/Types								
Educational Research	84	42	0.5	2.0	25	176	7.0	0.1
Research Methodology	105	178	1.7	0.6	13	28	2.2	0.5
Research Design	126	42	0.3	3.0	23	93	4.0	0.3
Survey/Institutional Research	57	1	0.1	57.0	5	2	0.4	2.5
Educational Development	6	19	3.2	0.3	13	33	2.5	0.4
Educational Diffusion	1	0	1.0*	0	0	0	0	0

V: Vacancy
A: Applicant

#VA: Number of Vacancies per Applicant
#AV: Number of Applicants per Vacancy

* Indicates number of vacancies (or applicants) even though there were no applicants (or vacancies) in that category.

(Continued)

Table 3.25 (Continued)

Area of Competence	1968 Employment Service V	A	#VA	#AV	1970 Employment Service V	A	#VA	#AV
Evaluation								
Evaluation Techniques (general)	146	54	0.4	2.7	29	92	3.2	0.3
Evaluation of Instructional Products	33	0	33.0*	0	3	8	2.7	0.4
Measurement								
Measurement Theory/ Psychometrics	108	109	1.0	1.0	32	100	3.1	0.3
Testing/Applied Measurement	69	39	0.6	1.8	7	33	4.7	0.2
Instrument Construction/ Development	27	1	0.1	27.0	3	8	2.7	0.4
Statistical Analysis								
Elementary Statistical Techniques	147	122	0.8	1.2	8	140	18.0	0.1
Advanced Statistical Techniques	30	4	0.1	7.5	3	24	8.0	0.1
Computer Techniques/Programming	75	52	0.7	1.4	25	62	2.5	0.4

(Continued)

Table 3.25 (Continued)

Area of Competence	1968 Employment Service V	A	#VA	#AV	1970 Employment Service V	A	#VA	#AV
Systems Analysis	21	0	21.0*	0	4	16	4.0	0.3
Psychology								
Educational/School Psychology	42	110	2.6	0.4	57	114	2.0	0.5
Developmental Psychology	42	58	1.4	0.7	16	39	2.4	0.4
Learning/Experimental Psychology	48	87	1.8	0.6	19	112	5.9	0.2
Social Psychology	12	3	0.3	4.0	9	11	1.2	0.8
Clinical Psychology	18	5	0.3	3.6	1	3	3.0	0.3
Guidance and Counseling	10	92	9.2	0.1	13	79	6.1	0.2
Educational Sociology/Economics	12	3	0.3	4.0	15	16	1.1	0.9
Administration								
Research Administration/Management	66	22	0.3	3.0	14	24	2.0	0.5
General Administration	57	93	1.6	0.6	14	103	7.4	0.1

(Continued)

Table 3.25 (Continued)

Area of Competence	1968 Employment Service V	A	#VA	#AV	1970 Employment Service V	A	#VA	#AV
Curriculum Development/Analysis	24	91	3.8	0.3	22	74	3.4	0.3
Teacher Education/Inservice Training	78	110	1.4	0.7	44	74	1.7	0.6
Vocational Education	3	0	3.0*	0	3	2	0.7	1.5
Subject Matter Areas (e.g., Social Studies)	15	11	0.7	1.4	43	69	1.6	0.6
Special Education	6	14	2.3	0.4	30	34	1.1	0.9
Instructional Media/Technology	16	16	1.0	1.0	31	51	1.7	0.6
Writing Ability/Editing	9	16	1.8	0.6	9	9	1.0	1.0
Other (e.g., comparative education, philosophy, work well with people, etc.)	146	185	1.3	0.8	38	68	1.8	0.6

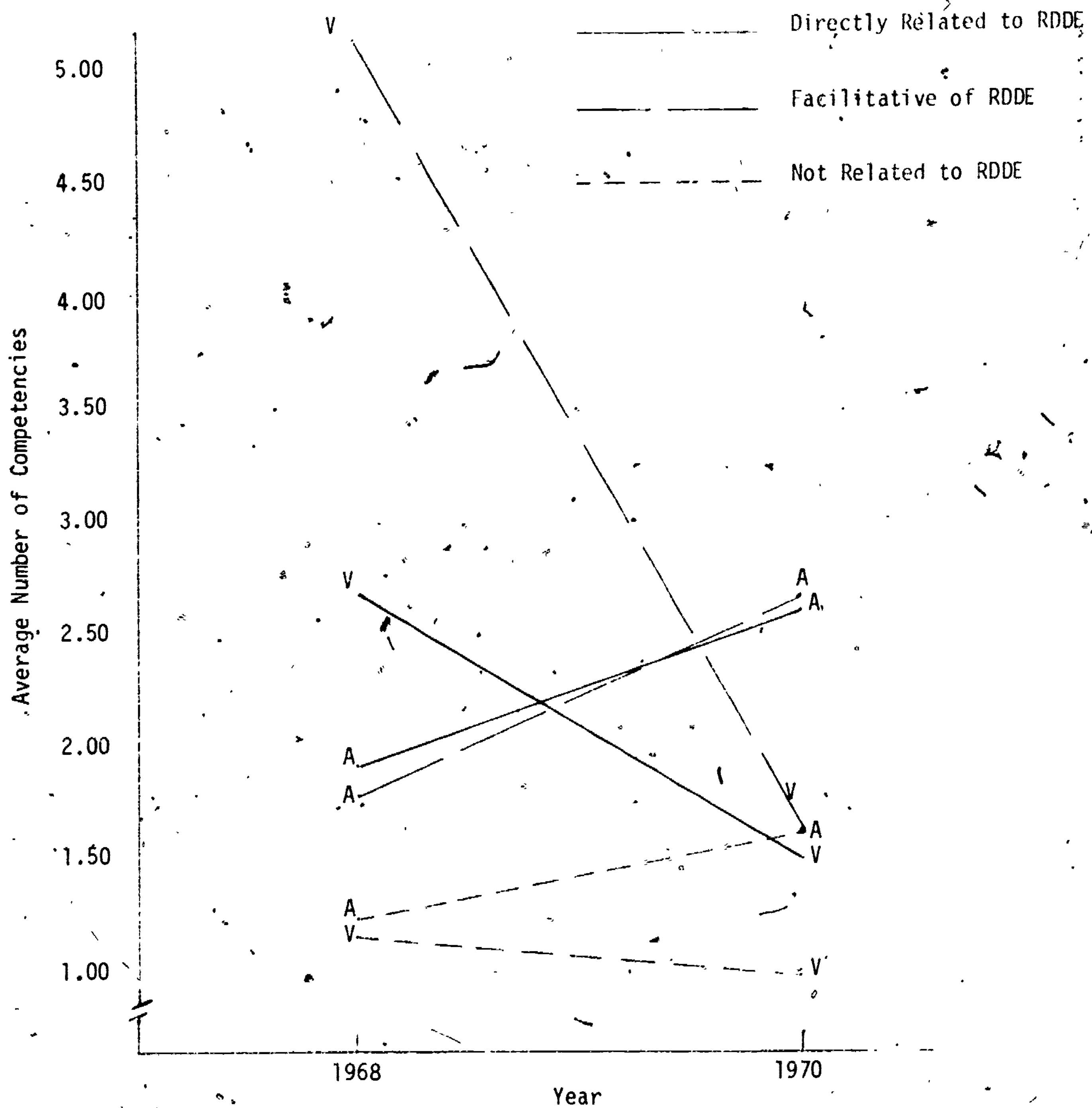

Figure 3.6 - Average Number of Competencies Listed by Applicants (A) and for Vacancies (V) in the AERA Employment Service: By Year and by Relevance to Educational Research and Research-related Activities (RDDE)

by applicants increased. One interpretation of the reduction in the average number of competencies required by employers is that it may reflect a certainty about the type of person being sought. That is, the employer might be hiring to fill a specific opening in his organization (possibly to fill an established position whose incumbent is preparing to vacate); the employer cannot afford the luxury of hiring a jack-of-all-trades. Conversely, so this interpretation goes, in expansive times when many staff are being sought by the same organization, it is possible to hire persons less restrictively and then redefine the remaining positions in terms of those areas of competence not yet "covered."

The increase in the average number of competencies listed by the applicants, on the other hand, might be explained by the gradual improvement in training in these areas of competence. A second interpretation is that the applicants are influenced by the prevailing dialogue proclaiming a tight job market. To avoid unemployment they list more areas of competence, and this both improves their overall appearance on paper and increases the probability that they will be considered for more jobs than if they had listed only one specific area of competence.

Be this as it may, the problem still remains of presenting the "area of competence" data from Table 3.25 in comparable units both across years and between the vacancy and applicant breakdowns for a single year. In 1970, for example, 726 <u>applicants</u> listed 1,697 competencies while the 412 <u>vacancies</u> involved only 569 competencies. In order to avoid the distortion which would result from use of the raw data, it was necessary to devise a common unit for presentation of the vacancy and applicant data. The procedure followed was to multiply the number of apparent vacancies (or applicants) within a given year and within a given category of research relevance by an "adjustment" percentage. That percentage was determined by dividing the number of actual vacancies (or applicants) in that category by the total number of competencies in the same category. This had the effect of reducing the number of competencies within a category to equivalency with the number of actual vacancies (or applicants) in that category. Clearly this procedure does some violence to the data, yet it is felt that general comparisons can be made with the data thus adjusted.

In Table 3.26 adjusted numbers of vacancies and applicants are presented by year and by research-relevant category. Table 3:27 follows directly from Table 3.26 and in it is indicated the adjusted number of vacancies per applicant (also adjusted) and the adjusted number of applicants per vacancy (also adjusted) for 1968 and 1970 by research-relevant category. It is apparent in the tables that the various numerical transformations resulted in some distortion of the data. Nevertheless, the entries in the two tables are in comparable units.

From Table 3.27 it is possible to classify the changes in vacancies per applicant from 1968 to 1970 into three categories: (1) pronounced <u>reduction</u> in vacancies per applicant; (2) little change in vacancies per applicant, and (3) pronounced <u>increase</u> in vacancies per applicant. The pronounced increases and decreases are shown in Table 3.28. If vacancies per applicant either increased or decreased by a factor of 3 from 1968 to 1970, then an entry was made in Table 3.28. Also included in the table are changes of 1.5 vacancies or more when the comparison figure from the other year was zero. The reader is cautioned that reference to other tables often is necessary to keep the entries in Table 3.28 in perspective,

Table 3.26

Adjusted Number of Vacancies and Applicants for the AREA Employment Service: By Year, by Area of Competence, and by Relevance to Educational Research and Research-related Activities (RDDE).

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA
Research Methods/Types																
Educational Research	15.5	5.2	8.4	17.1	0	0.8	23.9	23.1	9.3	45.4	6.3	21.0	1.0	1.2	16.6	67.6
Research Methodology	28.4	87.9	5.9	4.4	0	0.8	34.3	93.1	5.3	2.7	3.1	7.9	0	0	8.4	10.6
Research Design	23.1	13.0	12.7	8.8	0	0.8	35.8	22.6	11.3	21.6	3.8	13.9	0	0	15.1	35.5
Survey/Institutional Research	18.5	0.5	1.6	0	0	0	20.1	0.5	3.3	0.4	0	0.4	0	0	3.3	0.8
Educational Development	1.5	6.8	0.4	3.3	0	0	1.9	10.1	5.3	7.7	3.1	4.5	0	0.6	8.4	12.8
Educational Diffusion	0.4	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0	0

(Continued)

AV: Adjusted Vacancies
AA: Adjusted Applicants

DR-RDDE: Directly Related to RDDE
F-RDDE: Facilitative of RDDE
NR-RDDE: Not Related to RDDE

Table 3.26 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA
Evaluation																
Evaluation Techniques (general)	29.5	22.4	13.3	6.1	0	0	42.8	28.5	6.6	17.3	11.3	15.4	1.0	3.7	18.9	36.4
Evaluation of Instructional Products	7.6	0	2.5	0	0	0	10.1	0	0	1.5	1.3	1.1	1.0	0.6	2.3	3.2
Measurement																
Measurement Theory/ Psychometrics	20.4	40.0	9.8	16.0	3.4	2.4	33.6	58.4	10.0	13.9	10.1	24.0	1.0	0	21.1	37.9
Testing/Applied Measurement	8.3	10.9	9.2	9.4	0	0.8	17.5	21.1	2.7	7.7	1.3	3.8	1.0	1.8	5.0	13.3
Instrument Construction/Development	5.7	0.5	2.0	0	1.7	0	9.4	0.5	2.0	2.3	0	0.8	0	0	2.0	3.1
Statistical Analysis																
Elementary Statistical Techniques	19.3	40.6	10.1	22.6	37.8	2.4	67.2	65.6	2.0	25.0	3.1	28.1	0	0	5.1	53.1
Advanced Statistical Techniques	4.2	1.0	3.3	1.1	1.7	0	9.2	2.1	0	5.4	1.9	3.8	0	0	1.9	9.2
Computer Techniques/ Programming	8.3	16.6	3.5	11.0	30.0	0	41.8	27.6	5.3	13.9	10.1	9.0	1.0	1.2	16.4	24.1

(Continued)

Table 3.26 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA	AV	AA
Systems Analysis	4.5	0	1.4	0	1.7	0	7.6	0	0	3.5	2.5	2.3	0	0.6	2.5	6.4
Psychology																
Educational/School Psychology	2.6	29.1	0.2	16.0	29.2	19.7	32.0	64.8	15.9	15.8	9.4	15.4	18.0	19.7	43.3	50.9
Developmental Psychology	3.4	14.0	0	5.0	28.3	17.3	31.7	36.3	3.3	4.2	1.9	4.1	8.0	10.5	13.2	18.8
Learning/Experimental Psychology	10.2	25.0	1.2	21.5	12.9	0	24.3	46.5	6.6	18.1	3.1	15.4	4.0	14.8	13.7	48.3
Social Psychology	1.9	1.6	0.2	0	5.1	0	7.2	1.6	5.3	1.2	0	1.5	1.0	2.5	6.3	5.2
Clinical Psychology	0.4	2.1	0	0.6	14.6	0	15.0	2.7	0	0	0	0	1.0	1.8	1.0	1.8
Guidance and Counseling	0.4	26.5	0	11.6	7.7	15.7	8.1	53.8	2.0	10.8	1.9	5.6	7.0	22.2	10.9	38.6
Educational Sociology/ Economics	0.8	1.0	0.2	0.6	7.7	0	8.7	1.6	4.6	1.9	1.9	1.1	5.0	4.9	11.5	7.9
Administration																
Research Administration/ Management	0	0	12.9	12.1	0.0	0	12.9	12.1	1.3	2.7	6.3	6.4	0	0	7.6	9.1

(Continued)

Table 3:26 (Continued)

Area of Competence	1968 Employment Service DR-RDDE AV	AA	F-RDDE AV	AA	NR-RDDE AV	AA	Total AV	AA	1970 Employment Service DR-RDDE AV	AA	F-RDDE AV	AA	NR-RDDE AV	AA	Total AV	AA
General Administration	3.8	36.4	0	0	40.3	18.1	44.1	54.5	2.0	5.8	3.8	15.0	5.0	29.6	10.8	50.4
Curriculum Development/ Analysis	0.8	27.6	0	3.9	18.9	24.4	19.7	55.9	7.3	8.1	4.4	6.8	4.0	21.6	15.7	36.5
Teacher Education/ Inservice Training	0.4	37.4	0.4	13.2	64.4	11.0	65.2	61.6	10.6	10.4	10.1	7.1	12.0	17.2	32.7	34.7
Vocational Education	0	0	0	0	2.6	0	2.6	0	0	0.8	0	0	3.0	0	3.0	0.8
Subject Matter Areas (e.g., Social Studies)	0	4.2	0	0.6	12.9	1.6	12.9	6.4	7.3	8.1	8.2	6.4	19.0	19.1	34.5	33.6
Special Education	0.8	4.7	0	1.1	3.4	2.4	4.2	8.2	7.3	5.0	3.8	3.4	13.0	7.4	24.1	15.8
Instructional Media/ Technology	1.5	7.3	0.2	0	9.4	1.6	11.1	8.9	8.0	10.8	6	3.8	8.0	8.0	22.9	22.6
Writing Ability/Editing	1.1	6.8	0	0.6	5.1	1.6	6.2	9.0	3.3	0.4	2.[illegible]	2.6	0	0.6	5.8	3.6
Other (e.g., comparative education, philosophy, educated, work well with people, etc.)	a	a	a	a	a	a	a	a	6.0	7.7	12.0	5.6	10.0	20.3	28.0	33.6

a: Competencies in this area of competence could not readily be classified in the categories of research, research-facilitative, and nonresearch; therefore, they are not included in this analysis.

Table 3.27

Adjusted Number of Vacancies per Applicant and Adjusted Number of Applicants per Vacancy the AERA Employment Service: By Year, by Area of Competence, and by Relevance to Educational Research and Research-related Activities (RDDE)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV
Research Methods/Types																
Educational Research	2.9	0.3	0.5	2.0	0	0.8*	1.0	1.0	0.2	4.9	0.3	3.3	0.8	1.2	0.2	4.1
Research Methodology	0.3	3.1	1.3	0.7	0	0.8*	0.4	2.7	2.0	0.5	0.4	2.5	0	0	0.8	1.3
Research Design	1.8	0.6	1.4	0.7	0	0.8*	1.6	0.6	0.5	1.9	0.3	3.7	0	0	0.4	2.4
Survey/Institutional Research	37.0	<0.1	1.6*	0	0	0	40.0	<0.1	8.3	0.1	0	0.4*	0	0	4.1	0.2
Educational Development	0.2	4.5	0.1	8.3	0	0	0.2	5.3	0.7	1.5	0.7	1.5	0	0.6*	0.7	1.5
Educational Diffusion	0.4*	0	0	0	0	0	0.4*	0	0	0	0	0	0	0	0	0

A#VA: Adjusted Number of Vacancies per Applicant
A#AV: Adjusted Number of Applicants per Vacancy
*: Indicates adjusted number of vacancies (or applicants) even though there were no applicants (or vacancies) in that category.

DR-RDDE: Directly Related to RDDE
F-RDDE: Facilitative of RDDE
NR-RDDE: Not Related to RDDE

(Continued)

Table 3.27 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV
Evaluation																
Evaluation Techniques (general)	1.3	0.8	2.2	0.5	0	0	1.5	0.7	0.4	2.6	0.7	1.4	0.3	3.7	0.5	1.9
Evaluation of Instructional Products	7.6*	0	2.5*	0	0	0	10.0*	0	0	1.5*	1.2	0.8	1.7	0.6	0.7	1.4
Measurement																
Measurement Theory/ Psychometrics	0.5	2.0	0.6	1.6	1.4	0.7	0.6	1.7	0.7	1.4	0.4	2.4	1.0*	[illegible]	0.6	1.8
Testing/Applied Measurement	0.8	1.3	1.0	1.0	0	0.8*	0.8	1.2	0.4	2.9	0.3	2.9	0.6	1.8	0.4	2.7
Instrument Construction/ Development	11.0	0.1	2.0*	0	1.7*	0	19.0	0.1	0.9	1.2	0	0.8*	0	0	0.6	1.6
Statistical Analysis																
Elementary Statistical Techniques	0.5	2.1	0.4	2.2	16.0	0.1	1.0	1.0	0.1	13.0	0.1	9.1	0	0	0.1	10.0
Advanced Statistical Techniques	4.2	0.2	3.0	0.3	1.7*	0	4.4	0.2	0	5.4*	0.5	2.0	0	0	0.2	4.8

(Continued)

Table 3.27 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV
Computer Techniques/ Programming	0.5	2.0	0.3	3.1	30.0*	0	1.5	0.7	0.4	2.6	1.1	0.9	0.8	1.2	0.7	1.5
Systems Analysis	4.5*	0	1.4*	0	1.7*	0	7.6*	0	0	3.5*	1.1	0.9	0	0.6*	0.4	2.6
Psychology																
Educational/School Psychology	0.1	11.0	<0.1	80.0	1.5	0.7	0.5	2.0	1.0	1.0	0.6	1.6	0.9	1.1	0.8	1.2
Developmental Psychology	0.2	4.1	0	5.0*	1.6	0.6	0.9	1.1	0.8	1.3	0.5	2.2	0.8	1.3	0.7	1.4
Learning/Experimental Psychology	0.4	2.5	0.1	18.0	13.0*	0	0.5	1.9	0.4	2.7	0.2	5.0	0.3	3.7	0.3	3.5
Social Psychology	1.2	0.8	0.2*	0	5.1*	0	4.5	0.2	4.4	0.2	0	1.5*	0.4	2.5	1.2	0.8
Clinical Psychology	0.2	5.3	0	0.6*	15.0*	0	5.6	0.2	0	0	0	0	0.6	1.8	0.6	1.8
Guidance and Counseling	<0.1	66.0	0	11.6*	0.5	2.0	0.2	6.6	0.2	5.4	0.3	2.9	0.3	3.2	0.3	3.5
Educational Sociology/ Economics	0.8	1.3	0.3	3.0	7.7*	0	5.4	0.2	2.4	0.4	1.7	0.6	1.0	1.0	1.5	0.7

(Continued)

Table 3.27 (Continued)

Area of Competence	1968 Employment Service								1970 Employment Service							
	DR-RDDE		F-RDDE		NR-RDDE		Total		DR-RDDE		F-RDDE		NR-RDDE		Total	
	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV	A# VA	A# AV
Administration																
Research Administration/ Management	0	0	1.1	0.9	0	0	1.1	0.9	0.5	2.1	1.0	1.0	0	0	0.8	1.2
General Administration	0.1	9.6	0	0	2.2	0.4	0.8	1.2	0.3	2.9	0.3	3.9	0.2	5.9	0.2	4.7
Curriculum Development/ Analysis	<0.1	35.0	0	3.9*	0.8	1.3	0.4	2.8	0.9	1.1	0.6	1.5	0.2	5.4	0.4	2.3
Teacher Education/ Inservice Training	<0.1	94.0	0.1	33.0	5.9	0.2	1.1	0.9	1.0	1.0	1.4	0.7	0.7	1.4	0.9	1.1
Vocational Education	0	0	0	0	2.6*	0	2.6*	0	0	0.8*	0	0	3.0*	0	3.8	0.3
Subject Matter Areas (e.g., Social Studies)	0	4.2*	0	0.6*	8.1	0.1	2.0	0.5	0.9	1.1	1.3	0.8	1.0	1.0	1.0	1.0
Special Education	0.2	5.9	0	1.1*	1.4	0.7	0.5	2.0	1.5	0.7	1.1	0.9	1.8	0.6	1.5	0.7
Instructional Media/ Technology	0.2	4.9	0.2*	0	5.9	0.2	1.2	0.8	0.7	1.4	1.8	0.6	1.0	1.0	1.0	1.0
Writing Ability/Editing	0.2	6.2	0	0.6*	3.2	0.3	0.7	1.5	8.3	0.1	1.0	1.0	0	0.6*	1.6	0.6
Other (e.g., comparative education, philosophy, work well with people, etc.)	a	a	a	a	a	a	a	a	0.8	1.3	2.1	0.5	0.5	2.0	0.8	1.2

a: Competencies in this area of competence could not readily be classified in the categories of research, research-facilitative, and nonresearch; therefore, they are not included in this analysis.

for the latter are ratios and must be interpreted in light of the absolute and/or adjusted number of vacancies and applicants from which they are derived.

It can be noted in Table 3.28 that the pronounced decreases clearly outnumber the pronounced increases; additionally, the decrease ratios are larger than are the increase ratios. Examination of the areas in which pronounced decreases occur reveals that most of the categories concern what might be called the research-development-evaluation complex rather directly. The decreases often cut across the three categories within the area of competence; that is, the decrease is general across directly research related, research facilitative, and nonresearch related activities.

Dramatic shifts downward occurred in many areas of competence such as educational research, research design, survey research, evaluation of instructional products, instrument construction and development, elementary and advanced statistical techniques, systems analysis, etc.; note that reductions in these areas often occurred in vacancies directly related to, or facilitative of research. Reductions in most of the other categories (computer techniques and programming, learning and experimental psychology, social psychology, clinical psychology, educational sociology/economics, general administration, curriculum development and analysis, teacher education/inservice training, subject matter areas, instructional media/technology, and writing ability/editing) occurred in vacancies <u>not</u> related to research. Conversely, many of the pronounced <u>increases</u> dealt with these same areas of competence but with the directly related to, and facilitative of research categories. Note too (in Table 3.26, the directly related to, and facilitative of research columns) that the

Table 3.28

Pronounced Changes in Number of Vacancies per Applicant from 1968 to 1970: By Area of Competence and Degree of Change

Area of Competence	1968 A#VA	1970 A#VA	Research-Relevance Category
Pronounced Decreases			
Educational Research	2.9	0.2	DR
	1.0	0.2	Total
Research Methodology	1.3	0.4	F
Research Design	1.8	0.5	DR
	1.4	0.3	F
	1.6	0.4	Total
Survey/Institutional Research	37.0	8.3	DR
	1.6	0	F
	40.0	4.1	Total
Evaluation Techniques	1.3	0.4	DR
	2.2	0.7	F
	1.5	0.5	Total
Evaluation of Instructional Products	7.6	0	DR
	10.0	0.7	Total
Testing/ Applied Measurement	1.0	0.3	F

A#VA: Adjusted Number of Vacancies per Applicant.
DR: Directly Related to RDDE.
F: Facilitative of RDDE.
NR: Not Related to RDDE.
Total: All Categories

(Continued)

Table 3.28 (Continued)

Area of Competence	1968 A# VA	1970 A# VA	Research-Relevance Category
Instrument Construction/ Development	11.0	0.9	DR
	2.0	0	F
	1.7	0	NR
	19.0	0.6	Total
Elementary Statistical Techniques	0.5	0.1	DR
	0.4	0.1	F
	16.0	0	NR
	1.0	0.1	Total
Advanced Statistical Techniques	4.2	0	DR
	3.0	0.5	F
	1.7	0	NR
	4.4	0.2	Total
Computer Technology/ Programming	30.0	0.8	NR
Systems Analysis	4.5	0	DR
	1.7	0	NR
	7.6	0.4	Total
Learning/Experimental Psychology	13.0	0.3	NR
Social Psychology	5.1	0.4	NR
	4.5	1.2	Total
Clinical Psychology	15.0	0.6	NR
	5.6	0.6	Total
Educational Sociology/ Economics	7.7	1.0	NR
	5.4	1.5	Total

(Continued)

Table 3.28 (Continued)

Area of Competence	1968 A# VA	1970 A# VA	Research-Relevance Category
General Administration	2.2	0.2	NR
	0.8	0.2	Total
Curriculum Development/ Analysis	0.8	0.2	NR
Teacher Education/ Inservice Training	5.9	0.7	NR
Subject Matter Areas	8.1	1.0	NR
Instrument Media/ Technology	5.9	1.0	NR
Writing Ability/Editing	3.2	0	NR
Pronounced Increases			
Research Methodology	0.3	2.0	DR
Educational Development	0.2	0.7	DR
	0.1	0.7	F
	0.2	0.7	Total
Evaluation of Instructional Products	0	1.7	NR
Computer Technology/ Programming	0.3	1.1	F
Educational/School Psychology	0.1	1.0	DR
	<0.1	0.6	F
Developmental Psychology	0.2	0.8	DR
Social Psychology	1.2	4.4	DR

(Continued)

Table 3.28 (Continued)

Area of Competence	1968 A# VA	1970 A# VA	Research-Relevance Catetory
Educational Sociology/ Economics	0.8	2.4	DR
	0.3	1.7	F
General Administration	0.1	0.3	DR
Curriculum Development/ Analysis	<0.1	0.9	DR
Teacher Education/ Inservice Training	<0.1	1.0	DR
	<0.1	1.4	F
Special Education	0.2	1.5	DR
	0.5	1.5	Total
Instructional Media/ Technology	0.2	0.7	DR
	0.2	1.8	F
Writing Ability/Editing	0.2	8.3	DR

pronounced increases often involve areas of competence where the absolute numbers of vacancies and applicants are relatively small. Thus, the large reduction of vacancies in nonresearch-related positions noted earlier in this paper is concentrated in many of the areas of competence in which, at the same time, there has been a small but noticeable increase in the number of vacancies in research and research facilitative categories.

Comparison of the Results of the 1970 Telephone Interview of Employers with Analyses of the 1968-70 AERA Employment Services Data.

It is of interest to note correspondences between the two analyses above of the 1968-1970 AERA employment services data and the results from the 1970 telephone interview of employers. Neither of the investigations (the AERA employment service study and the telephone survey of employers) was designed to verify data from the other, since different populations were sampled, different questions were asked, etc. Thus there is no reason to expect high correspondence between the sets of information generated. At the same time, extensive disagreement would not be expected.

The 58 employers who were interviewed by telephone identified skills that they considered important in their organization and, of the important skills, denoted those that they felt were in short supply or "hard to come by." In some cases, the skills judged in short supply by the employers bore a high degree of correspondence to the areas of competence generated from the placement data. Ten of these skills are listed below:

1) Understanding and using experimental design and other approaches to inquiry (research).

2) Developing measurement instruments (research).

3) Reporting research findings and implications orally and in writing (research).

4) Conceptualizing systems, their elements, and interrelations among these elements (research-based development).

5) Selecting or devising appropriate techniques for measuring outcomes (research-based development).

6) Composing information for accurate and pervasive dissemination (diffusion).

7) Devising and conducting long-range evaluation of the installed package (diffusion).

8) Measuring current actual outcomes of the system (context evaluation).

9) Applying appropriate designs to evaluation studies (outcome evaluation).

10) Selecting (or developing) and using techniques of measurement to yield information relevant to standards (outcome evaluation).

For the purpose of comparison, it was assumed that these skills shared common characteristics with certain areas of competence as indicated below.

Skill	Area of Competence
1) Understanding and using experimental design.	1c) Research design.
2) Developing measuring instruments.	5c) Instrument construction and development
3) Reporting findings, orally and in writing.	19) Writing/editing
6) Composing information for pervasive dissemination.	
4) Conceptualizing systems and interrelations.	8) Systems analysis.

5) Devising appropriate measurement techniques to measure outcomes.	
8) Measuring current actual outcomes.	5b) Testing/applied measurement.
10) Selecting measurement techniques to gather data relevant to standards.	
7) Designing and conducting long range evaluation.	4a) Evaluation techniques.
9) Applying appropriate designs to evaluation studies.	

Focusing on the relationship between the telephone interviews and the first analysis above (changes in percentages of employer-required competencies and applicant-listed competencies), attention should be redirected to Table 3.24. Research design, instrument construction and development, testing/applied measurement, and evaluation techniques clearly received less emphasis in the 1970 vacancies than in those listed for 1968. For systems analysis, the employment service data was mixed across the research-related, research facilitative, and nonresearch-related categories, with an overall trend of slightly downward. Only in the case of writing/editing do the data presented in Table 3.24 suggest that the AERA employment service vacancies reflect the telephone interviewees' perceptions of an important skill in short supply.

Turning to the second analysis and the areas of competence in Table 3.28, it is seen that each competence area under discussion experienced a pronounced change from 1968 to 1970. However, in every case except one the change was a decrease in vacancies per applicant. The one skill which showed an increase for research-related vacancies (i.e., writing/editing) also showed a <u>decrease</u> for the nonresearch-related category.

Thus, while the two analyses of the AERA employment service data agree very well with one another (as one would expect), there is little agreement between them and the results of the telephone interview survey. On the one hand, the telephone interviews indicate that the 10 skills listed above are important and that they are in short supply. Thus it might be inferred that vacancies exist which require the exercise of these skills. The employment service data, on the other hand, show that the percentage of vacancies requiring these same 10 skills has decreased since 1968 and that the number of vacancies per applicant in these skill areas is also decreasing.

It is not easy to resolve the apparent discrepancy. First, the two sets of data were obtained from different populations, and although some overlap is likely, the AERA employment sample could well be more dominated by university personnel than was the sample for the telephone interviews. Second, the question "Which skills are both important and in short supply?" is fundamentally different from the question "Is your organization at this point in time attempting to hire persons possessing these important, short-supply skills?" That is, even though employers recognized that a skill was important to their operation and was in short supply, they still may not have been in a position to add a new staff member in that area even if one was available. A third possibility is that the telephone-interviewed employers may have been setting much higher standards for "competency" in an area than were the AERA employment service applicants reporting competency in that same area.

Implications and Conclusions

No attempt is made in this final section to review all of the foregoing commentary; rather, attention is focused on several salient points which seem warranted in spite of the great number of uncertainties associated with the data.

1. There is a trend over the past two years toward fewer vacancies being registered at the annual AERA employment service. The reduction is slight in the case of positions related to and facilitative of RDDE (from 322 to 288), while the reduction is pronounced for vacancies not related to RDDE (from 339 to 124).

2. There is a trend over the past two years toward slightly fewer applicants registering at the annual AERA employment service. The reduction in applicants for research-related and research-facilitative positions is considerable (from 655 to 516) while the number of applicants for positions not related to RDDE has increased (from 121 to 210). It is unclear whether this is indicative of a change in the types of personnel being trained, a change in the types of persons using the employment service, a change in the self-report tendencies of applicants, or some combination of these or other factors.

3. Based on the number of vacancies listed in the 1970 AERA employment service, there is a general oversupply of applicants in most categories. The ratio of applicants to vacancies for positions directly related to and facilitative of RDDE has changed slightly in the direction of fewer applicants per vacancy (from 2.03 applicants per vacancy in 1968 to 1.79 applicants per vacancy in 1970). Despite this small improvement, the AERA employment service data seem to contain early indicators of what could develop into a depressed job market situation. For example, in

Figures 3.3 and 3.4, it can be noted that applicants outnumber vacancies in all three categories (directly related to, facilitative of, and not related to RDDE). Additionally, fewer transactions are occurring on the job market; the absolute numbers of both vacancies and applicants are down. In comparing the 1968 and 1970 data, this is particularly true for vacancies (769 to 412) and less pronounced for applicants (811 to 727).

4. It would appear that the current <u>over</u>supply of applicants is especially pronounced in the following areas:

Educational Research
Research Design
Evaluation Techniques
Evaluation of Instructional Products
Testing/Applied Measurement
Instrument Construction/Development
Elementary and Advanced Statistical Techniques
Systems Analysis
Guidance and Counseling
General Administration

The statements above (concerning areas of competence where a pronounced oversupply of applicants in relation to vacancies exists) must be tempered in light of the 1970 telephone interview study in which several of the competence areas listed above were felt by employers to represent skills both important and in short supply.

On the other hand, those areas in which there is an <u>under</u>supply of applicants are not as numerous. Areas of competence in which there is an undersupply, or a relatively good balance between applicants and vacancies are:

Survey and Institutional Research
Social Psychology
Educational Psychology
Vocational Education

Subject Matter Areas
Special Education
Instructional Media/Techniques
Writing Ability/Editing

5. Although there currently exists in the educational literature a good deal of emphasis on accountability, performance contracting, the necessity of both formative and summative evaluation in educational settings, etc., and despite the pronouncements of the 58 employers taking part in the telephone interview, there is nothing in the AERA employment service data to indicate that evaluators are in greater demand in 1970 than they were in 1968. In fact, the data from the employment service suggest that they are in <u>less</u> demand. One possible explanation is that school districts and other organizations, because of current financial restrictions, may have merely labeled some of their longstanding employees as "evaluators" rather than hiring new personnel recently trained in evaluation.

6. Although applicants for positions in development continue to outnumber vacancies (see Table 3.27) there are some bits of information which suggest that development is emerging as a more important and larger occupational area than was previously true. In the discussion of Table 3.24, for example, it was noted that there was a modest increase in demand in 1970 for persons having competencies in educational development, curriculum development/analysis, and instructional media/techniques. It would seem that confirmation of this trend is required from other sources before it can be accepted as a definite indication of a growing demand for developers.

7. Employers interviewed by telephone indicated a need for persons trained in diffusion skills. Yet these same employers ranked diffusion as less important than the other six RDDE functional areas (evaluation was presented in that interview in four subareas rather than one). In

addition, when checking the AERA employment service data for the last three annual meetings, one finds almost no mention of a demand for diffusers or of a supply of applicants in the diffusion area. It is clear that educational literature has been inundated with diffuser titles such as "change agent," "facilitator," etc. Nonetheless, the only support that might be garnered from the employment service data for the notion that diffusion is the coming wave, would be the modest increases in the demand for skills in instructional media/techniques and in writing/editing skills in research-related areas.

8. In the discussion of Table 3.24, several shifts from 1968 to 1970 were noted in the types of competencies required by employers and the types of competencies reportedly possessed by applicants. Although this time period is far too short to be certain, it would appear that the demand (or vacancy) competencies are much more variable than the supply (or applicant) competencies. This is as might be expected, since the competencies required for a position can change almost overnight as a result of changes in funding, whereas manipulation of applicant competencies is not so easy to accomplish since it involves changing either direction or emphasis in existing training programs.

9. This final point should receive emphasis above all the others. The need for additional data on supply and demand--specifically data from sources other than the AERA employment service--is clear. The vagaries attendant on a placement service that lacks a permanent site, a permanent clientele, and a permanent staff are clearly pronounced, and data from such a source are difficult to interpret. Additionally, the AERA placement service is clearly dominated by applicants who are university-oriented in terms of the occupation they seek; universities also represent

the largest single employer group operating through the AERA placement service. The lack of correspondence between the results of the telephone interview survey and the results of the employment service analyses may reflect in part the fact that universities were proportionally a smaller part of the telephone interview sample than they were of the employment service sample. Other indications from the data also suggest the need for comprehensive collection of information from many sources in order to establish reliable indications of supply and demand in educational RDDE.

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CHAPTER 4

AN ANALYSIS OF CHARACTERISTICS OF 1969-70 TRAINEES IN TITLE IV GRADUATE RESEARCH TRAINING PROGRAMS AND A COMPARISON WITH SIEBER'S STUDY OF 1966-67 TRAINEES

AN ANALYSIS OF CHARACTERISTICS OF 1969-70 TRAINEES IN TITLE IV GRADUATE RESEARCH TRAINING PROGRAMS AND A COMPARISON WITH SIEBER'S STUDY OF 1966-67 TRAINEES

Since the advent of the Elementary and Secondary Education Act (ESEA), the Graduate Research Training Program funded under Title IV of that Act has been the major vehicle for funding the training of educational researchers. Recently, the program has been under attack from many quarters. The U.S. Senate and the former U.S. Bureau of the Budget have both taken a highly critical posture toward the program, and other internal reviews within the Office of Education and the Department of Health, Education, and Welfare have been quoted as being critical of the Graduate Research Training Program. In addition, several earlier studies (e.g., Clark & Hopkins, 1969; DiLorenzo, 1967; and Sieber, 1968) have been critical of either the basic structure and conduct of the program, the relevance of role types being prepared in it, or the background and quality of program trainees and directors.

This is not an attempt to answer or comment on the various criticisms of the program. First, it is an effort to furnish objective background information for both adherents and critics of the program. And secondly it is an initial step toward determining the extent to which Title IV programs provide training in the skills and knowledge essential for educational research.

The focus of this chapter will be on one major question: What are current trainees in the program like? The quality of output from any training program is obviously dependent on two factors: the quality of the input (trainees) into the program and the effectiveness of the program in increasing their knowledge and shaping their behavior in desired ways.

The quality of the input is the prior question, since even an effective program will likely be effective in direct proportion to the quality of the raw material entering the program. (While the foregoing statement may not hold for programs designed specifically for the disadvantaged or slow learner, it is felt that no Title IV programs were designed with such an intent.)

In addition to describing current trainees in the program, two ancillary purposes remain. One is to compare current trainees with the 1966-67 trainees (described by Sieber, 1968) to see if there have been changes in trainee characteristics in three years of program operation. A second purpose is to compare trainees in "terminated" programs -- programs discontinued by USOE as of the end of the current fiscal year -- with the trainees in continuing programs. The comparison was conducted to determine the extent to which USOE decisions resulted in an overall increase or decrease in the quality of trainees in the program.

It is anticipated that data presented here will prove useful to several audiences, among them the following: USOE officials, where it might be useful input for major planning decisions; directors of research training programs; and AERA officials, especially members of the Task Force and others with direct concern or responsibility for the training of research and research-related personnel.

The remainder of this chapter is divided into five sections: (1) description of procedures used in collecting and analyzing the data, (2) description of some characteristics of the Title IV Graduate Research Training Programs, (3) presentation of primary data on trainee quality and potential productivity, (4) presentation of other descriptors of trainees, and (5) concluding observations.

Procedures

There were two major sources of data for this study: (1) "Statement of Appointment of Trainee Under the Educational Research Training Program" forms required by the USOE for each trainee, and (2) a supplemental form developed by the Task Force staff and sent to directors of all Title IV training programs.

In Sieber's (1968) study of 1966-67 Title IV trainees, appointment forms served as the basic source of data. Specifically, Office of Education Form 6003 (2/66) was used. Sieber found these forms inadequate and in his study recommended changes that would provide more data on subsequent trainees. Most of his suggestions were incorporated into a revised Form 6003 (8-69), a copy of which is shown in Appendix K.[1] In the present study, the new forms were available for almost 90 percent of the 1969-70 trainees; the remaining trainees had filled out the older, obsolete forms. Most data were comparable on the two forms, but where the new form provided data which did not appear on the old form, the data was coded as missing for the 10 percent who had used the old form.

A copy of the supplemental form developed by Task Force staff is also shown in Appendix K. It was sent to program directors to obtain information on the academic ability of trainees

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[1]These forms provided such information as the following: biographical data, including birthdate, birthplace, marital status and number of dependents; educational background, including institutions attended in the past and degrees received; employment background over the past five years, including positions held and/or duties, name of the employer and dates of employment; current or expected professional affiliation of the trainee following completion of the program; type of degree sought under the training program, when the trainee expects to receive that degree, and the discipline and subdiscipline of that degree; amount and type of financial support received by the trainee; and a record of all major publications produced by the trainee.

(e.g., GRE or MAT scores and cumulative GPA) and the number of nonstipend trainees in Title IV programs (trainees affiliated with Title IV programs but supported by other funds, such as NSF or NDEA fellowships).

Collection of Data

In April, 1970 appointment forms for the 1969-70 trainees were obtained through cooperation of the staff of the USOE Research Training Branch. As the forms were coded, duplications and omissions were noted. On June 15 packets were sent to all program directors to refine the data then in hand. Directors received a cover letter explaining the nature and purpose of the study as well as the supplemental forms. Program directors were asked to do three things: (a) provide information on the academic ability of each trainee, (b) make corrections in the list of trainees in their Title IV graduate training program so that the Task Force would have complete and accurate information for each program, and (c) provide copies of Form 6003 for any trainees for whom forms were not available from the USOE.

Program directors who had not responded by July 6 were contacted by telephone and encouraged to provide the requested information. A second telephone follow-up was conducted during the week of July 27. As a result, responses were received from all but one of the 89 program directors; for that program, all information except data on trainee academic ability was available from the USOE forms.

Analysis of Data

Although there were 89 Title IV programs, only 88 were included in the data analysis since the sole trainee in one program at the University of Georgia had dropped out of the program early in the academic year and had not been replaced by another. In all, 800 appointment forms were obtained; these were then winnowed to eliminate the redundancy which occurred when a student left the training program and his traineeship was immediately taken over by a new trainee. Since the focus of concern in this study was the potential contribution to be made to American education and to educational research by the graduates of the Title IV Research Training Program, the appointment form of any trainee who left the program (and therefore was less likely to make such a contribution) was removed and his replacement was used in all analyses. This left 797 appointment forms for the 819 graduate traineeships awarded by the Research Training Branch. As there are some traineeships each year which go unfilled, the 797 trainees included in the present analyses very nearly represent the complete population of Title IV-supported trainees during academic year 1969-70 (without the overrepresentation which would result from including the trainees who had been replaced during the course of the academic year).

Wherever possible, data were coded to parallel the coding conducted by Sieber in his earlier study of Title IV trainees.[2] Data were keypunched and verified in preparation for computer analysis.

Since data were obtained on the total population of trainees, only descriptive statistics were used in the analyses. These analyses, conducted so as to be as comparable as possible to analyses reported by

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[2]A code book showing in detail the coding of data analyzed herein appears as Appendix L. While this coding parallels Sieber's, two types of deviations occur: (a) some data coded for the present study were not available for Sieber's study, and (b) changes were made in some cases where it was felt they represented improvements over Sieber's codes.

Sieber, comprised frequencies, percentages, means and standard deviations. The analyses went beyond the pattern established by Sieber in that master's degree and doctoral programs were analyzed separately. In addition, terminated and continuing programs (described later) were analyzed separately and are compared in later sections.[3]

Computer programs used in the analyses include the University of Colorado LER Tally-X, BMD 01D, BMD 02S, and programs specially written for these analyses.

Comparisons Used in the Analyses

Two types of comparisons will be drawn in the sections which follow. First, where the data are comparable, similarities and differences in the characteristics of the (Sieber) 1966-67 trainees and the (Task Force) 1969-70 trainees will be examined. Data from other relevant studies will also be introduced and examined where they are comparable.

A second set of comparisons will be made within the 1969-70 population itself. These internal comparisons became desirable when the Research Training Branch, in March, 1970, made the first change in the original lineup of 89 graduate training programs by notifying 29 directors that support for their training programs would be discontinued at the close of the initial five-year support period and nine other directors that a similar decision might be made about their programs after one additional year of support. One comparison, then, is between the characteristics of trainees in the 51 continued programs and the characteristics of trainees in the 38 discontinued and probationary programs. The focus of this first internal comparison is upon the extent to which the decisions made by the USOE will

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[3]All comparisons reported in this paper are judged on the practical significance of the differences observed between programs.

likely result in better programs and trainees as indicated by generally accepted indicators of quality (e.g., level of talent).

A second comparison within the 1969-70 population was prompted by the exigencies which resulted when the Fiscal Year 1971 appropriation to the Research Training Branch was reduced from $6.25 million to $2.0 million. As a consequence of this reduction, and the extremely terse justification offered by the Senate for its action (". . . the present programs are unimpressive"), consideration was given to eliminating all or a major portion of the 51 remaining graduate training programs. In order to examine the effects of such an action, the writers selected (on the basis of their reputational quality) 37 programs which most informed observers would agree were illustrative of the better training being offered within the overall Research Training Program. A separate run was made of the characteristics of the trainees in these "better" programs in order to allow comparisons between them and trainees in (a) the 89 original programs, (b) the 51 programs which were scheduled -- prior to the appropriations cut -- to be continued, and (c) the 38 programs which were either discontinued or placed on probationary status. The reader should recognize that the characteristics of the trainees in the "better" programs are represented in the characteristics presented for the 89 original and 51 continuing programs, so there is overlap in the comparisons reported herein. The focus of this examination is upon (1) the extent to which a further reduction in the number of training programs would result in a commensurate increase in quality, and (2) the dimensions of the talent loss which would occur if all of the current graduate training programs were discontinued before the current trainees had a chance to complete their preparation.

The Title IV Research Training Programs[4]

Before commencing a description of the characteristics of trainees in the 89 Title IV training programs, the reader may find it helpful to have some detail about the programs themselves. Since few changes were made with respect to the sites of participating programs between the time Sieber examined them in 1966-67 and the present, much of what follows is excerpted from his 1968 report.[5]

Institutional Settings

Sieber (1968, p. 14) found the institutional settings of the 89 graduate training programs to be chiefly settings of professional education:

	N	%
University departments of education	70	78
Local or state school systems	10	11
Liberal arts and sciences departments	5	6
Nonuniversity and nonschool settings	4	5
Total	89	100

Forty percent of the graduate programs entailed interdisciplinary training.

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[4]A more detailed description of the Title IV programs, along with a critical analysis of some of their features, is presented in Technical Paper No. 16 in the AERA series. That paper also traces the evolution of Title IV as an integral part of the Elementary and Secondary Education Act of 1965.

[5]A listing of the 89 Title IV training programs for 1969-70 may be found in Appendix L, pp. 2-4.

Regional Distribution.

Sieber reported the regional distribution of graduate trainees within programs and compared it to (a) the distribution of practicing educational researchers, as reported by Bargar, et al. (1965), and (b) the distribution of public school pupils at that time. One of his major findings was that the distribution of trainees in all Title IV programs taken together more closely conformed to the distribution of public school enrollment than to that of educational researchers; among graduate trainees, however, the distribution was more like that of researchers than public school students, as shown in the following table (Sieber, 1968, p. 12).

Table 4.1

Regional Distribution of Graduate Trainees, Researchers-at-Large and Public School Enrollment (Fall, 1966)

Region	Graduate Trainees	Researchers-at-Large	Public School Enrollment
New England	11%	6%	5%
Middle Atlantic	24	23	16
East North Central	21	23	21
West North Central	7	7	9
South Atlantic	13	14	14
East South Central	5	2	7
West South Central	6	4	10
Mountain	5	5	5
Pacific	8	14	13
	100%	98%	100%
N =	(774)	(3,910)	(41,700,000)

Research Quality of the Institutions

Various lists have been derived of institutions in which the educational research conducted and/or research training received is considered to be of unusually high quality. These lists are based on amount of research funds received, the quality of research produced (as judged by knowledgeable peers), the research productivity of students trained in their programs, and on various combinations of these and other measures. On the basis of the lists he used, Sieber concluded that the training programs were located in universities that promised the best contribution to research training.

Specifically, Sieber (196_, p. 15) noted that of the 20 "best" schools in Keniston's (1959) scale of university quality (see Appendix L, p. 5), 15 held Title IV research training grants. This analysis was carried a step further in the present study, to the number of trainees being supported in programs located at Keniston's "best" universities. The results of that analysis are depicted in Table 4.2.

Sieber and Lazarsfeld (1966) developed a list of 22 schools of education which were named in 1964-65 by deans and research coordinators in education as producing the most competent and worthwhile research (Appendix L, p. 6). Seventeen (77%) of the 22 schools of education hold a Title IV research training grant. The proportions of 1969-70 trainees in programs located in the schools of education identified by Sieber and Lazarsfeld appear in Table 4.3.

Worthen (1968) ranked 40 universities that had been identified in other studies as institutions high on some educational research index (Appendix L, p. 6). Of these, 24 (60%) have Title IV training programs. In Table 4.4 is presented the proportion of trainees pursuing their studies (1) at institutions listed among the first ten cited by Worthen, (2) in the next thirty institutions, and (3) at institutions not included on the Worthen list.

Table 4.2

Trainees in Programs Located in Institutions Ranked "Best" Upon Keniston's Scale of University Quality[a]

Category	Doctoral Programs Only							
	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	N	%	N	%	N	%	N	%
"Best" on Keniston's scale	294	45	267	60	27	13	201	56
Not "Best" on Keniston's scale	357	55	179	40	178	87	157	44
Subtotal	651	100	446	100	205	100	358	100
	Subdoctoral Programs Only							
"Best" on Keniston's scale	3	2	0	0	3	2	0	0
Not "Best" on Keniston's scale	131	90	14	100	117	89	9	100
Not Applicable	12[b]	8	0	0	12[b]	9	0	0
Subtotal	146	100	14	100	132	100	9	100
TOTAL	797		460		337		367	

(see footnotes on next page)

Table 4.2 footnotes

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[a]Perhaps an illustration of how the data in the tables can be "read" would be helpful. The reader will recall the Task Force's interest in the comparison between the 51 continuing programs and the 38 probationary and discontinued programs was whether the indices of quality were improved or heightened as a consequence of the Research Training Branch's action. The data in Table 4.2 may therefore be examined thusly: A higher proportion of the continuing doctoral programs (60%) are included on Keniston's scale of university quality than were included in the original group of doctoral programs (45%), so the effect of the USOE action on this particular index was to raise the overall quality of the (diminished in size) training program. The small number of trainees in doctoral programs at "best" universities which were placed on probation or discontinued (27 trainees) suggests that on this particular index the USOE action did not result in a significant proportion of high quality trainees being "carried away with the bath water."

The Task Force's interest in examining the relationship between the 51 continuing programs and 37 "better" programs was twofold: to see whether further reductions would result in a commensurate increase in quality -- at the expense of numbers of trainees, of course; and, secondly, to assess the loss of talent which would result from summary elimination of all of the current graduate training programs. The data in Table 4.2 indicate that a further reduction in programs would result in a decrease (from 60% to 56%) in the proportion of doctoral trainees being prepared at Keniston's "best" universities. The data in Table 4.2 do not treat directly the talent loss which would result if all training programs were discontinued (later tables will do so) but one may infer that loss of the 60% of trainees enrolled in the "best" universities would constitute a talent loss of some magnitude.

[b]These trainees are from a program administered by a group of universities and school districts; therefore the program could not be ranked on institutional quality.

Table 4.3

Trainees in Programs Located in Schools of Education
Identified by Sieber and Lazarsfeld for the Quality of Their Research

Category	Doctoral Programs Only							
	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	N	%	N	%	N	%	N	%
School is on list	316	49	283	63	33	16	235	66
School is not on list	326	50	154	35	172	84	114	32
Not Applicable	9[a]	1	9[a]	2	0	0	9[a]	3
Subtotal	651	100	446	100	205	100	358	101
	Subdoctoral Programs Only							
School is on list	12	8	9	64	3	2	9	100
School is not on list	122	84	5	36	117	89	0	0
Not Applicable	12[b]	8	0	0	12[b]	9	0	0
Subtotal	146	100	14	100	132	100	9	100
TOTAL	797		460		337		367	

[a]These trainees are in a program which is not located in a school of education.

[b]These trainees are from a program administered by a group of universities and school districts; therefore the program could not be ranked on institutional quality.

Table 4.4

Trainees in Programs Located in Institutions
Cited by Worthen for the Quality of Their Educational Research

Category	Doctoral Programs Only							
	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	N	%	N	%	N	%	N	%
Among top ten	230	35	208	47	22	11	165	46
Among next thirty	181	28	152	34	29	14	129	36
Not on list	240	37	86	19	154	75	64	18
Subtotal	651	100	446	100	205	100	358	100
	Subdoctoral Programs Only							
Among top ten	3	2	0	0	3	2	0	0
Among next thirty	9	6	9	64	0	0	9	100
Not on list	122	84	5	36	117	89	0	0
Not Applicable	12[a]	8	--	--	12[a]	9		
Subtotal	146	100	14	100	132	100	9	100
TOTAL	797		460		337		367	

[a]These trainees are from a program administered by a group of universities and school districts; therefore the program could not be ranked on institutional quality.

Recruitment Practices and Admissions Standards

Each year -- usually at the time when funds are requested for the following year's operation -- the director of each Title IV training program submits a progress report to the U. S. Office of Education. The 89 progress reports submitted with 1969-70 proposals serve as the source for information presented here and in the following sections.

Eighteen progress reports either gave no information regarding entrance requirements or gave information which was too general to classify. Of the 71 programs which provided usable information, 53 either require or recommend that Graduate Record Examination scores (verbal and quantitative) be presented by applicants. Most of these do not specify minimum scores for admission; for those which do, the minimum acceptable total GRE score ranges from 900 to 1250 with a mode of 1000 (10 of 19 programs). Examination of the progress reports indicates that in most cases the GRE requirement for admission to the Graduate Research Training program is the same as that for admission to the institution of which it is a part (or to the school or college of education).

The Miller Analogies Test is recommended or required for admission to 30 of the training programs. Other standardized tests used by one or more of the programs examined include the National Teachers Exam, the Doppelt Mathematical Reasoning Test, the GRE Advanced sections (either in education or in another area of the applicant's choosing), the STEP Writing Test, the Cooperative English Tests, and the Watson-Glaser Critical Thinking Appraisal.

Of those programs which provided usable information about their entrance requirements, nearly all specified that a student's undergraduate and graduate scholastic record is important in the selection process. Most require a 3.0 undergraduate grade point average (on a 4.0 scale) and a 3.5 graduate GPA. It should be emphasized, however, that only 19 of the 89 programs gave specific information on the question of GPA; therefore, it is not known whether the 3.0 and 3.5 standards are maintained by most programs.

Eight of the programs studied specifically mention that teaching experience is required for admission or that preference is given to applicants who have such experience. It cannot be determined from the progress reports whether or not the remaining 81 programs require teaching experience for admission. Nonetheless it is interesting to note that of the 71 reports which furnished information of some kind regarding admissions requirements, only eight indicated the requirement of teaching experience. If this is an accurate portrayal, it seems likely that the majority of programs will produce persons who continue in research careers. Sieber and Lazarsfeld (1966) found the requirement of teaching experience dysfunctional in preparing persons for careers in educational research.

About half the Title IV programs engage in active recruitment for prospective trainees. At the very least, this involves the preparation and distribution of flyers or pamphlets describing the particular Graduate Research Training program. Several program administrators go beyond this, using contacts in other areas to publicize their programs.

Type of Program

In Chapter 3 above, areas of competence in research and research-related activities were listed as derived from 1968 AERA employment service forms. This list provided the categories of program type and course type which are used as headings in Tables 4.5 through 4.7. Not all of the areas of competence were used in deriving the categories for these tables, however; some were combined and several were omitted. One additional category -- mathematical statistics -- was created to describe two programs which emphasize statistics but not in conjunction with research methodology and design. The resulting categories describe fairly broad areas which encompass all of the programs discussed here.

Each progress report was examined for any information which would aid in identifying the type of program. In some cases this could be derived from the stated objectives of the program; in others, it was necessary to consider course requirements, practicum experiences and miscellaneous statements in order to determine the program type.

In Table 4.5, the number of doctoral and subdoctoral programs in each "type" category is indicated. Since some of the doctoral programs have several separate and distinct areas of emphasis, the doctoral total is greater than the actual number of doctoral programs.

It was difficult to be definite about the type of several of the subdoctoral programs since they seem to be most accurately described as surveys of research or research-related areas. Thus the classification of subdoctoral programs is more ambiguous than is that of the doctoral programs.

Table 4.5

Classification of Title IV Graduate Research Training Programs by Type -- Doctoral and Subdoctoral Levels

Type of Program	Number of Programs Doctoral	Subdoctoral
Research methods, design, statistics	17	4
Educational development	4	0
Educational diffusion	1	1
Evaluation and/or measurement	9	4
Computer methods, utilization	3	0
Psychology	15	0
Administration	8	0
Curriculum (including specialized subject areas)	22	0
Guidance and counseling	2	0
Vocational education	2	0
Special education	2	0
History and philosophy of education	6	0
Other social and behavioral sciences	15	0
Mathematical statistics	2	0

It can be seen that most programs on the doctoral level emphasize (1) curriculum, (2) research methodology, design and statistics, (3) psychology and (4) other social and behavioral sciences. It should be pointed out that the majority of programs listed under the curriculum heading were, in fact, programs in specialized subject areas (e.g., math education or reading). All except one of the subdoctoral programs fell into two categories: (1) research methodology, design and statistics, or (2) evaluation and/or measurement. As it was pointed out above, however, some of these might more accurately be described as surveys of research.

Course Requirements

The headings used in Table 4.5 to identify the type of program were also used to classify required and elective courses. Usable information listing or describing courses was found in 67 progress reports, but some of those 67 did not provide complete information (e.g., they described only new course requirements established since the previous report). Still, several generalizations may be made regarding the classroom preparation of Title IV trainees.

Almost every program requires coursework in research methods, design and statistics, and most appear to require at least three or four courses in this area. Since these are research training programs, this requirement is not surprising. Nevertheless, it seems to be one requirement common to the programs.

Table 4.6 shows the count of doctoral and subdoctoral programs (of those furnishing specific information) which have required courses in each area. This table contains no data on how many courses are required in each area; it identifies only the types of courses required.[6]

The following should be noted in interpreting the information in Table 4.6. Courses concerned with testing (test construction, explanation of standardized tests, etc.) were usually placed in the

[6] Technical Paper No. 16, which deals in more detail with Title IV programs, contains information on the relative emphasis of various classroom experiences.

"evaluation and/or measurement" category. Most of the 35 programs noted in the table in this category require courses in testing as opposed to evaluation per se. Courses classified as "other social and behavioral sciences" were for the most part in sociology. Those in "other disciplines" were diverse -- from art to mathematics.

Table 4.6

Types of Courses Required in Title IV Graduate Research Training Programs -- Doctoral and Subdoctoral Levels

Types of Courses	Number of Programs Doctoral	Number of Programs Subdoctoral
Research methods, design, statistics	58	9
Educational development	1	0
Educational diffusion	2	0
Evaluation and/or measurement	27	8
Computer methods, utilization	27	5
Psychology	27	5
Administration	11	1
Curriculum (including specialized subject areas)	20	1
Teacher education	6	0
Vocational education	1	0
Special education	1	0
History and philosophy of education	20	1
Other social and behavioral sciences	19	2
Other disciplines	7	0

Fewer progress reports gave information on elective courses. For the 23 that did, Table 4.7 shows how their courses are classified.

Table 4.7

Types of Elective Courses in Title IV Graduate Research Training Programs -- Doctoral and Subdoctoral Levels

Types of Courses	Number of Programs Doctoral	Subdoctoral
Research methods, design, statistics	10	1
Evaluation and/or measurement	12	0
Computer methods, utilization	10	1
Psychology	14	0
Administration	7	0
Curriculum (including specialized subject areas)	9	0
Guidance and counseling	4	0
Teacher education	2	0
Special education	4	0
History and philosophy of education	7	0
Other social and behavioral sciences	9	0
Other disciplines	4	0

Practicum Experiences

This was the most difficult section of the progress reports to classify because there was such diversity in the way program directors chose to describe this aspect of the programs. Eighty progress reports provided enough information for at least a partial description of their practicum arrangements.

Two kinds of information were extracted from the progress reports. First, it was desired to know in what setting the practicum experience occurred for each program. This information is given in Table 4.8. The numbers in this table reflect the fact that (1) many programs place some trainees in one kind of practicum setting and some in another, (2) some trainees have more than one practicum and (3) some trainees have a practicum which places them in two settings jointly (e.g., a university education department and a school district). It can readily be seen that the vast majority of practicum experiences take place in university settings and in schools and school districts.

Table 4.8

Institutional Setting of Title IV Program Practicum Experience -- Doctoral and Subdoctoral Levels

Institutional Setting[a]	Number of Programs Doctoral	Subdoctoral
University - Education Department	44	5
University - Other Departments	37	4
R & D Centers	7	1
Regional Educational Laboratories	11	0
Schools and School Districts	42	8
State Education Departments	10	2
Independent Research Agencies	19	2
Federal Agencies	3	2
Industry	10	2
Professional Education Associations	4	0

[a]These institutional settings were first listed in Technical Paper No. 2 in the AERA series.

The second kind of information concerned the type of assignment held by the trainee during his practicum. Worthen and Roaden (1970) found that for research assistants in educational research generally, assignment to an individual faculty member -- but not in relation to a research bureau or on one specific project -- is positively correlated with later research productivity. The Title IV training program reports were therefore examined for information on this aspect of the practicum.

Usable data were obtained from 53 progress reports. Within each program, all practicum arrangements mentioned in the report were considered together and a determination made as to the usual pattern of experience. This pattern of practicum assignments for the 53 programs is shown in Table 4.9. It appears that at least three-quarters of the practicum assignments are either to a single faculty member working on one project or to a research lab or bureau in which many senior researchers and many projects are involved.

Table 4.9

Type of Assignment in Title IV Program Practicum Arrangements -- Doctoral and Subdoctoral Levels

Type of Assignment	Number of Programs	
	Doctoral	Subdoctoral
1 researcher/ 1 project	17	3
1 researcher/ more than 1 project	6	2
more than 1 researcher/ 1 project	5	0
more than 1 researcher/ more than 1 project	18	2

It was also indicated in twenty-three progress reports that some sort of seminar for trainees was held; in some cases these were scheduled weekly, while in others they were held only sporadically. Topics of the seminars ranged from discussions of methodology in specific experiments, to reports of research being conducted by individual faculty members or trainees or problems of school administrators in specific areas. Most program administrators (and, by implication, the trainees) view these seminars as valuable, both for the learning experience they offer and for the opportunity they present for trainee and faculty interaction.

The "Ripple Effect" of Title IV Training Programs

Data on nonstipend Title IV trainees (trainees associated with the program but not supported by Title IV funds) were collected in the present study to determine how many such trainees exist and what level of talent they exhibit.

There were found to be 113 nonstipend trainees in the 89 programs. On indices of academic talent, they fell somewhat below regular trainees on Miller Analogies Test and Graduate Record Examination scores, as follows:

	MAT Scores		GRE Total Scores	
	Mean	N	Mean	N
Nonstipend trainees	58.92	26	1,169	59
Regular trainees	64.78	309	1,205	473

On graduate grade-point average, the nonstipend group mean of 3.67 on a 4-point scale (N=88) was slightly higher than the regular group mean of 3.62 (N=518). It should be noted, however, that the very great difference in the sizes of the two groups makes direct comparisons between them tenuous at best.

It is doubtful if a large proportion of the nonstipend group would be receiving systematic training in educational research in the absence of the Title IV training programs. If this assumption is correct, Title IV might be viewed as having the "ripple effect" of providing training for considerably more trainees than the approximately 800 supported by Title IV funds.

Primary Indicators of Trainees' Potential Productivity and Contribution

Certain of the characteristics of trainees are considered to be stronger and/or more direct indicators of potential productivity and contribution than others. Fleury and Cappelluzzo (1969) found that the literature on research training indicated there were five factors which should be considered when developing recruitment procedures and entrance examinations for prospective educational researchers: (1) age at the doctorate, (2) level of student talent, (3) previous teaching experience, (4) academic background, and (5) undergraduate and graduate grade point averages.[7] Data on these five factors will be presented in this section for the benefit of that large proportion of readers whose interest will be satisfied without proceeding further. Data on additional, related variables will be presented in the section which follows for those who are interested in probing further into the subject.

In brief, the reader will find the following selected comparative data reported in this section:

	1966-67 Trainees	1969-70 Trainees
1. Mean age at graduation from doctoral training programs	31.2 years	31.1 years

[7] Fleury and Cappelluzzo found these entrance requirement variables were not effective predictors of the relative success of the trainees in completing their programs; in fact, they predicted success only about fifteen percent of the time. Nonetheless, logic supports the conclusions of investigators in the realm of research training that these variables must be considered in recruiting and training productive professionals.

2. Level of talent of 1969-70 doctoral trainees as compared to first-year graduate students outside education.

Rank	Discipline, Profession, or Set of Trainees	Mean MAT Score
1	Applicants for Psychoanalytic Training	68.4
2	Trainees in continuing doctoral programs	66.8
3	Trainees in "better" doctoral programs	66.7
4	Trainees in all doctoral programs	65.9
5	Psychology	65.3
6	Medicine	64.5
- - -	- - - - - - - - - - - -	- - -
11	Business Administration	54.1
12	Engineering	53.5
13	Social Work	49.6

	1966-67 Trainees	1969-70 Trainees
3. Lapse of less than five years before entry to graduate training	73%	86

4. Undergraduate major field

	Buswell's 1964 Education Doctorates	1969-70 Doctoral Trainees, All Programs
Education	30%	26
Social Sciences	23	39
Natural Sciences	15	23
Humanities	18	9
Other	13	3
TOTAL	99%	100%

5. Graduate grade-point averages, 1969 doctoral trainees

All Programs	3.63
Continuing Programs	3.65

Age

Age at time of entry into training. A number of investigators have held that educational researchers who complete their doctoral programs by age 32 are more productive than older doctorates (e.g., Buswell, et al., 1966; Sieber & Lazarsfeld, 1966; Millikan, 1966). Entry age data gathered on the 1966-67 trainees by Sieber and the 1969-70 trainees in the present study are presented in Table 4.10.

Table 4.10

Age at Time of Entry into Title IV Graduate Training Program, 1966-67 and 1969-70 Trainees

Age Category	Doctoral Trainees Only				Master's and Others Only			
	1966-67		1969-70		1966-67		1969-70	
	N	%	N	%	N	%	N	%
19 - 24	178	31	167	26	53	39	45	32
25 - 29	173	30	250	39	27	20	41	29
30 - 34	117	20	121	19	18	13	23	16
35 - 39	64	11	61	10	18	13	8	6
40 - 44	37	6	26	4	14	10	12	9
45 - 49	12[a]	2[a]	7	1	6[a]	5[a]	6	4
50 - 54	--	--	3	1	--	--	5	4
Total N	581	100	635	100	136	100	140	100

[a]Sieber's last category was 45+, so these results compare to the last two age categories for the 1969-70 trainees.

Sieber (1968, p. 78) noted that a distinct contribution of the Title IV Research Training Program was to lower the age at receipt of degree by about seven years. Further progress has been made since 1966-67 in recruiting younger trainees. In 1966-67, 61% of the trainees were 29 years of age or younger upon entry to the doctoral program; in 1969-70 there were 65% of the trainees of this age at time of entry.

The mean age upon entry to the graduate training programs was:

	1966-67 Trainees	1969-70 Trainees
Doctoral programs	29.0 years	28.5 years
Subdoctoral programs only	29.2	30.0
All graduate programs combined	29.1	28.8

Age at graduation. Data were also gathered on the 1969-70 trainees' age at the expected date of graduation, as shown in Table 4.11.

Table 4.11

Number and Percent of 1969-70 Trainees in Various Age Categories at Expected Date of Graduation

Age Category	Doctoral Trainees Only		Subdoctoral Trainees Only	
	N	%	N	%
19 - 24 years	13	2	19	31
25 - 29	285	46	34	36
30 - 34	182	29	10	11
35 - 39	96	15	4	4
40 - 44	27	4	7	8
45 - 49	16	3	3	3
50 - 54	2	>1	6	6
55 - 59	1	>1	1	1
TOTAL	662	99	84	100

The projected mean age at graduation from the graduate training programs was computed for the 1966-67 and 1969-70 populations of trainees:

	Projected Mean Age at Graduation	
	1966-67 Trainees	1969-70 Trainees
Doctoral programs only	31.2 years	31.1 years
Subdoctoral programs only	30.3	30.4
All graduate programs combined	31.4	31.0

Eighty-five percent of the 1969-70 trainees will likely complete their doctoral programs prior to the mean age (36.6 years) of Buswell's 1964 Ph.D. recipients and virtually all will complete their programs prior to the mean age of the 1964 Ed.D. recipients (39.0 years).

Time lapse between entry and expected date of degree. The mean lapse of time between entry to the graduate program and expected receipt of degree computed by Sieber was quite similar to that found for the 1969-70 trainees.

	Lapse of Time Between Entry and Expected Time of Degree	
	1966-67 Trainees	1969-70 Trainees
Doctoral programs only	2.4 years	2.4 years
Subdoctoral programs only	1.1	1.2
All graduate progrmas combined	2.2	2.3

Level of Student Talent

In their study of the ways in which American educational research is organized, Sieber and Lazarsfeld (1966) concluded that the level of student talent is probably the most important factor which should be considered when recruiting prospective professionals. Fleury and Cappelluzzo (1969) found in their questionnaire study that training directors generally accept scores of standardized tests as indicators of the level of student talent The returns to their questionnaire indicated that, in 1966-67, 49.4 of the training directors used the Miller Analogies Test (MAT) as a selection tool and 76.5% used the Graduate Record Examination (GRE).

In Table 4.12 are presented the data on the MAT and GRE scores of 1969-70 trainees.

Some comparative data are presented in the next few pages to help the reader interpret the mean MAT and GRE scores presented in Table 4.12. The reader is cautioned, however, that the comparisons are between scores of a select group of scholarship-level education students (Title IV trainees) and scores achieved by the full range of students in other professions and the disciplines. Under these circumstances, the education trainees should be expected to compare favorably, and they do. What is of interest is the extent to which they score higher than students in the other professions and the disciplines. Of equal interest are comparisons between the level of talent among trainees in probationary and discontinued programs and the level of talent among trainees in continuing programs.

Mean MAT scores for the various groupings of Title IV graduate training programs are compared in Table 4.13 with the percentage of students in other professions and the disciplines who scored lower on the same test.

Only 13 percent of education graduate students (excluding educational administration students) in doctorate degree-granting institutions scored as well as or better than the average trainee in a continuing or "better" doctoral program. Only 14 percent scored as well as or better than the average trainee in all of the doctoral programs combined. Sixteen percent scored as well as or better than the average trainee in the probationary and discontinued doctoral programs.

Table 4.12

Mean Scores on the Miller Analogies Test and Graduate Record Examination by 1969-70 Trainees

Category	All Programs Mean	All Programs s	Continuing Programs Mean	Continuing Programs s	Probationary and Phased Out Programs Mean	Probationary and Phased Out Programs s	"Better" Programs Mean	"Better" Programs s
	Doctoral Programs Only							
MAT scores	65.92	14.79	66.84	14.31	64.43	14.72	66.69	15.32
N	(260)		(160)		(100)		(126)	
GRE Verbal	610.33	99.11	624.43	96.70	573.25	96.14	622.68	96.39
N	(414)		(300)		(114)		(239)	
GRE Quantitative	615.92	102.12	621.53	100.61	601.14	105.00	631.04	96.63
N	(414)		(300)		(114)		(240)	
GRE Total	1225.53	154.49	1246.28	146.89	1171.47	161.22	1254.06	139.73
N	(414)		(300)		(114)		(239)	
	Sub-doctoral Programs Only							
MAT scores	58.78	15.02	60.78	13.86	58.33	15.40	60.78	13.86
N	(49)		(9)		(40)		(9)	
GRE Verbal	536.61	87.68	ND[a]	ND	536.61	87.68	ND	ND
N	(59)		ND	ND	(59)		ND	ND
GRE Quantitative	520.51	86.33	ND	ND	520.51	86.33	ND	ND
N	(59)		ND	ND	(59)		ND	ND
GRE Total	1057.46	147.27	ND	ND	1057.46	147.27	ND	ND
N	(59)		ND	ND	(59)		ND	ND

[a]ND indicates No Data

Table 4.13

Comparison of Mean Scores of 1969-70 Title IV Trainees with Percentiles of Graduate and Professional School Students Scoring Lower on the Miller Analogies Test[a]

Training Programs Included	Trainees' Mean MAT Score	Education: Doctorate-granting Institutions: Except Admin.	Education: Doctorate-granting Institutions: Educ. Admin.	Education: Master's-granting Institutions	Psychology	Rehabilitation Counseling	Social Work	Nursing	Theology	Bus. Admin.	Engineering	Medicine	Applicants for Psycho-Analytic Training
Continuing doctoral programs and "better" doctoral programs	67	87	90	--	50	85	86	92	91	81	81	57	40
All doctoral programs	66	86	89	--	47	83	85	91	90	80	80	55	37
Probationary and discontinued doctoral programs	64	84	87	--	42	80	82	87	87	74	77	50	35
Continuing and "Better" Subdoctoral programs	61	80	84	90	35	75	77	83	84	65	70	40	29
All Subdoctoral programs	59	76	80	88	30	70	72	81	81	60	65	32	25
Probationary and discontinued subdoctoral programs	58	75	77	87	28	69	70	80	80	57	63	30	23

Source: The 1970 edition of the Manual for administering the Miller Analogies Test.

[a] The table should be read thusly: The mean MAT score of 67 for trainees in the continuing and "better" doctoral programs indicates that the average Title IV doctoral trainee scored higher on this test than 87 percent of the education norm group in doctoral-granting institutions (excluding educational administration), 90 percent of the educational administration norm group in doctoral-granting institutions, and so forth across the row.

Looking outside of education, with the exception of students in psychology and medicine, and applicants for psychoanalytic training, the trainees in the continuing and "better" doctoral programs compared almost as favorably with students in other professions and the disciplines as they did with students in education. Their level of talent was also acceptable when compared to that of students in psychology and medicine, and that of applicants for psychoanalytic training (50th, 57th, and 40th percentiles, respectively).

The master's, specialist and other trainees in subdoctoral Title IV training programs also compared acceptably to the rank and file of students outside psychology and medicine, and applicants for psychoanalytic training.

Another, perhaps easier, way of comparing the level of talent is through a simple ranking of the mean scores for the various norm groups. For the MAT, the norm groups rank as shown in Table 4.14.

The mean scores of various groupings of the Title IV trainees on the verbal section of the Graduate Record Examination are compared with the scores achieved by other norm groups in Table 4.15. Of particular interest are the percentile scores for students in "All Fields" and in the social and behavioral sciences, e.g., for trainees in the continuing doctoral programs: All Fields (69th percentile), government (56th percentile), psychology (52nd percentile), and sociology (67th percentile).

Rank ordering of the desciplines, professions, and various sets of training programs by mean GRE-Verbal scores produces the list in Table 4.16.

Table 4.14

Ranking of 1969-70 Title IV Trainees and Norm Groups in other Professions and the Disciplines on the Miller Analogies Test

Rank	Discipline, Profession, or Set of Training Programs	Mean MAT Score	Standard Deviation	N
1	Applicants for psychoanalytic training	68.4	16.5	240
2	Continuing doctoral programs	66.8	14.8	160
3	"Better" doctoral programs	66.7	15.3	126
4	All doctoral programs	65.9	14.8	260
5	Psychology	65.3	14.4	2644
6	Medicine	64.5	12.0	627
7	Probationary and discontinued doctoral programs	64.4	14.7	100
8	Continuing <u>and</u> "better" subdoctoral programs	60.8	13.9	9
9	All subdoctoral programs	58.8	15.0	49
10	Probationary and discontinued subdoctoral programs	58.3	15.4	40
11	Business Administration	54.1	15.2	303
12	Engineering	53.5	14.1	525
13	Social Work	49.6	15.5	287
14	Rehabilitation Counseling	49.6	15.8	409
15	Education in doctorate-granting institutions (except Admin.)	46.9	16.2	7641
16	Nursing	46.4	14.2	212
17	Theology	44.6	15.7	1920
18	Education Administration in doctorate-granting institutions	44.5	15.[illegible]	1247
19	Education in Master's degree-granting institutions	39.2	15.4	3604

Table 4.15

Comparison of Mean Scores of 1969-70 Title IV Trainees with Percentiles of First Year Graduate Students Scoring Lower on the Graduate Record Examination, Verbal[a]

Training Programs Included	Mean GRE-V Score	Percentile of First Year Graduate Students Scoring Lower on the GRE - Verbal															
		Biology	Chemistry	Economics	Engineering	French	Geology	Government	History	Lit. in Eng	Mathematics	Philosophy	Physics	Psychology	Sociology	Spanish	All Fields
Continuing doctoral programs	624	78	64	62	75	43	66	56	59	43	66	31	47	52	67	68	69
"Better" doctoral programs	623	77	63	61	75	42	66	56	59	43	65	30	47	52	66	66	68
All doctoral programs	610	73	59	57	71	37	61	52	54	38	60	26	41	47	61	59	65
Probationary & discontinued doctoral programs	573	62	47	46	58	30	53	41	41	28	50	16	29	34	51	54	56
Subdoctoral programs	537	55	37	34	42	24	39	31	27	12	41	11	20	24	40	50	47

Source: The Performance of First Year Graduate Students on the GRE, Educational Testing Service, July, 1968

[a]The norm population was those students who enrolled as full-time graduate students for the first time in Fall, 1964 in a member institution of the Council of Graduate Schools. Comparisons of these percentiles with more recent norm data (for 1965-68 but simply distributed Men, Women, and Total) indicated that more recent mean scores are one to two points lower.

Table 4.16

Ranking of 1969-70 Title IV Trainee's and Norm Groups in other Professions and the Disciplines on the Graduate Record Examination, Verbal

Rank	Discipline, Profession, or Set of Training Programs	Mean GRE-V Score	Standard Deviation	N
1	Philosophy	652	90	289
2	Literature in English	626	93	237
3	Continuing doctoral programs	624	97	300
4	"Better" doctoral programs	623	96	239
5	Physics	622	103	233
6	All doctoral programs	610	99	414
7	Psychology	609	89	258
8	French	608	105	146
9	History	587	103	259
10	Government	586	117	212
11	Economics	581	104	260
12	Chemistry	566	117	280
13	Probationary and discontinued doctoral programs	559	120	289
14	Geology	556	112	126
15	All Fields	547	124	3812
16	Sociology	546	134	251
17	Spanish	542	96	77
18	Engineering	539	110	175
19	Subdoctoral program	537	88	59
20	Biology	518	128	163

Comparative data on the quantitative section of the Graduate Record Examination are presented in Table 4.17. The Title IV trainees' performance on the quantitative section compares less favorably than it did on the verbal section to students in mathematics, the natural sciences (biology, chemistry, geology, and physics), and the mathematics-oriented content areas (economics and engineering -- by 50 to 57 percentiles in the latter case!). In the humanities and social and behavioral science areas (French, government, history, literature in English, philosophy, psychology, sociology, and Spanish), the trainees' relative quantitative performance was uniformly improved over their verbal performance.

Rank ordering of the mean scores on the GRE-Q results in the list in Table 4.18.

Time Lapse Before Entry into Training Program

Buswell, et al. (1966, p. 8) found the number of years of teaching experience negatively related to research productivity, particularly after more than five years of experience. He recognized that the factor of previous teaching experience was interrelated with other factors, such as the age at time of the decision to go on for the doctorate and the age at the time of graduation. Presumably the factor of socialization into teaching and/or administration career lines (as opposed to a research career line) also becomes a stronger consideration as the years of teaching accumulate. Sieber and Lazarsfeld (1966, p. 273) concluded from their data that a requirement of previous professional experience for entry to research training actually reduced the production of researchers.

Data are reported in Table 4.19 on the amount of time which lapsed between receipt of the most recent degree and entry to a Title IV graduate training program as developed in three studies: Fleury and Cappelluzzo,

Table 4.17

Comparison of Mean Scores of 1969-70 Title IV Trainees with Percentiles of First Year Graduate Students Scoring Lower on the Graduate Record Examination, Quantitative[a]

Training Programs Included	Mean GRE-Q Score	Percentile of First Year Graduate Students Scoring Lower on the Graduate Record Examination, Quantitative															
		Biology	Chemistry	Economics	Engineering	French	Geology	Government	History	Lit. in Eng	Mathematics	Philosophy	Physics	Psychology	Sociology	Spanish	All Fields
"Better" doctoral programs	631	73	31	48	21	86	40	79	86	86	28	58	12	63	78	98	66
Continuing doctoral programs	622	72	28	44	18	85	36	76	83	84	24	55	10	61	75	98	64
All doctoral programs	616	71	27	42	17	84	35	75	82	83	23	54	9	60	74	98	63
Probationary & Discontinued doctoral programs	601	67	27	37	13	84	33	74	80	80	16	48	5	52	72	98	61
Subdoctoral programs	521	38	9	16	4	68	11	56	53	55	7	20	--	28	47	88	40

Source: The Performance of First Year Graduate Students on the GRE, Educational Testing Service, July, 1958.

[a] See note to Table 4.15 for norm information.

Table 4.18

Ranking of 1969-70 Title IV Trainees and Norm Groups in other Professions and the Disciplines on the Graduate Record Examination, Quantitative

Rank	Discipline, Profession, or Set of Training Programs	Mean GRE-Q Score	Standard Deviation	N
1	Physics	730	67	233
2	Engineering	688	83	175
3	Mathematics	681	105	289
4	Chemistry	652	110	280
5	Geology	637	98	126
6	"Better" doctoral programs	631	97	240
7	Economics	624	116	260
8	Continuing doctoral programs	622	101	300
9	All doctoral programs	616	102	414
10	Philosophy	608	117	228
11	Probationary and discontinued doctoral programs	601	105	114
12	Psychology	587	111	258
13	All Fields	553	137	3812
14	Biology	543	123	163
15	Subdoctoral Programs	521	86	59
16	Government	513	129	212
17	Sociology	510	142	251
18	Literature in English	504	109	237
19	History	502	110	259
20	French	486	105	146
21	Spanish	446	77	77

Table 4.19

Comparative Data from Three Studies on the Lapse of Time Between Trainees' Receipt of the Most Recent Degree and Entry into a Title IV Training Program

Years Elapsed	Fleury and Cappelluzzo Respondents		1966-67 Trainees (Sieber)		1969-70 Trainees (Total)		1969-70 Trainees: Doctoral		1969-70 Trainees: Subdoctoral	
	N	%	N	%	N	%	N	%	N	%
1 year	[241]	[47]	276	37	342	54	274	56	68	48
1 - 3 years			179	24	142	23	113	23	29	20
3 - 5	128	25	90	12	54	9	42	9	12	8
Subtotal	369	72	545	73	538	86	429	88	109	76
5 - 7	[108[a]]	[21]	75	10	36	6	25	5	11	8
7 - 9			30	4	24	4	18	4	6	4
9 - 11	21[a]	4	22	3	10	2	6	1	4	3
11 - 20	7[a]	1	67	9	20	3	11	2	9	6
20+	3[a]	1	7	1	3	>1	0	0	3	2
Total	508	99.0	746	100	631	101	489	100	142	99
Mean No. of years =	--	--	--	3.3	--	2.3	--	2.1	--	3.1

[a]Fleury and Cappelluzzo's categories were five but less than ten years elapsed, ten but less than fifteen years, fifteen but less than twenty years, and twenty years or more.

Sieber, and the present study. The assumption is made in the latter that this was time spent in securing teaching experience. Fleury and Cappelluzzo's population was composed of graduate trainees in Title IV training programs between September 1, 1966 and April, 1969. Thus, they were dealing with the same population as Sieber (the 1966-67 trainees) plus the population of trainees who entered the program after 1966-67 but before April, 1969.

In addition to determining the lapse of time for all graduate trainees, the Task Force staff analyzed separately the amount of time lapse for doctoral and subdoctoral trainees. These data are reported in the right hand portion of Table 4.19. The more interesting items in Table 4.19 appear to be:

(1) A greater proportion of trainees are entering their graduate programs within the five-year period Buswell found to be significant in the preparation of productive researchers: 86 percent in 1969-70 as compared to 72 or 73 percent in 1966-67.

(2) The greatest change has occurred in the proportion who are beginning their advanced training immediately, or almost immediately, upon receipt of their degrees -- from 37 percent in Sieber's population to 54 percent of the 1969-70 trainees.

(3) The increased proportion of trainees who are beginning their advanced training earlier may indicate a change in the recruitment practices of the doctoral programs.

(4) The mean number of years elapsed prior to entry into advanced training declined by a full year from 1966-67 to 1969-70 (to 2.3 years) for all trainees, and declined by fourteen and one-half months (2.1 years) for the doctoral trainees.

There was some effort to recruit into the subdoctoral programs students who had just received their degrees, but the modification was not sufficiently widespread to diminish very much the mean number of years elapsed.

Academic Background

The trainees' academic background is an indication of the breadth of their preparation and the likelihood of their being well grounded in a substantive field other than education. Heiss's (1966, p. 77) analysis of the academic background of 31 productive educational researchers led her to conclude that outstanding educational researchers will tend to show a background in a substantive rather than a professional field.

Undergraduate major field. Buswell, et al. (1966) gathered data on the undergraduate major field of 1954 and 1964 doctoral recipients in education which is comparable to data assembled by the AERA Task Force on the 1969-70 Title IV doctoral trainees. These are presented in Table 4.20.

The data in Table 4.20 indicate that:

(1) Approximately three-fourths of the 1969-70 trainees earned an undergraduate degree outside of education. (This compares to 93 percent of Heiss's productive educational researchers.)

(2) A higher proportion of the trainees in probationary and discontinued doctoral programs held undergraduate degrees in education -- 32 percent as compared to 20 percent of the trainees in those doctoral programs which were scheduled for continuation.

(3) A further reduction in the number of doctoral programs being supported would likely produce such a small (1-2 percent) decrease in the proportion of trainees who had earned undergraduate degrees in education

Table 4.20

Undergraduate Major Field of 1954 and 1964 Doctoral Recipients in Education and of 1969-70 Title IV Doctoral Trainees

Undergraduate Major Field	Buswell Respondents				1969-70 Doctoral Trainees							
	1954 Grads		1964 Grads		All Programs		Continuing Programs		Probationary and Discontinued Programs		"Better" Programs	
	N	%	N	%	N	%	N	%	N	%	N	%
Education	186	23	533	30	63	10	36	8	27	13	27	8
Education Subject Area	--	--	--	--	92	14	54	12	38	19	41	11
Subtotal	186	23	533	30	155	24	90	20	65	32	68	19
Psychology	40	5	124	7	110	17	80	18	30	15	68	19
Sociology	6	1	31	2	34	5	21	5	13	6	15	4
Economics	16	2	26	1	--	--	--	--	--	--	--	--
Other Social Sciences	173	21	232	13	87	13	62	14	25	12	46	13
Subtotal	235	29	413	23	231	35	163	37	68	33	129	36
Physical & Biological Sciences and Mathematics	161	20	255	15	137	21	96	22	41	20	85	24
Subtotal	161	20	255	15	137	21	96	22	41	20	85	24
Humanities	138	17	318	18	54	8	41	9	13	6	27	8
Other	98	12	231	13	19	3	11	2	8	4	11	3
No Data	--	--	--	--	55	8	45	10	10	5	38	11
Total	818	101	1750	99	651	99	446	100	205	100	358	101

that the "improvement" (if it be such) would not begin to offset the loss of 88 traineeships.

Graduate major field. Data on the graduate major fields of the 1969-70 trainees appear in Table 4.21. The only data available on trainees seeking the master's or another subdoctoral degree were for those in all Title IV programs.

Notice should be taken of the large number of trainees for whom no data were available (from 35 to 40 percent of the trainees in various combinations of doctoral programs and 68 percent of the subdoctoral trainees). A recomputation of the proportion of trainees in education and the other major fields with the number of trainees for which no data were available excluded substantially increases the proportion of trainees who had earned graduate degrees in education, as indicated for the doctoral trainees in Table 4.22.

Even in the "better" programs, the 46 percent figure for trainees with master's degrees in education does not compare favorably with the 33 percent of Heiss's productive researchers who had earned master's degrees in education. On the other hand, however, it does indicate that more than half of the trainees in the "better" programs were recruited into the Title IV doctoral training programs from fields outside of education.

In fact, the proportion of 1969-70 trainees recruited from outside education may be somewhat higher than that indicated in Table 4.22. Some, at least, of the Title IV trainees entered the research training program with only the baccalaureate. If a person in this group happened to be part of a training program which required that he earn a master's degree en route to the doctorate, then he would appear in the category of those with education as a master's field. To an

Table 4.21

Graduate Major Field of 1969-70 Title IV Graduate Trainees

Graduate Major Field	Doctoral Trainees								Subdoctoral Trainees	
	All Programs		Continuing Programs		Probationary and Discontinued Programs		"Better" Programs		All Programs	
	N	%	N	%	N	%	N	%	N	%
Education	161	25	105	24	56	27	76	21	32	22
Education Subject Area	58	9	40	9	18	9	24	7	5	3
Subtotal	219	34	145	33	74	36	100	28	37	25
Psychology	38	6	27	6	11	5	23	6	0	0
Sociology	13	2	11	2	2	1	10	3	0	0
Other Social Sciences	27	4	16	4	11	5	13	4	2	1
Subtotal	78	12	54	12	24	11	46	13	2	1
Natural Sciences	65	10	44	10	21	10	40	11	1	1
Humanities	7	1	6	1	1	1	5	1	3	2
Other	42	7	29	7	13	6	25	7	4	3
No Data	240	37	168	38	72	35	142	40	99	68
Total	651	101	446	101	205	99	358	100	146	100

Table 4.22

Graduate Major Fields of 1969-70 Doctoral Trainees for Whom Data Were Available

Graduate Major Field	Sets of Doctoral Programs			
	All Programs	Continuing Programs	Probationary and Discontinued Programs	"Better" Programs
Education	53%	52%	56%	46%
Social and Behavioral Sciences	19	19	18	21
Natural Sciences	16	16	16	19
Humanities	2	2	1	2
Other	10	10	10	12
TOTAL	100%	99%	101%	100%
N =	(411)	(278)	(133)	(216)

unknown degree, the inclusion of such individuals tends to inflate the figures for trainees holding graduate degrees in education. At the same time, it tends to minimize the numbers of those who are regarded as having been recruited to Title IV programs from outside the field of education.

An interesting comparison may be made between the major fields of education doctorate recipients (and trainees) at the undergraduate level and at the master's degree level. Table 4.23 contains data drawn from Tables 4.20 and 4.22 to make that comparison. (Note, however, that no master's degree data are available for 1954 and 1964 graduates.)

Table 4.23

Major Fields of Earned Undergraduate and Master's Level Degrees, 1954 and 1964 Doctoral Recipients and 1969-70 Doctoral Trainees

Major Field	Undergraduate Degrees			Master's Degrees
	1954 Graduates	1964 Graduates	1969-70 Doctoral Trainees, All Programs	1969-70 Doctoral Trainees, All Programs
Education	23%	30%	26%	53%
Social and Behavioral Sciences	29	23	39	19
Natural Sciences	20	15	23	16
Humanities	17	18	9	2
Other	12	13	3	10
TOTAL	101%	99%	100%	100%
N =	(818)	(1,750)	(588)[a]	(411)[a]

[a]Recomputed to exclude trainees for whom no data were available.

The proportion of trainees who earned education degrees doubled at the master's level, at the expense of all other major fields, but chiefly at the expense of the humanities and social and behavioral sciences. (It will be seen later in Table 4.40 that an additional increase of about 25 percent occurs at the doctoral level.) As it was pointed out above, however, the proportion of master's degrees in education is confounded to an unknown extent by the fact that some trainees earn the master's en route to the doctorate as a part of the Title IV program.

Grade Point Average

Grade point averages are frequently accepted as indicators of scholarship. It should be borne in mind, however, that while the GPA may be evidence of the student's scholarship vis-a-vis other students in the same location, it is of only the most general utility as one moves away from the particular department, school or university in which the GPA was earned. For that reason, one should expect the scholarship-level trainees to have high GPA's, and they do. Table 4.24 contains the mean GPA scores for the 1969-70 trainees.

Table 4.24

Mean Graduate Grade Point Averages for the 1969-70 Trainees

Category	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	Mean	s	Mean	s	Mean	s	Mean	s
Doctoral Programs Only								
Graduate GPA	3.63	.26	3.65	.25	3.59	.27	3.66	.26
N	(414)		(272)		(142)		(228)	
Subdoctoral Programs Only								
Graduate GPA	3.56	.31	3.68	.20	3.55	.32	3.68	.20
N	(104)		(9)		(95)		(9)	

Other Indicators of Trainees' Potential Productivity and Contribution

A number of additional analyses relating to various trainee characteristics were developed for this study. On the surface these do not appear to be as strongly or directly related to potential production and/or contribution as the five variables presented in the preceding section, but the scholar in the field will find them of interest.

Personal Variables

Sex. There is a Hobson's Choice in the recruitment of males or females to the graduate training programs. Active researchers are predominantly male, so it can be argued that only males should be recruited and awarded traineeships; to do otherwise is to choose the easy course of recruiting from among the large pool of women in education even though they are unlikely to follow research careers. On the other hand, it is suggested that although women in education compose the most accessible recruitment pool for educational research, few women are recruited into educational research and have opportunities to go on to be productive researchers. Therefore, it can be argued that attention should be devoted (a) to attracting the more intellectually talented among women into educational research training, and (b) to making careers in educational research more attractive to women. The reader must interpret the data on the sex of the trainees according to which of these views he favors. Table 4.25 presents percentage of males among researchers-at-large, 1966-67 trainees, and 1969-70 trainees.

Marital status. Buswell, et al. (1966, p. 51) determined that 83 percent of the 1964 doctorates in education were married at the time they received the doctorate. Sieber (1968, pp. 82-3) states that a conservative estimate of the proportion of 1966-67 trainees who were married during their graduate studies was 62 percent. (There appears to be an error in the calculation since the number of cases cited -- 586 trainees with dependents out of 771 cases -- is actually 76 percent of the total.) The data on the 1969-70 trainees are presented in Table 4.26.

Two items appear to be of interest in Table 4.26:

(1) The proportion of doctoral trainees who were married may have declined -- a possible concomitant of the influx of younger trainees reported in the analyses of age upon entry to training.

(2) A smaller proportion of the subdoctoral trainees were married, yet the age-upon-entry analyses indicated the subdoctoral trainees were older, which appears to be an anomaly. A higher percentage of the subdoctoral trainees were women, but that doesn't seem to be sufficient explanation for the anomaly.

Number of dependents. At the time of their graduation, only 17 percent of Buswell's population of 1964 doctorates had no dependents. The average number for the entire group (of 1750) was 2.7 dependents; one-third had four or more dependents at the time of graduation (Buswell, et al., 1966, p. 52). Sieber (1968, p. 82) found the mean number of dependents for his entire group (of 717) was 1.5 dependents, but his figure was for students in the midst of their graduate training, rather than at the end of it. The data for the entire group of 1969-70 trainees indicated that the mean number of dependents had decreased from Sieber's finding of 1.5 dependents to 1.36 dependents (see Table 4.27).

Table 4.25

Percentage of Males Among Researchers-At-Large, the 1966-67 Trainees, and the 1969-70 Trainees

	Researchers-at-Large[a]	1966-67 Trainees[a]	1969-70 Trainees		
			All Trainees	Doctoral	Subdoctoral
Male	86%	73%	68%	71%	56%
N	(3,907)	(774)	(797)	(651)	(146)

[a]Source: Sieber, 1968, p. 41.

Table 4.26

Marital Status of 1969-70 Title IV Graduate Trainees

Marital Status	All Trainees in All Programs		Doctoral Trainees in All Programs		Subdoctoral Trainees in All Programs	
	N	%	N	%	N	%
Married	539	68	455	70	84	58
Single	222	28	163	25	59	40
Divorced or Widowed	27	3	25	4	2	1
No Data	9	1	8	1	1	1
Total	797	100	651	100	146	100

Table 4.27

Mean Number of Dependents of 1969-70 Title IV Graduate Trainees

Category	All Trainees in All Programs		Doctoral Trainees in All Programs		Subdoctoral Trainees in All Programs	
	Mean	s	Mean	s	Mean	s
Number of dependents	1.36	.15	1.37	.15	1.30	.17
N	(781)	--	(637)	--	(144)	--
No data	(16)	--	(14)	--	(2)	--

Data from Tables 4.26 and 4.27 can be combined to give a clearer picture of the average number of dependents per married student, as follows:

	1969-70 Trainees		
	All Trainees in All Programs	Doctoral Trainees in All Programs	Subdoctoral Trainees in All Programs
Number of married trainees	539	455	84
Total number of dependents	1,060	873	187
Average number of dependents per married trainee	1.97	1.91	2.22

These data compare to an average number of dependents per married trainee in 1966-67 of 2.66.[8]

Academic Background

Degree(s) earned. The data on undergraduate and graduate degrees earned by the 1969-70 trainees are presented in Table 4.28. The reader should note that no data were available on earned graduate degrees for 68 percent of the subdoctoral trainees -- undoubtedly because most were even then in the process of earning their first graduate degree. The size of the "no data" category is so large that little attention should be given the distribution of subdoctoral trainees across the various master's degrees.

The year's difference between the doctoral and subdoctoral trainees in receipt of the degree conforms precisely to the difference in time elapsed

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[8] Table 44 in Sieber (1968) snows 430 trainees (56 percent of 767) with one or more dependents and a total number of dependents of 1,146, or an average of 2.667 dependents for each trainee who claimed dependents.

between the trainees' receipt of their highest degree and entry into a Title IV training program (reported in Table 4.19). It also appears to reflect faithfully the difference in mean ages reported immediately following Table 4.10 (28.5 years for doctoral trainees; 30.0 for subdoctoral trainees).

Table 4.28

Undergraduate and Graduate Degrees Earned by 1969-70 Trainees

Type of Degree Earned	Doctoral Trainees N	Doctoral Trainees %	Subdoctoral Trainees N	Subdoctoral Trainees %
Undergraduate				
B.A.	350	54	63	43
B.S.	209	32	71	49
B. Ed.	29	4	11	8
Other	16	3	1	1
No Data	47	7	--	--
Total	651	100	146	101
Graduate				
M.A.	192	30	13	9
M.S.	92	14	21	14
M.Ed. (MAT)	98	15	9	6
Other	28	4	4	3
No Data	241	37	99	68
Total	651	100	146	100

Date of receipt of degree(s). The mean date of receipt of their degrees was as follows for the 1969-70 trainees:

	Doctoral Trainees	Subdoctoral Trainees
Undergraduate Degree	May, 1963	May, 1962
Graduate Degree	June, 1966	June, 1965

Quality of institutions which granted degrees. The extent to which the previous degrees earned by the 1969-70 trainees were granted by institutions which had been cited by Keniston for the quality of their research was determined. These data, reported in Table 4.29, indicate that at least 14 percent of the doctoral trainees earned their undergraduate degrees at institutions cited for the quality of their research, versus 8 percent of the subdoctoral trainees. The doctoral trainees substantially improved that proportion (to 26 percent) at the graduate level. The large "no data" category for subdoctoral trainees confuses the results for that group.

Table 4.29

Appearance of Institutions Which Granted Degrees to 1969-70 Trainees Among Institutions Cited by Keniston for the Quality of Their Research

Appearance Among Institutions Cited for Quality Research	Undergraduate Institution				Graduate Institution			
	Doctoral Trainees Only		Subdoctoral Trainees Only		Doctoral Trainees Only		Subdoctoral Trainees Only	
	N	%	N	%	N	%	N	%
Appears among institutions cited for research quality	89	14	11	8	166	26	9	6
Does not appear	512	79	135	92	378	58	70	48
No Data	50	8	--	--	107	16	67	46
TOTAL	651	101	146	100	651	100	146	100

<u>Size of degree granting institutions</u>. The size of the institutions which granted undergraduate and graduate degrees to the 1969-70 trainees is reported in Table 4.30. As might be expected, the whole group of trainees moved toward larger institutions as they took up their graduate work.

Table 4.30

Size of Institutions in Which 1969-70 Trainees Earned Undergraduate and Graduate Degrees

Size of Degree Granting Institution	Undergraduate Institution				Graduate Institution			
	Doctoral Trainees Only		Subdoctoral Trainees Only		Doctoral Trainees Only		Subdoctoral Trainees Only	
	N	%	N	%	N	%	N	%
Under 4,000	182	28	37	25	26	4	11	8
4,000-10,000	112	17	46	31	106	16	32	22
10,000-20,000	133	20	43	30	200	31	25	17
20,000-30,000	95	15	8	6	96	15	5	3
Over 30,000	68	10	10	7	107	16	6	4
No data	61	9	2	1	116	18	67	46
TOTAL	651	99	146	100	651	100	146	100

<u>State in which degree institution located</u>. The states in which the largest number of 1969-70 trainees earned their undergraduate degrees were, for the most part, also the states in which the greatest number of trainees earned their graduate degrees, as reported in Table 4.31.

Not much can be said about this geographic distribution of trainees <u>vis-a-vis</u> trainees in general, other than that there is a definite correlation

Table 4.31

States in Which Title IV Trainees' Degree-granting Institutions are Located

States in Which Degree Institutions are Located	Undergraduate Degree			Graduate Degree		
	Rank	No. of Trainees	Percent of Trainees	Rank	No. of Trainees	Percent of Trainees
California	3	62	7.8	2	54	6.8
Connecticut	11	25	3.1	--	--	---
Florida	7	32	4.0	7	27	3.4
Illinois	5	42	5.3	5	35	4.4
Indiana	12	22	2.8	10	20	2.5
Iowa	--	--	---	11	19	2.4
Massachusetts	4	53	6.6	2	54	6.8
Michigan	6	38	4.8	5	35	4.4
New York	1	121	15.2	1	108	13.6
Ohio	9	26	3.3	9	22	2.8
Pennsylvania	2	65	8.2	4	37	4.6
Texas	9	26	3.3	8	23	2.9
Wisconsin	8	27	3.4	11	19	2.4
Others	--	215	27.2	--	172	22.0
No Data	--	43	5.4	--	172	22.0
Total	--	797	100.4	--	797	101.0

between this distribution and the number of traineeships awarded by the Title IV Training Program, as indicated below.

Table 4.32

Ranking of Top States with Respect to Number of Traineeships, Undergraduate Degrees and Graduate Degrees

State	Rank with Respect to Number of Traineeships	Rank in Number of Undergraduate Degrees Awarded	Rank in Number of Graduate Degrees Awarded
New York	1	1	1
Massachusetts	2	4	2
Pennsylvania	3	2	4
California	4	3	2
Florida	5	7	7
Michigan	6	6	5
Texas	7	9	8
Wisconsin	8	8	11
Iowa	8	-	11
Illinois	10	5	5
Ohio	10	9	9

There was a substantial amount of interstate mobility (as reported below in Table 4.33), but as the rankings above indicate, the mobility apparently took place among the populous, university-rich states.

Table 4.33

Number and Percent of 1969-70 Trainees Who Enrolled in a Title IV Training Program in Their State of Residence

Is Program of Instruction in the Same State as the State of Residence?	All Trainees		Doctoral Trainees		Subdoctoral Trainees	
	N	%	N	%	N	%
Yes, in the same state.	366	56	290	51	76	84
No.	292	44	277	49	15	16
TOTAL	658	100	567	100	91	100

Before leaving the matter of interstate mobility, one further comparison may be drawn between the 1966-67 and 1969-70 trainees. As the data in Table 4.34 indicate, virtually no change occurred in the interstate mobility of trainees over the three-year period.

Table 4.34

Number and Percent of 1966-67 and 1969-70 Trainees Who Enrolled in a Title IV Training Program in the Same State as the State in Which Their Highest Degree Was Earned

Is Program of Instruction in the Same State as the Highest Degree Institution?	1966-67 Trainees[a]		1969-70 Trainees	
	N	%	N	%
Yes, in the same state.	428	58	409	59
No.	309	42	282	41
TOTAL	737	100	691	100

[a]Source: Sieber, 1968, p. 54.

Employment Background

Sieber raised the question of whether the 1966-67 trainees' employment experience was such that it would have helped prepare the individual for a research career, or offered a predisposition in that direction. Results of a similar analysis for the 1969-70 trainees (presented in Table 4.35 together with Sieber's results) suggest that somewhat more 1969-70 trainees were recruited from among persons who had already shown a predilection for research and were therefore more likely to remain in the educational research field after completing their degrees.

Table 4.35

Nature of Most Recent Employment of 1966-67 and 1969-70 Trainees Prior to Their Entering a Title IV Training Program

Category	1966-67 Trainees[a]		1969-70 Trainees					
			All Trainees		Doctoral Only		Subdoctoral Only	
	N	%	N	%	N	%	N	%
In Education, Some Research	54	8	112	14	105	16	7	5
In Education, No Research	446	66	406	51	308	47	98	67
Not in Education, Some Research	54	8	41	5	38	6	3	2
Not in Education, No Research	122	18	160	20	131	20	29	20
Other or Indeterminate	--	--	36	5	36	6	--	--
No Data	--	--	42	5	33	5	9	6
TOTAL	676	100	797	100	651	100	146	100

[a]Source: Sieber, 1968, p. 51.

In order to secure a somewhat better estimate of the magnitude or seriousness of the prior research employment experience, a separate analysis of the trainees' most recent full-time employment was developed and is reported in Table 4.36.

Table 4.36

Nature of Most Recent Full-Time Employment, 1969-70 Trainees

Category	Doctoral Only		Subdoctoral Only	
	N	%	N	%
In Education, Some Research	54	8	4	3
In Education, No Research	282	43	98	67
Not in Education, Some Research	30	5	3	2
Not in Education, No Research	132	20	14	10
Other or Indeterminate	15	2	--	--
No Data	138	21	27	19
TOTAL	651	99	146	101

It is clear from the data in Tables 4.35 and 4.36 that though a greater proportion of the trainees were recruited with some previous research experience, those trainees with a significant comm[illegible]ent to or employment in research were still a very small proportion of the total.

As might be anticipated because of the younger age, fewer dependents, and greater likelihood of their having proceeded immediately from graduation to registration in a Title IV training program, the doctoral trainees were less likely than the subdoctoral trainees to have worked full time at their most recent employment (Table 4.37).

Table 4.37

Most Recent Employment of 1969-70 Trainees, Full-time or Part-time

Type of Employment	Doctoral Trainees Only		Subdoctoral Trainees Only	
	N	%	N	%
Full-time	402	62	112	77
Part-time	188	29	20	14
No Data	61	9	14	10
TOTAL	651	100	146	101

The doctoral trainees were employed for a shorter period than the subdoctoral trainees, as reported below using mean data.

	Doctoral Trainees	Subdoctoral Trainees
Employment begun	July, 1966	July, 1965
Employment ended	June, 1968	July, 1968
Calendar length	24 months	37 months

The mean employment period for all of the trainees was 25 months; by comparison, Sieber (1968, p. 49) reported a mean employment period for the 1966-67 trainees of 31.2 months (2.6 years).

Professional Goals

Data were obtained on selected professional goals of the 1969-70 trainees.

Type of degree sought. When compared with the 1966 trainees, a smaller proportion of the 1969-70 doctoral trainees were seeking the Ed.D.

degree (Table 4.38). Inexplicably, since the number of subdoctoral and doctoral traineeships supported by Title IV remained essentially stable over the three-year period, the proportion of trainees seeking subdoctoral degrees also declined; perhaps the difference is traceable to the 60 cases for which no data were obtained. The marked increase in the proportion of trainees seeking the Ph.D. -- the "research degree" -- is an encouraging sign.

Table 4.38

Degree Sought by 1966-67 and 1969-70 Trainees

Degree Sought	1966-67 Trainees[a]		1969-70 Trainees	
	N	%	N	%
Subdoctoral	139	19	107	15
Ed.D.	184	25	125	17
Ph.D.	397	54	505	69
Others	15	2	--	--
TOTAL	735	100	737	101

[a]Source: Sieber, 1968, p. 57a.

The data on degrees sought by the 1969-70 doctoral trainees (Table 4.39) reveal an item of interest; the programs placed on probation or discontinued featured a higher proportion of students seeking the Ed.D. degree. There is an even greater bias toward the Ph.D. degree in the data on trainees in the "better" programs. It seems probable that the decision to elect the Ph.D. as the degree sought is related to the pride felt by directors

Table 4.39

Degree Sought by 1969-70 Doctoral Trainees

Degree Sought	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	N	%	N	%	N	%	N	%
Ed.D.	122	19	68	15	54	26	39	11
Ph.D.	504	77	363	81	141	69	305	85
Other	17	3	7	2	10	5	6	2
No Data	8	1	8	2	--	--	8	2
TOTAL	651	100	446	100	205	100	358	100

and students in being part of an outstanding research program; hence, they select the higher status, "research" degree -- the Ph.D.[9]

Field of highest degree sought. Two presentations will be made on the field of the highest degree sought. The first presentation focuses on the fields of education, psychology and the other social sciences (Table 4.40). Clearly, there was little movement in the fields being pursued by the trainees between 1966-67 and 1969-70.

Table 4.40

Education, Psychology, and Other Social Science Concentrations in Fields of Highest Degree Sought by Researchers-at-Large, and by the 1966-67 and 1969-70 Trainees

Field of Highest Degree Sought	Researchers-at-Large (1964)		1966-67 Trainees[a]		1969-70 Trainees	
	N	%	N	%	N	%
Education (including Ed. Psych)	2,201	57	562	77	565	77
Psychology	1,274	33	102	14	83	11
Other Social Sciences	270	7	44	6	63	8
Others	116	3	22	3	25	4
TOTAL	3,861	100	730	100	736	100

[a]Source: Sieber, 1968, p. 73.

[9]Data on the relative correlations of Ph.D. and Ed.D. degrees with subsequent productivity in educational research are not conclusive; there are studies supporting proponents of the Ph.D. as the research degree and those that suggest that degree type makes no difference in later productivity. Although it is not possible to review the studies here, suffice it to say that any trends across studies seem to favor the position that the Ph.D. is a more appropriate degree for neophyte researchers. Whether true or not, this opinion is held by many and has doubtlessly resulted in many strong research programs not offering the Ed.D. degree at all.

For the 1969-70 trainees, it was also learned that (1) most of the "Other Social Sciences" category consisted of sociology (six percent out of eight percent) and (2) the "Others" category consisted of humanities (two percent), natural sciences (one percent) and other (one percent).

Data on the field of the highest degree sought by 1969-70 trainees alone are presented in Table 4.41. These figures reveal only minor differences among the continuing, the discontinued and the "better" doctoral programs. Again, the large "no data" category in the subdoctoral section makes interpretation of these data difficult.

Professional identification. Data were gathered on the jobs for which trainees saw themselves being prepared. The 1969-70 trainees identified professionally with the jobs listed in Table 4.42.

The subtotals are inserted in Table 4.42 to facilitate comparison of these jobs with a different set of job titles Sieber used to categorize the "Vocational identification" of the 1966-67 trainees. The job titles Sieber used, with the proportion of 1966-67 trainees so classified, are presented below in Table 4.43. Data for comparable groups of jobs, as indicated by the subtotals, are presented to the right for comparison. The reader will want to question whether the comparisons made are valid ones (for example, the juxtaposition of "student" and "undecided").

To the extent that there is validity in the comparisons drawn between dissimilar job titles, it becomes clear that the professional identification of the 1966-67 trainees was nearly identical to that of the 1969-70 trainees. Perhaps this may be explained by the fact that the two classes of trainees were located in the same training programs -- and thereby constrained in the breadth of their job choices by the objectives of the training programs.

Table 4.41

Field of Highest Degree Sought by 1969-70 Trainees

Field of Highest Degree Sought	Doctoral Programs Only							
	All Programs		Continuing Programs		Probationary and Phased Out Programs		"Better" Programs	
	N	%	N	%	N	%	N	%
Education	482	74	332	74	150	73	261	73
Psychology	70	11	44	10	26	13	39	11
Sociology	46	7	36	8	10	5	31	9
Other Social and Behavioral Sciences	17	3	10	2	7	3	10	3
Natural Sciences	6	1	3	1	3	2	3	1
Humanities	12	2	6	1	6	3	0	0
Other	7	1	3	1	0	0	3	1
No Data	11	2	12	3	3	2	11	3
Total	651	101	446	100	205	101	358	101
	Subdoctoral Programs Only							
Education	83	57	14	100	69	52	9	100
Psychology	13	9	0	0	13	10	0	0
No Data	50	34	0	0	50	38	0	0
Total	146	100	14	100	132	100	9	100

Table 4.42

Vocational Identification of 1969-70 Title IV Trainees[a]

Job	All Trainees		Doctoral Trainees		Subdoctoral Trainees	
	N	%	N	%	N	%
Administrator of research	25	3.1	20	3.1	5	3.4
Administrator of evaluation	1	.1	--	---	1	.7
Administrator of development	2	.3	1	.2	1	.7
Administrator of diffusion	--	---	--	---	--	---
Other academic administration	2	.3	2	.3	--	---
Elem./Sec. administration	13	1.6	11	1.7	2	1.4
Other administration	4	.5	3	.5	1	.7
(Subtotal #1)	(47)	(5.9)	(37)	(5.8)	(10)	(6.9)
Teacher of research	12	1.5	11	1.7	1	.7
Teacher of evaluation	--	---	--	---	--	---
Teacher of development	--	---	--	---	--	---
Teacher of diffusion	--	---	--	---	--	---
Other university instruction	36	4.5	36	5.5	--	---
Elem./Sec. teacher	17	2.1	9	1.4	8	5.5
Teacher/researcher	176	22.1	171	26.3	5	3.4
Teacher/administrator	8	1.0	6	.9	2	1.4
Other instructor	13	1.6	13	2.0	--	---
(Subtotal #2)	(262)	(32.8)	(246)	(37.8)	(16)	(11.0)
Research Associate	60	7.5	48	7.4	12	8.2
Evaluation Associate	7	.9	5	.8	2	1.4
Product developer	4	.5	4	.6	--	---
Diffusion specialist	1	.1	1	.2	--	---
Researcher/administrator	7	.9	6	.9	1	.7
(Subtotal #3)	(79)	(9.9)	(64)	(9.9)	(15)	(10.3)

(Continued)

Table 4.42 (Continued)

Job	All Trainees		Doctoral Trainees		Subdoctoral Trainees	
	N	%	N	%	N	%
Undecided	298	37.4	232	35.6	66	45.2
(Subtotal #4)	(298)	(37.4)	(232)	(35.6)	(66)	(45.2)
Current Status or Unknown	31	3.9	21	3.2	10	7.5
No Data	80	10.0	51	7.8	29	19.2
Total	797	99.9	651	100.1	146	100.1

[a] The professional identification data presented here suggest that the Title IV programs are unlikely (as presently constituted) to produce large numbers of educational development, evaluation, or diffusion personnel. Indeed, with few exceptions, the existing programs were not designed for that purpose. It should be noted, however, that the data reported in this paper probably underestimate to some unknown degree the number of Title IV trainees who actually take jobs in these research-related roles. An inspection of appointment forms of trainees in two programs known to the writers showed that over 30 percent of the trainees in these two programs took jobs as developers or evaluators, even though they had all given a professional identification of "researcher" on their appointment forms. This suggests that an acquiescence set prompted by the respondent's position as a trainee in an "educational research training program" may have colored the responses to some degree. However, this caution in interpreting the data does not negate the fact that the majority of persons in current training programs are preparing to be educational researchers and that training in research-related roles seems to receive only ancillary attention.

Table 4.43

Vocational Identification of 1966-67 and 1969-70 Title IV Trainees

Sieber's Job Designations	1966-67 Trainees[a]		1969-70 Trainees		Task Force Job Designations
	N	%	N	%[b]	
Executive	45	6	47	6.4	Subtotal #1
Teacher, Professor	269	36	262	36.5	Subtotal #2
Research Associate, Scientist, Statistician, Other	74	10	79	11.0	Subtotal #3
Research Assistant	30	4	--	---	------------
Student	298	40	298	41.5	Subtotal #4
All Other	30	4	31	3.9	
Total	746	100	717	99.3	

[a]Source: Sieber, 1968, p. 85

[b]Recomputed to exclude 80 cases for which no data were available.

States/regions of planned employment. The states or regions in which the 1969-70 trainees planned to locate upon completion of their training are listed below. The number of traineeships assigned to each of the five most popular states is also listed, so the effect of having traineeships located in a state can be estimated.

Table 4.44

States and Regions of Planned Employment for 1969-70 Title IV Trainees

Site of Trainees' Planned Residence	N	% of Total	Traineeships Assigned N	Traineeships Assigned % of Total
New York	52	6.5	145	18.2
California	29	3.6	59	7.4
Massachusetts	25	3.1	66	8.3
Pennsylvania	24	3.0	64	8.0
Florida	17	2.1	52	6.5
East	45	5.6		
West	29	3.6		
Midwest	28	3.5		
Other Regions	132	16.8		
Undecided	302	37.9		
No data	114	14.3		
TOTAL	797	100.0		

The data in Table 4.44 indicate that one-third to one-half of the trainees wish to remain in the state in which they are trained; this emphasizes the desirability of maintaining some geographic spread in the training offered. The large number of undecided trainees plus the regional choices make it difficult to pursue this particular analysis further; a follow-up study of individuals is needed a few years hence to obtain better information on placement.

Observations and Conclusions

1. The 1969-70 trainees were found to be very much like the 1966-67 trainees in many of the characteristics analyzed. These similarities probably result from the fact that both sets of trainees occupied traineeships in the same programs and were trained by essentially the same people.

2. There were also found to be several noticeable differences between 1966-67 and 1969-70 trainees. The more interesting of these were the following:

   (a) The 1969-70 trainees were younger upon entry and will be younger upon graduation (from .1 to .4 years) than the 1966-67 trainees; they were much younger (5.5 to 8 years) than the 1964 graduates in education.

   (b) The emphasis placed on younger trainees produced an increase in the proportion of students who were recruited directly from their previous degree program -- from 37 percent in 1966-67 to 54 percent in 1969-70.

   (c) The more recent trainees had a somewhat broader disciplinary-base than did education students in earlier years, particularly with respect to academic work in the social and behavioral sciences.

   (d) The 1969-70 trainees were more frequently recruited from positions which involved some research activity; this indicated that they would be more likely to stay in the field once they graduate. However, the proportion was still quite small (19 percent).

   (e) There was a greater tendency among the 1969-70 trainees to seek the Ph.D. degree (69 percent vs. 5[illegible] percent of the 1966-67 trainees);

as the trainees begin to look more like arts and sciences students on the other variables (age, talent, etc.) it may be that they will look more and more like them in terms of the degree sought as well.

3. Although prior intuitive criticisms of the quality of the training programs and of the trainees may have had some validity when applied to individual cases, the data assembled here indicate they cannot be applied with validity to the entire training program or group of trainees. It was found that:
   (a) For the most part, the training programs were located at good training institutions; approximately two-thirds of the doctoral programs were at institutions cited for the quality of their research. Of the remaining institutions not cited for research quality *per se*, many are nonetheless noted for overall institutional quality.
   (b) A strong interdisciplinary emphasis did exist in the Title IV training programs, suggesting that the continuing call for more interdisciplinary training may be based on naivete about those programs. Specifically, it was found that (1) three-fourths of the 1969-70 doctoral trainees were recruited from undergraduate fields outside of education, (2) approximately half held the master's degree in fields outside education, (3) at the doctoral level, a full one-fourth of the trainees were getting their degrees outside of education, and (4) forty percent of the programs provided some interdisciplinary training, including some in which the degree awarded was an education degree. An increasingly larger proportion of the trainees did move into education as they progressed from

one degree to another, but this convergence also characterized Heiss's (1966) outstanding scholars and is a natural consequence of increased specialization. Her work tended to verify that outstanding educational researchers will "show a background in a substantive rather than a professional field (Heiss, 1966, p. 77, italics added)," not that the degree or the burden of advanced work should or must be in a substantive field.

(c) The 1969-70 trainees, as a group, were very talented academically. The GRE and MAT scores they received were on a par with or higher than the scores received by a majority of the students in virtually every professional and substantive field referenced.

4. The remaining area of greatest ignorance in studying Title IV training is the substance of the . aining programs themselves. The characteristics of the trainees, the training directors, and research units have been well described and, in some cases, have been independently verified through the present study and Sieber's (1968) early analyses. What happens to the trainees while they are in the training program -- that is, the processing phase -- is currently known only to the trainees and directors in the various programs.

5. In the absence of more adequate data on the training programs (e.g., data on the content and practicum experiences provided within each program, subsequent positions and research productivity of graduates from each program) no final judgements can be drawn about the recent USOE decision to discontinue approximately one-third of the existing Title IV training programs. However, the evidence on trainees presented

in these pages indicates that:

(a) The process of selecting Title IV training programs for continuation (and terminating or placing others on probation) has proven effective in retaining programs in which trainee talent is highest. The total GRE scores in Table 4.12, for example, show a 75-point difference between the mean scores of doctoral trainees in continued programs and those of the trainees in probationary and discontinued programs.

(b) Even in the 38 programs that were discontinued or placed on probation, the overall level of talent was sufficiently high that the field of educational research was not "saved from mediocrity" by the termination of federal support for trainees in these programs.

(c) Termination of all or an additional segment of the Title IV training programs would disrupt the preparation of a cadre of students in educational research who could compete successfully with the best students in any and all of the professions and disciplines examined here. More importantly, such action would doubtlessly result in the loss of a large number of these students from the field of educational research altogether.

6. The Title IV Graduate Research Training Programs, particularly at the doctoral level, appear likely to produce successful educational researchers and are deserving of strong support.

CHAPTER 5

ALTERNATIVE APPROACHES TO EDUCATIONAL RESEARCH TRAINING

ALTERNATIVE APPROACHES TO EDUCATIONAL RESEARCH TRAINING

The final area of investigation in the 1969-70 Task Force project was the consideration of alternative approaches to educational research training. This effort took two di[illegible]n which are reported in this chapter.

In the first section, information is presented from a survey of a small sample of professional organizations. The survey was undertaken in order to learn of inservice training approaches which might hold promise for the training of educational researchers.

The second section is a brief description of three training possibilities directly stimulated by activities of the Task Force. The third section of this chapter is a detailed examination of one of those possibilities: the use of simulation techniques in educational research training. In particular the adaptability of this technique to the teaching of certain essential skills and knowledge is considered.

A Survey of Inservice Training Programs of Selected Professional Organizations

Introduction

As part of the general focus of the AERA Task Force Project on the Training of Educational Research Personnel, it was stated that "particular attention is to be directed to the needs for and methods of training for upgrading [educational research personnel], newly-developed methodology and technology, and the overcoming of potential obsolescence among educational research personnel employed in a variety of jobs and roles" (Gagné, 1969, p. 6). An ultimate aim of the Task Force is the development of an educational research training program which will accomplish the following:

(1) upgrade the skills of researchers who are now poorly trained;

(2) maintain the high level of competence of researchers now entering the field;

(3) teach new skills made necessary by innovations in educational techniques and products; and

(4) broaden the base of personnel engaged in activities calling for the application of educational research skills.

At present, the major continuing educational program for educational researchers consists of the presessions held just before the annual AERA meeting. The stated purpose of the program is

> . . to train educational researchers in fundamental research skills, e.g., experimental design, statistical analysis, survey techniques. . . . The Research Training Presessions are intended to be instructional or disseminative of established research techniques as opposed to generative of new substantive problems . . . It is also not the purpose . . . to disseminate innovations in education (e.g., team teaching . . .) which are not properly research skills and techniques common to a large class of research activities.
>
> Preference for participation . . . will be given to researchers who hold a doctorate. (Glass, 1968, pp. 3-4)

Proposals for AERA presessions are solicited through announcements in the Educational Researcher and professional journals and invitations to leading researchers. The courses to be offered are selected from the proposals submitted to the Presessions Committee, and are announced in publications in the behavioral sciences. Applicants are screened by the chairman of the session for which they apply. No tuition fees have been charged for sessions up to and including 1970. (Due to reduction of Federal funding, tuition will be charged for the 1971 presessions.)

The 1968 evaluation report (Glass, 1968) includes several interesting facts. Eleven courses were offered at the conference presessions, each of five days' duration; over 700 participants were enrolled. Analysis of data from these presessions showed that 15 percent of the participants came from public school systems, 71 percent from colleges and universities. Over 80 percent held an earned doctorate. The data also showed that a disproportionate number of enrollees came from the upper Midwest (the AERA Conference was held in Chicago that year), and thus gave evidence to the belief that travel costs were a factor in presession attendance. These data indicate that there may be a need for expanding the training program and offering it in other regions of the country.

Several vehicles have been mentioned as possible elements in an expanded training program for educational researchers:

(1) Presession courses, of the sort which have been successfully conducted by AERA, in a still greater variety of substantive areas;

(2) Courses of longer duration, application to techniques and skills which require longer study;

(3) Summer institutes, conducted by outstanding scholars with particular areas of expertness;

(4) Conferences which would emphasize the generation and organization of new knowledge;

(5) Workshops for the teachers of educational researchers, emphasizing methods of teaching specific techniques or methods;

(6) Development of instructional materials and products for distribution to AERA members.

One step in assessing the likely utility of these and other vehicles is to "discover, describe, and evaluate the applicability of methods for upgrading training of professional personnel carried out by other professional and scientific organizations" (Gagné, 1969, p. 6). This section is directed to that task.

Inservice Education Programs of Other Professional Organizations

In order to discover the types of in-service training employed elsewhere, a sample of professional organizations was selected for contact by members of the Task Force staff. General information available to those conducting the investigation yielded a list of organizations which were thought to have adequate programs of in-service education for their members. From this list, a final selection was based on the pragmatic criteria of geographic accessibility for interview by a staff member and willingness of an officer of the organization to set aside time for an interview. The resulting list of six professional organizations, including the name of the person interviewed in each case, is as follows:

The American Association of Junior Colleges -- Washington, D.C. (Roger Yarrington)

The American Association of School Administrators,-- Washington, D.C. (William Ellena)

The American Chemical Society -- Washington, D. C., (Moses Passer)

The American Psychological Association -- Washington, D. C.
(William Simmons)

The Association for Computing Machinery -- New York City, (James Adams)

The National Society of Professional Engineers -- Washington, D. C.
(Paul Robbins)

It can be seen from this list that several disciplines were represented in the sample.

The interviewee from each organization was interviewed during late 1969 and early 1970 by a member of the Task Force staff. The objective of these interviews was to learn the following about each organization's in-service training program:

(1) intents of the program,

(2) audiences addressed,

(3) types of training vehicle employed,

(4) manners of determining course content,

(5) methods of developing course materials,

(6) cost factors and means of financing,

(7) methods and results of evaluations, if any.

What follows is a brief account of the information gathered from each organization.

The American Association of Junior Colleges.

While the American Association of Junior Colleges (AAJC) co-sponsors numerous seminars and workshops developed by other organizations, and while it actively publicizes programs of private industry, foundations and educational institutions, these efforts do not appear to be directed toward the in-service education of teachers and administrators in two-year colleges. Such programs are addressed, rather, to students or potential students in various phases of occupational education and to potential employers of the graduates of two-year colleges. An exception is found in AAJC's publications in the field of health and medical technology education. The National Health Council and AAJC, with the support of the W. K. Kellogg Foundation, have taken the initiative in providing substantial guidance for those administrators who wish to develop educational programs in medical technology within their institutions. The AAJC also publishes for its members an in-service guide of summer courses and workshops in junior college teaching and administration; this guide lists, by region, the summer offerings of colleges and universities throughout the country. The AAJC does not, however, participate in the development of these courses, nor does it endorse them.

The American Association for School Administrators.

The American Association of School Administrators (AASA) has an extensive program of in-service training, employing several different vehicles. The general audience for the program is all practicing school administrators, but the specific audience may vary with the type of presentation (e.g., by geographical location or by the type of position held by potential participants). Except for one type of vehicle, which is invitational, the program is open to all practicing administrators.

Since the details of the programs vary considerably with the types of presentation, each training vehicle is discussed separately.

The Annual Convention is a meeting open to all members of AASA (nonmembers may join at the time of the convention). Several large discussion groups meet at the time of the convention, with discussion topics determined from a survey of 4,000 members of the organization. The meeting program is organized by the national office of AASA and is financed by conference registration fees.

Regional Conferences are held annually in the 12 regions of the Association, and are open to all administrators within the region. The conferences are generally three-day programs of lectures, panels and information-sharing sessions, with topics determined by those in the region. The conference staff is identified and supplied by the national organization. Program planning is done on a regional level, but funding is by national membership dues and there is no cost to the individual participants.

Circuit Rides are very informal meetings in which a member of the national staff of AASA makes a one-day stop, usually in a rural area, to talk with a group of local administrators. The meetings are unstructured and topics are determined as they progress. Expenses incurred by the staff member are a part of the normal operating budget of the national office and are financed through the membership dues of the organization.

The above activities are not continuing education programs *per se*. Two programs that are more directly relevant are the following.

The National Academy for School Executives is a relatively new program of AASA and may be described as a traveling academy of seminars, clinics and workshops lasting from five to 12 days. Topics for Academy sessions are determined from the recommendations of the educational staff of the national organization and from those of state Academy leaders. Sites are chosen on the basis of accessibility by air and automobile, and suitability of physical facilities. Sessions are generally limited to about 50 participants. This program is financed on a fee basis, with a tuition charge of $180 for the five-day courses and from $225 to $280 for sessions lasting longer than five days. In addition, travel and room and board expenses are borne by the enrollee, if the session takes place outside of his home city.

There are two Seminars for Professors each year, meeting in different parts of the country. These are three-day, invitational meetings bringing together approximately 35 university professors of school administration and five top superintendents of schools selected from throughout the country.

Participants for the seminars are chosen on the basis of geographical representation, the number of years remaining in the profession, time available and degree of commitment. The seminar program, which is determined by the educational staff of the national office, consists of formal presentation of case studies, with each presentation followed by in-depth discussion. Provision is also made for overall review of the problems and solutions considered at the meeting. No tuition is charged for the seminars and AASA reimburses each participant for half his travel and living expenses. The cost to the individual for the remaining half of his expenses averages $200 to $250.

The American Chemical Society.

Late in 1964, the Education Office of the American Chemical Society (ACS) published a report on continuing education for chemists; this followed a survey of ACS members on the use and effectiveness of continuing education techniques which were then available, and on the perceived need for and potential effectiveness of new techniques. The report included an account of programs of other scientific organizations. A major recommendation of the investigators was that ACS take the initiative in continuing education by (1) immediately providing a listing of courses and lectures available through university extensions, NSF and the like; and (2) developing pilot programs employing techniques not previously used.

The first formal educational program offered by ACS, shortly following the survey, consisted of courses (of a few days duration) presented at the Society's annual meetings. It was found that the great majority of the participants were Ph.D.s. In order to avoid an apparent neglect of bachelor's degree holders--the "bench" chemists--ACS inaugurated a program of traveling "short" courses. Ultimately, the courses offered at the national meeting were dropped.

The current education program of the Society consists of three types of training vehicles--the short courses, film courses and tape courses. The film and tape courses are extremely limited at present, however, and the overall program thus consists essentially of the short courses and their "package" course versions, which are described below.

The primary purpose of the ACS program is to combat technical obsolescence by providing organized courses of study for the association's members. The target audience comprises graduates in chemistry (holders of degrees from the bachelor's degree through the doctorate) who are otherwise unable to keep abreast of technical innovations in their field. Once the desired background for students in a course is determined, participants are chosen on a self-selection basis. Enrollees in all phases of the ACS program come primarily from private industry.

The ACS short courses are organized courses of study lasting from two to three days; the Society specifically avoids the kind of presentation which summarizes recent advances in a particular area of interest. The courses are sponsored by local chapters of ACS and are held in some easily accessible meeting place, such as a hotel or convention center. The Education Office of the national organization has responsibility for all program development and administration. Suggestions for course subjects are solicited from outstanding chemists and from previous registrants in ACS courses; course topics and instructors are then selected by the education staff. Once the instructor has been chosen, any decisions concerning format, additional staff, materials for study and the like are made by him. The usual format is a combination of lecture, discussion and laboratory demonstration. All written materials, including outlines, assignments and supplementary readings, are prepared by the staff of the course. The Education Office has responsibility for the printing of the materials and for their distribution, if desired, to course registrants in advance. All expenses for the development, presentation and administration of the program of 50 short courses are undertaken by the national ACS organization. The costs are met by fees charged to the participants, with the fees averaging $50 to $60 per person for a two-day course.

In an effort to reduce the per person cost of the short courses and thus make them available to a larger audience of practicing chemists, the education staff conceived the idea of presenting a number of the short courses in "package" versions. The package version of a short course has the same content as the original presentation, and the staff and all materials are furnished by the ACS Education Office. The essential difference is that the course is sponsored and presented in-house by a private company (or perhaps two smaller companies in the same area) rather than by an ACS local affiliate. The sponsoring company undertakes all local arrangements for the presentation, including the meeting place, audio-visual facilities, publicity, registration and record-keeping. The administrative savings thus made possible to the national organization are passed on in the form of lower individual costs for the courses. It has been found that course expenses can be reduced by as much as 30 to 40 percent through the package offerings.

Each new course developed for the ACS program is evaluated, at the time of its pilot presentation, by the staff of the Education Office. Thereafter, there is participant evaluation of each presentation of the course, with feedback, through the Education Office, to the course staff.

The film and tape courses mentioned above are recent additions to the ACS education program and have not yet been fully developed. To date, one film course has been produced, in four parts with an accompanying chart book. The first tape course is a series of six interrelated lectures with textual material. These courses are available, through either rental or purchase, to private industry, local ACS affiliates, and college and university organizations. Other film and tape courses are currently in preparation.

The American Psychological Association.

The primary educational function of the American Psychological Association (APA), as a national organization, is in the area of accreditation of graduate degree programs in psychology. The parent organization has no formal or informal program of in-service education for its members, but by publicizing available training funds it does encourage university departments to develop such programs. While some of the state associations hold workshops, and some of the 29 divisions of APA are planning educational presentations for the APA annual meetings, these are not yet fully enough developed to constitute an in-service education program.

The Association for Computing Machinery.

The continuing education program of the Association for Computing Machinery (ACM) is greatly similar to that of the American Chemical Society, which was discussed above.

The general audience for the program consists of all those employed in the use of electronic computers and related equipment. Most participants come from private industry and they represent all fields within the area of the computer arts and all personnel levels. Prerequisites for individual courses are specified in detail in the literature describing the program. Potential participants determine the appropriateness of their own preparation and are then selected by ACM on a first-come, first-served basis.

The major purpose of the program is to provide instruction in new skills and techniques required in a very rapidly changing industry. This instruction occurs in a series of one- or two-day traveling seminars covering a variety of topics. Subjects for the seminars are selected by the Professional Development Committee of ACM from several sources: (1) a listing sent to ACM members, (2) titles of articles in journals, (3) topics of papers presented at meetings, and (4) questionnaires completed by participants in earlier seminars.

Once the need for a course on a particular subject has been established, the seminar is developed in one of two ways. The Professional Development Committee may select an instructor who is directly known to them, or they may solicit proposals for the course from several agencies. If the latter, then one of the proposals submitted will be chosen by the Committee and the agency placed under contract for the planning and presentation of the course. The major criteria in the selection of a proposal are relevance of the content to the needs of the target audience, experience of the proposed instructors (as practitioners as well as theoreticians), the appropriateness of the level of presentation, the cost to ACM and the availability of the instructors for additional presentations of the course.

All instructional materials are developed by the instructor or by the agency selected for the course, but the national office of ACM handles printing and distribution. Average total costs for a two-day seminar accommodating about 50 participants are approximately $1500. Financing is on a fee basis, with the fee paid by the participant or his employer.

Course evaluation takes place on two levels. The first session of a new course (and a dress rehearsal, if possible) are evaluated by a team from the Professional Development Committee. Subsequent sessions of the course are evaluated by the participants.

The National Society of Professional Engineers.

Four years ago, the Professional Engineers in Industry (PEI), a subgroup of the National Society of Professional Engineers (NSPE), conducted a survey of its members to determine the extent of their participation in various kinds of continuing education programs. The kinds of study included: (1) college and university programs, (2) programs sponsored by private industry, and (3) those presented by other professional organizations. PEI concluded from this investigation that private industry should take primary responsibility for the continuing education of engineers by making time available to employees, organizing and conducting courses, defraying costs for education programs, and providing employee motivation through pay increases, promotions, etc.

As a possible result of PEI's conclusions, NSPE has adopted a relatively passive role in providing in-service education for engineers. The Society does present seminars at its national meeting, but these deal with management problems and not with engineering topics per se. In addition, some local chapters of NSPE sponsor refresher courses for those seeking engineering licenses from the state. These are lecture courses staffed by faculty from local institutions and tuition is charged to cover expenses.

The vehicle which appears to be most directly related to engineering education is a series of programmed long courses which the Society makes available at cost to its members. These are packaged, self-instructional courses which are purchased in quantity from a company specializing in educational products; the per course cost ranges from $3 to $50 and averages about $10. The course "enrollee" pays the fee to NSPE, but the Society itself is in no way involved in the development of the educational material.

Summary

From the program descriptions just completed, it is evident that even a small sample of professional organizations provides a wide variety of techniques for in-service training. Among the formal programs, however--those developed by the American Association of School Administrators, the American Chemical Society, and the Association for Computing Machinery--there are several parameters which can be examined in order to give a brief sketch of the vehicles employed. These identifying features are shown in Table 5.1 for AASA, ACS, and ACM, and comparable information is given for the AERA presessions.

Although it is impossible to give a single description which will be valid for each individual case, certain common characteristics may be noted in the non-AERA programs:

1. In general, a traveling course lasting from one to three days has been adopted--or has evolved--as an effective training vehicle.
2. In general, topics for presentation as courses are solicited informally from the membership or are selected from current literature in the field.
3. In general, the actual course content and presentation are developed by those within the parent organization.
4. In general, participants are selected on a self-screening basis; i.e., the applicant himself determines whether he has the desired background for the course.
5. In general, a tuition fee is charged for the course; the program is thereby made self-supporting.

6. <u>In general</u>, it is possible for most of the potential audience to participate in <u>some</u> part of the program without incurring significant expenses for travel and lodging. (While it is most unlikely that the entire program of 50 ACS courses will be presented in Chicago, for example, during one year, it is fairly certain that a chemist in that city will be able to choose from a number of ACS offerings without leaving the Chicago area.)

Table 5.1

Salient Features of Selected In-Service Training Programs

Professional Organization and Training Vehicle	Location		Length		Participant Screening		Tuition		Other Expenses[a]		Course Developer		Topics Suggested by Members[b]	
	Stationary	Traveling	1-3 Days	4-12 Days	By Self	By Organization	Yes	No	Yes	No	Internal	Outside Agency	Yes	No
AASA														
Regional Conference	X[c]		X		X			X		X	X			X
National Academy for School Executives		X		X	X		X			X[d]	X			X
Seminars for Profs.	X		X			X		X	X[e]		X			X
ACS														
Short Courses and Package Courses		X	X		X		X[f]			X	X		X	
ACM														
Traveling Seminars		X	X		X		X			X	X	X	X	
AERA														
Presessions	X			X		X		X	X		X[g]			X[h]

a This category represents additional expenses--e.g., for travel and housing--which would be incurred by large numbers of potential participants.

b This category represents formal solicitation of the organization's membership or of previous participants in the education program. In all cases, the topics offered were actually selected by the organization, not by the membership.

c Although the regional conferences are stationary, there are 12 of them held annually in 12 separate regions of AASA.

(Continued)

Table 5.1 (Continued)

d Some sessions which are held in resort areas rather than major population centers would require additional expenses.

e Each participant pays half his expenses.

f Tuition for package courses is less than for short courses.

g AERA solicits from its membership proposals to conduct courses on any topic. The instructor, the topic and the course outline are thus accepted or rejected as a package. In the other associations represented here, an instructor is designated by the organization to develop a course on a topic which has already been determined.

h Members are asked to submit proposals for sessions, including specification of content, but the membership is not polled for perceptions of most needed topics.

Recommendations

The sample of professional organizations discussed above is evidently quite small and is not representative of all professional associations. In addition, it should be noted that the kinds of knowledge required by a practitioner of one of the physical sciences, for example, and the kinds of skills which must be mastered by him, are quite likely to be very different from those required for the preparation of an educational researcher. One may state with some assurance, therefore, that the specific training techniques which have been used successfully by one or another of these organizations may not easily be adopted en bloc for the educational research community.

With these limitations and disclaimers in mind, however, it is suggested that certain elements of the training programs described above hold considerable promise for the improvement of in-service training in educational research. On this basis, the following recommendations are presented for Task Force consideration.

1. Any in-service training program in educational research must actively and imaginatively seek participants from outside the membership of AERA. There are indications that considerable numbers of personnel who are currently involved in educational research or research-related activities are not associated with AERA (Worthen and Roaden, 1969, pp. 12-14, 29). In fact, these persons may not even be readily identifiable as educational researchers, since they "may in many instances function in a capacity involving educational research activities without necessarily having this function reflected in their job titles" (Gagné, 1969, p. 3).

2. A survey should be conducted of the membership of AERA, and other educational research and research-related personnel who can be identified, in order to determine both the <u>subjects</u> which need to be included in the education program and the training <u>vehicles</u> (e.g., presessions, two- or three-day courses, summer institutes) by which they may be presented most effectively.
3. The program should be constructed in such a way that the non-university practitioners of educational research will be served. That is, courses should be offered which will provide skills specifically needed by those engaged in applied research, development, diffusion, and evaluation.
4. The program must be made available on a local level. It is not sufficient to offer courses at the annual meeting of AERA, since the time and financial commitment required for attendance at such conventions severely limits the audience.
5. A tuition fee should be charged. At present, there is no charge for the presessions. Unfortunately, however, the incentive provided by having tuition-free courses is offset by the expenses of travel and lodging at the presession site. If the program is to be offered on a local or traveling basis, it will cost more than it does now. By charging tuition, AERA can make the program self-supporting and, at the same time, make it accessible to those who are now effectively excluded from participation.[1]

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[1]It has been argued that although chemists, engineers, and others usually employed by private industry <u>must</u> avoid obsolescence or jeopardize their jobs, no such pressures exist for most educational researchers. Whether or not educational researchers would be as willing to pay tuition costs for post-doctoral training as persons in these other fields is a moot point that could be determined by testing this proposal.

6. AERA might consider establishing a regional administrative structure for such training programs. Such a structure would almost certainly aid in the implementation of recommendations 2 and 4. It is also likely that a regional AERA organization will seem less formidable, and therefore more accessible, to non-university personnel involved in applied research and research-related activities. The structure developed need not be elaborate and could, in fact, be quite informal.
7. AERA should investigate the feasibility of sponsoring the production of instructional packages which could be made available to its members at a reasonable cost.
8. AERA should investigate the feasibility of compiling a list of available fellowships, institutes, workshops, etc., in educational research and related activities and disseminating this list to its members.
9. The Task Force should decide whether information of the type contained herein is sufficiently useful to warrant a more adequate and extensive survey of training practices of a broader sample of professional associations than the convenience sample used in the present survey.

Research Training Activities Stimulated by The Task Force

One of the objectives for 1969-70 Task Force operation was "To conduct a tryout and evaluation of at least two promising modes of training [research personnel]." Almost 12 percent of the funds from the USOE grant to the Task Force were designated for the implementation and evaluation of the two training modes. However, it became apparent during 1969-70 that information about certain characteristics of present trainees and graduates of ESEA Title IV graduate research training programs was essential to attain other objectives the Task Force had espoused. Since the original proposal contained no provision or funds for collecting and analyzing such data, the possibility of requesting additional funds for these activities was explored with the project officer in the Research Training Branch of the USOE National Center for Educational Research and Development. The result of these discussions was a joint decision of the project officer and the Task Force that the funds originally designated for the tryout and evaluation of two modes of training should be used instead to collect and analyze the data on Title IV trainees that are reported in Chapter 4 of this report.

Despite the decision to eliminate the "tryout and evaluation" objective from the formal objectives of the project, the Task Force continued to consider alternative training modes that seem to have potential for training educational researchers and research-related personnel. Many alternative training techniques were discussed by the Task Force, and these deliberations stimulated efforts to design, implement and evaluate some modes of training that might be useful in preparing educational research personnel. Three such activities are described below.

Cassette Tapes on Research Topics

One suggestion for training that was generated within the Task Force was the development of a library of cassette tapes on research topics for use by researchers in keeping abreast of new developments in research methodology. The intent was to develop materials that could be used during "dead" time (e.g., commuting, airplane travel, lunch) to learn more about important new research topics. The topics themselves were of less concern to the Task Force than was testing whether or not available cassette tapes of this type would be used by researchers.

The responsibility for development of these training materials was given to W. J. Popham, with whom the idea originated. A proposal to the USOE for development of a cassette tape library has been funded and is currently being implemented under the auspices of the Task Force. (The body of the proposal may be found in Appendix M.) As part of that project, an extensive evaluation of the effectiveness of this training technique will be conducted, resulting in decisions about its future utility for training research personnel in education.

Presession Materials Development

Another suggestion that resulted from Task Force discussions was that transportable packages of training materials should be developed on several research topics for which good curriculum materials are not now available. Rather than beginning such developmental efforts _de novo_, it was suggested that materials already developed for use in prior AERA presessions for research training could serve as a basis for further materials development. Consequently, all prior AERA presessions (and postsessions) were screened on the basis of two criteria: (a) is there evidence that the content of the presession is of interest to a sufficient number of researchers and research trainers to warrant its development into an instructional package and (b) are the basic materials that are already developed of sufficient quality to serve as a basis for further developmental efforts.

Twelve presessions met both criteria and the directors of these presessions were encouraged by the Task Force to submit proposals for materials development grants under RFP 70-27 issued by the USOE Research Training Branch. Five presession directors agreed to submit such proposals and, if funded, to develop packaged curriculum materials and submit them to rigorous evaluation. Two directors ultimately submitted proposals under RFP 70-27; one was accepted and will result in the development of three course content modules to train research and research-related personnel to appraise research critically. The second proposal was rejected with suggestions for specific revisions and the recommendation that it be re-submitted in the later competition for materials development grants.

Simulated Research Activities

In a recent issue of the Educational Researcher (Vol. XX, No. 8, 1969), the Task Force solicited the AERA membership for ideas about new and effective means for training educational research and research-related personnel, with the intent of assisting in finding funding sources for those ideas that seemed worthy of implementation. Thirty-three proposals were submitted by AERA members and were screened by use of the following criteria:

A. General

1. Each proposal should have definite potential for developing, maintaining or upgrading relevant research and research-related

skills through either pre- or in-service training.

2. Each proposal should either: (a) be designed to present content relating to the most needed skills and/or functions, or (b) utilize a training technique that promises to be generalizable across content areas.

B. Specific

1. Target Audience

   a. what type of person will be trained
   b. number of trainees involved
   c. anticipated availability of trainees

2. Director and Tentative Staff

   a. experience and capability
   b. degree of commitment of tentative staff

3. Content

   a. clarity about content to be included
   b. importance of topic (need)
   c. usefulness of competencies to be developed

4. Instructional Techniques

   a. appropriateness for content being presented
   b. organization of topics

5. Proposed evaluation activities

   a. extent of planning
   b. appropriateness of evaluation design
   c. comprehensiveness

6. Feasibility (adequacy of resources to conduct the program)

   a. cost (economic efficiency)
   b. facilities
   c. institutional support

7. Coordination with other programs in progress to avoid duplication

8. Potential for program continuation and expansion after funding period

9. Breadth of probable impact, in terms of research and research-related functions in varying institutional settings.

Only one of the suggested training techniques met the criteria well enough to warrant further consideration.[2] This was a proposal for investigating the possible application of simulation techniques to the training of educational researchers.[3] That investigation is reported in the following section.

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[2] Three other proposals met all criteria except that of economic feasibility. They were designs for training centers not unlike innovative Title IV graduate research training programs, with costs ranging between $50,000 and $190,000 annually. No funds at that level were available.

[3] The proposal was submitted by Dr. William L. Goodwin, USOE post-doctoral research fellow at Harvard University.

Considerations in Developing Simulation Materials for Training in Educational Research[4,5]

To what extent is simulation an appropriate and potentially useful technique for the training of research and research-related personnel in education? How can it best be used? In what form? In what topical areas? The purpose of this section is to provide partial answers to the questions above. No attempt is made here to provide definitive specifications for developing simulation materials; only general guidelines are presented for Task Force consideration.

The remainder of this section is divided into four major parts. In the first part, attention will be given to the use of simulation for instructional purposes, in general, and its use for training personnel in educational roles, in particular. Other parts of this section will include consideration of (a) suggested steps in designing a simulation, (b) areas in research, development, diffusion, and evaluation most amenable to a simulation format and (c) issues pertinent to the role of simulation in the area of research training.

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[4] This section originally appeared as Technical Paper No. 17 in the AERA Task Force series, under the authorship of W.L. Goodwin and B.R. Worthen. Only minor stylistic changes have been made for its presentation here.

[5] The authors express appreciation to Donald R. Cruickshank and Paul A. Twelker for their advice and assistance in clarifying many concepts in this paper and for providing and guiding us to many useful references. Despite the contribution of Drs. Cruickshank and Twelker to this paper, the responsibility for any misunderstandings or inadequacies in its content rests solely with the authors.

Instructional Uses of Simulation

This portion is to familiarize the reader new to the area of simulation with present uses of the technique in a variety of instructional programs. Two excellent and complementary reviews served extensively in providing material for this part (Cruickshank and Broadbent, 1970; and Twelker, 1969) and the reader seeking more information is directed to them and to a recent ERIC basic reference paper by Twelker (1970a); these sources are useful in reviewing simulation's use in research, operational analysis, design and development as well as in military, government, medical and industrial settings on topics not considered here.

For the purposes of this section, simulation is defined as "a representation of several variables in the same arrangement as they occur in a particular natural or artificial system" (Crawford, 1967), while the term "simulation games," following Cruickshank and Broadbent (1970), is used to denote simulations that involve competitive interactions between or among participants. It should be noted that these definitions have led to the development of many simulation systems and games that meet these definitional criteria to a greater or lesser extent.

Outside the area of training educators for various roles, simulation has made its most notable impact upon the instruction of students, normally in the form of simulation games. To date, the use of games as an instructional technique aimed at imparting subject content to pupils is intuitive. There is no solid evidence that it is more effective or efficient than other modes (Cherryholmes, 1966; Garvey and Seiler, 1966; Inbar, 1966; and Twelker, 1969); several studies reported in Boocock and Schild (1968) and Robinson (1966) provide additional data on games' outcomes, but results are far from definitive.[6]

[6] The reader is directed to an exhaustive review of research in this area by Fletcher (1969).

Rather, the use of simulation games is justified on the basis of their being valuable for imparting decision-making skills (Demaree, 1961; Parker and Downs, 1961; Twelker, 1967; Western Behavioral Science Institute, 1966) as in management games (Cohen and Rehnman, 1961; Dill, 1961; Fulmer, 1963) or, relatedly, for training students to select between alternate strategies (Abt, 1966; Boocock, 1966; Schild, 1966). Abt (1966) suggests further that student learning of processes simulated by the game takes place, but no evidence is presented for this. The belief that simulation games serve as motivational stimulants is widely expressed (Abt, 1966; Bruner, 1966; Cherryholmes, 1966; Coleman, 1960, 1966; and Sprague and Shirts, 1966). In short, claims for the utilizing of simulation are many, but primarily not based on research results.

Many different types of simulation are in common use as instructional devices. Some of the most interesting are described below.

One simulation with the unique characteristic of continuing sessions, for an hour or so daily throughout the entire school year, warrants special note. Micro-society has been developed under the auspices of the Portola Institute (Dobbs, et al., 1968). In Micro-society, upper elementary students organize their classroom as a miniature social system. Each student has a role, or multiple roles, and via the resultant interaction, observes and engages in activities necessary for maintenance of the system (e.g., book delivery service; message delivery system; the selling of mid-morning sustenance, office supplies, etc.; and court settlement of civil disputes).

When the concept of student is expanded to include the television-viewing public, the motivational qualities of simulation are again noted as during "The Most Dangerous Game" broadcast (on the 1950 Korean Crisis) that permitted home-viewer interaction (Lee, 1967, 1968), "Cabinets in Crisis" (on the 1950 Yugoslavia Crisis with Russia; reported in Twelker, 1969, p. 136) and the National Driving Test administered over TV in the late 1960's.

Instructional uses of simulation have also appeared, or been suggested, in the general area of vocational education. Boocock's Life Career Game is designed to give students a preview of the multiple ramifications of vocational choice. Hamreus (1969) has proposed instructional uses of simulation in diverse areas, such as auto repair, secretarial work, health education, consumer marketing, sheet metal fabrication, home economics, drafting, selling and merchandising, accounting and the like.

A wide range of actual simulation materials has been developed for medical students and is utilized for both teaching and assessment purposes. (Note later in this section Schalock's comments on the use of simulation for assessments.) At the "paper and pencil" end of the continuum, a training exam involves sequential decisions on the part of the trainee as he makes a diagnosis based on case material he reads, erases an opaque material on the answer sheet to indicate his choice, and proceeds as directed by the area of the answer sheet thus exposed. This continues through a series of steps (note that this is a "branching" technique with trainees often taking different routes) with feedback to the student on the probable outcome of his procedural technique (Crawford and Lewy, 1965; McGuire and Babbott, 1967; Univeristy of Illinois, 1967a, b); uniquely, several paths may lead to a favorable outcome. At a somewhat different end of the continuum, an ingenious flesh-colored, skin-fitting suit has been developed on which war wounds may be simulated and trainees judged on their efforts to treat same (Wooley and Audet, 1956). More recently, an expensive computer-controlled patient has been developed for medical training; titled Sim One, it is highly realistic (Abrahamson, et al., 1969). Materials also exist for role playing diagnostic and treatment interviews (Levine and McGuire, 1968). In another instrument, tape recordings of three case studies are interrupted periodically to allow students to write ten questions they would like to ask the patient at that point; in addition to a skill score, attitudinal concern for the patient is also derived (Frederiksen, 1962b).

Most instructional uses of simulation and simulation games have involved materials of the paper-and-pencil variety, presumably to keep costs reasonable. It is difficult, for example, to think of simulation devices used in public schools that are similar in complexity or cost to the link trainer developed to train pilot_ he gyrating decks and related equipment designed to train submarine commanders, or the ingenious and extensive simulation vehicles and situations established in conjunction with the space program. Some fairly elaborate simulations have been introduced in the schools, however, such as the driver training package in which the student operates basic automobile-like controls in response to stimuli presented via various projectors integrated through an electronic control system.

Simulation has been suggested as amenable to a second educational area, separate from but related to instruction. Schalock (1969) proposes that simulation might play a valuable role in effective measurement. Essentially, via prior work (Schalock, et al., 1965; and Schalock and Beaird, 1968), it is suggested that simulation allows the creation of more realistic test situations (i.e., with higher fidelity) permitting the elicitation of more complex responses. Responses thus observed and judged are considered by Schalock to have greater predictive validity than more common measures derived from conventional examining means. Simulations, it is suggested, allow assessment of how one behaves in a lifelike situation, not merely ascertainment of how he thinks he should behave. Many of the uses of simulation for training personnel in educational roles have been developed along the lines implied by Schalock, but with emphasis on the realistic training thus provided rather than on considerations related primarily to measurement.

Simulation in Training Personnel for Educational Roles.

In a very real sense, the specific use of simulation for training educators has had a short history, having probably been initiated with the in-basket test for training school administrators (Frederiksen, et al., 1957; Frederiksen, 1962a; and Hemphill, et al., 1962). The trainee primarily reads background material that sets the situation although some films and tapes are also used. For two days, the trainee plays the role of a school principal first coming on the job a few days before school opens. Via his in-basket, he receives and must make decisions on a series of communications (letters, messages, memos, etc.) typical of those that would confront a principal before the opening of school. Based on his decisions, a profile is prepared that indicates how his responses compared with others along the dimensions of analyzing situations, maintaining relationships, preparing information, responding to outsiders, complying with suggestions, etc. Foster and Danielian (1966) and Roberts (1965) point out the advantages they see in the in-basket technique over a case study approach, such as providing some pressure on participants, allowing scrutiny in one area while keeping a larger system in mind, and placing emphasis on the method of solution rather than just the solution.

That the simulation mode thus initiated met with considerable endorsement is implied by the large number of simulations subsequently appearing. Many of these were developed by the University Council on Educational Administration for the roles of elementary principal, secondary principal, superintendent, vocational educator, associate superintendent for business, associate superintendent for instruction and community college president. Other sources have developed simulations for training administrators of colleges (Rickard, 1966; White, 1963).

elementary school principals (Pharis, et al., 1966), research and development managers (Dillman and Cook, 1969), counselors (Beaird and Standish, 1964; and Dunlop and Hintergardt, 1968) and educational evaluators (Worthen and Hock, in press). Procedures used have generally followed the in-basket model, although exceptions can be noted. In addition, numerous "special situation" simulations and simulation games have been devised for planning educational systems (Abt, 1967), introducing educational games into the curriculum -- Fixit (Gordon, 1968), evaluating elementary schools -- the Russel Sage Social Relations Test (Damrin, 1959), providing inservice stimulation for teachers -- Project Sesame G (Goodwin, 1966; Goodwin, et al., 1969), conducting professional negotiations (Horvat, 1968), selecting personnel (McIntyre, undated), and training project directors in general knowledge about evaluation (Twelker, 1970b, d, e).

Simulation materials have also been developed for teachers: for preservice teachers (Lehman, 1966; and Project Insite, undated); for racial desegregation and problems of the inner city schools (Cruickshank, et al., 1967; Cruickshank, 1969; and Venditti, undated); and for reading teachers (Utsey, et al., 1966). A relatively elaborate and unique simulation in the area of preservice teacher training was undertaken by Kersh and his associates at Oregon (Kersh, 1961, 1963; and Twelker, 1967). Via multiple projection modes, using films and background materials (e.g., students' cumulative records), trainees were placed in the role of a practice teacher in the classroom with a supervising teacher. Films of 60 problem episodes were made focusing on the students in the class; the trainee's perspective was supposed to be that of the teacher reacting to these students. After he reacted to each episode, the trainee was presented with a filmed sequence indicating the probable, or at least one possible, outcome of his decision. Research findings from the project prompted the development of teacher education materials that may be used in a variety of less costly instructional settings (Teaching Research, 1968; Twelker, 1970c).

As is apparent in the information thus far presented, simulation materials are used in many facets of education, one primary area being personnel training. However, with the exception of (a) the two sets of simulation materials (Worthen and Hock, in press; Hock and Worthen, in press) for training evaluation personnel, (b) materials being planned by Teaching Research and the Special Media Institute (Michigan State, Syracuse, Teaching Research and the University of Southern California) and (c) a few embryonic development projects recently initiated, little in the way of simulation materials has been attempted for specifically training personnel in functional roles in research, development, diffusion or evaluation. The procedural model that might be followed in designing such simulations is next considered.

Proposed Steps in Simulation Design[7]

Eight sequential steps in designing simulations are outlined and discussed below.

I. Define the instructional problem, describe the operational educational system, and interrelate the instructional problem with the operational system.

Experts on simulation games often treat this stage of designing an instructional simulation as three independent steps; they are listed as one here to emphasize their nearly concurrent occurrence in the planning process In essence, this step involves developing the rationale justifying a search for new instructional procedures; it requires a relatively broad and long-range perspective of the substance and needs of the total instructional program. Relatedly, the

7The discussion in this section draws heavily on the work of Crawford and Twelker (1969) and Twelker (1969); the reader is directed to the original sources for a more detailed presentation.

system in which the new instructional sequence would be used needs to be described thoroughly. Contextual settings in which instructional packages are installed differ widely on many salient variables (e.g., characteristics of learners in the target groups, availability of staff and institutional resources). When the descriptions of the problem and the operational system are related, it may become clear that the problem cannot be solved given the operational setting. More likely, via several successive approximations, the problem will be re-defined or otherwise restructured to increase its solubility/compatibility within the operational system.

II. Specify objectives in behavioral terms and develop criterion measures.

Again steps listed sequentially by Crawford and Twelker (1969) are combined because of their temporal contiguity. The notion of behavioral or performance objectives is dramatically in vogue at the present time. Although not without limitation, it does seem clearly to represent an advance over the usual state of affairs in instructional sequences. Denoted are both enabling and terminal objectives, each of which ideally should contain information on the target group, the desired behavior, the givens or conditions of performance, and the degree of attainment desired. Objectives can be written in the cognitive, affective and psychomotor domains (or the recently defined interpersonal and regulatory domains) (Schalock, 1968). It will be noted below that simulations may have a pronounced advantage in "relating to" the affective component of behavior.

Performance measures to indicate degree of attainment of enabling and terminal objectives are developed in conjunction with the objectives. Interestingly, traditional measurement means can obviously be used to determine change in student behaviors; also, observational and evaluational procedures can be embedded within the simulated situation to add realism to the measuring process and hopefully to enhance the validity of the outcomes (essentially an extension of the approach suggested by Schalock, 1969).

III. Determine the appropriateness of simulation.

This particular step is of great importance (especially given the main purpose of this section). If the difficulty encountered by the authors in writing this part is at all indicative, it also looms as a particularly difficult step. It is at this point that a type of outcome-effectiveness/efficiency statement has to be generated for simulation, as well as for available alternative instructional strategies. As noted in the first part, simulation has generally not been differentially more effective than other instructional modes for imparting cognitive knowledge.

Crawford and Twelker (1969) and Cruickshank and Broadbent (1970) cite advantages and limitations of simulations that bear directly on this issue.

Simulations seem advantageous in that they:

1) Emphasize affective behavior.

2) Interrelate and integrate affective and cognitive behavior.

3) Motivate and engage the learner to initiate and sustain involved activity that often seems more relevant than classwork.

4) Emphasize interaction and serious encounters between the learner and a complex, reactive environment.

5) Emphasize incorporation of the behavior displayed within the personal style of the learner.

6) Permit application of the behavior in a variety of contexts, including allowing the novice "to be himself."

7) Emphasize a realistic "perceptual frame" or relevant set within which the learner operates, possibly as effective in this regard as field training such as student teaching.

8) Permit more control over what the learner experiences than does the laboratory or field experience.

Conversely, simulations may be inappropriate to the extent that they:

1) Lack relative efficiency in bringing about acquisition of cognitive knowledge. (Note, however, that simulations might be justified in situations where learner characteristics render more traditional instructional modes ineffective.)

2) Cost more in money and development time than other instructional modes, possibly even requiring staff training for their proper use. (Cruickshank and Broadbent, 1970, note, however, that simulations are more economical than scheduling and coordinating diverse laboratory or field experiences for all trainees.)

3) Create conditions (e.g., higher noise level, increased student physical mobility, etc.) that may "intrude" on more conventional instructional settings, particularly with simulation games.

4) Have as outcomes processes that are not easily evaluated.

5) Provide feedback (to participant responses) that often is not empirically validated or even empirically derived.

Note that it is possible for the developer to exit at this point if the outcome prognosis for simulation is not positive.

IV. <u>Determine the type of simulation required.</u>

If step III above results in a decision to consider simulation further, the type of simulation that is most appropriate must be determined. Suggested as alternative categories by Crawford and Twelker (1969) are interpersonal ascendant simulations, machine/media ascendant simulations, and nonsimulation games. (Following our earlier definitions, either type of ascendant simulation could be a simulation game if it involved competitive interactions between players.) The first type, interpersonal ascendant simulations, are at present more prevalent in education than the other two types; they typically involve player-interaction, role-playing and decision-making. Their prevalence probably is due to multiple reasons: their appropriateness for training in areas involving human interaction, particularly since the complex branching nature of interaction is horrendous to program on a machine; their relatively low cost; their adaptability to varying characteristics of learners; their tendency to place much responsibility on the learner-players for the unfolding of the simulated activity; and their natural inclusion of timely, relevant feedback (usually from other learner-players).

Media/machine ascendant simulations are those in which a major portion of the instructional program is carried by the media or machine. Examples would include the link trainer, business games that are computer-based, and classroom simulations as developed by Kersh (1963). Advantages cited for machine/media simulations include: the relative control (even of planned variability) and reproducibility of the presentation; teachers are not as threatened by the temporary shift of control to machines (as compared to the shift of control to students in interpersonal ascendant simulations); the complex stimuli can be interjected into the simulation more easily by machine.

Crawford and Twelker (1969) indicate that a number of business games have been developed that are mix-mode simulations (i.e., media/machine and interpersonal elements exist about equally).

The third category contains games such as Wff'n'Proof, Equations, and On Sets which do not attempt to simulate reality. As "intellectual games," they often have objectives close to standard course objectives and are easily inserted in the curriculum. Their development is relatively easy and inexpensive, and they are adaptable to single or multiple participants.

V. Develop specifications for the simulation.

To proceed on this step, the design personnel must have in mind both the learning objectives and a model of reality upon which the simulation will be built (except in the case of a nonsimulation game). The difficulty of achieving this step lies in the facts that there are no scientifically derived specification steps to follow, nor are there design guidelines, and there are few principles for use within particular contexts. This task is formidable but a necessary prerequisite before the following steps can be undertaken: identification of the scope of the simulation (location, particular activity, setting, time, causes, etc.); identification of the decision-makers and their motives; and identification of interactions between decision-makers and other operations, including feedback and information flow.

VI. Develop a prototype of the simulation system.

Logically following V, this step should proceed without major difficulty if the prior step were accomplished satisfactorily. Minor alterations in specifications and decisions will have to take place during this step, but effort required will be minimized to the extent that efforts on Step V were full and complete.

VII. Pilot the simulation system prototype and modify accordingly.

Regardless of the skill with which the prior steps have been carried out, Step VII is essential. Designers of the simulation must observe in detail a small-scale tryout with a limited number of students. Crawford and Twelker (1969) wisely suggest video-taping the tryout so that modification plans derived can be checked against transactions that occurred; an accurate recording and observational system would be a logical alternative if video-tape was not available. Note, too, that changing the simulation to make it more effective is only one alternative open to the designers; a decision could also be made to discard the simulation if it does not, to some marked degree, bring about the pre-set objectives.

VIII. Conduct the field trial and make further modifications.

The modified simulation should have a full-scale field trial. Supports available previously (e.g., designer present during tryout and easy modification of procedures) are no longer present; the simulation must stand on its own. Again, an accurate recording system is in order to gather data that can be used in making essential modifications. Outside evaluators are sometimes utilized, as the designer is committed by this point to a degree where his complete impartiality would be difficult if not impossible. Obviously, final refinements before implementation and dissemination are made on the basis of data collected during the field trial, including opinions of the students of the simulation. Some designers incorporate into their "final" product, procedures by which informative data come back to them from users so that future modifications or changes can be data-based.

In a recent communication,[8] it has been indicated that modifications have been made in the material from which the above steps were adopted and will soon be published. Early in the sequence, an additional necessary step appears to be defining the management and staff resources available to undertake the simulation development effort. Also, the "criterion measures" portion of Step II has been separated out and included in a later step that involves validation of the simulation system. However, despite further modifications, the steps presented here should be useful in guiding beginning efforts.

With this general model depicted, let us now turn to consider simulation with specific regard to research, development, diffusion and evaluation training.

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[8] Twelker, P. A., Personal communication, July, 1970.

Amenability to Simulation of Areas in Research, Development, Diffusion and Evaluation Training

In developing this paper, it was initially planned to merely list areas within research and research-related role training that seemed to lend themselves "naturally" to simulation as an instructional technique. This intended procedure was abandoned for the most part because the approach lacked supporting rationale.

The format subsequently decided upon and used here is much more systematized, but nevertheless is highly presumptive and open to question. Keying on the earlier work of the Task Force (see Chapter 2), skills listed under the functions of research, research-based development, diffusion and evaluation were considered individually in relation to simulation. Specifically, each skill was judged as to: (a) its susceptibility (great, moderate or little) to simulation; (b) the probable amount of work (great, moderate or little) that would be required to develop simulation materials for use in teaching that skill; and (c) the present availability (available, in progress or unavailable) of simulation materials bearing on the skill. The tables following were subsequently derived.

The judgments reflected in the tables that follow were made by the authors, with the assistance of a small number of consultants. Although not entirely arbitrary, many of the decisions about classification were based on available information and on the slimmest of "evidence." Specific reservations about the tables are listed below:

1) There is little empirical support available for decisions in the table.

2) The skills on which these tables are based are listed in a type of chronological sequence, e.g., as they would be needed in the course of a research study. Much more appropriate would be a hierarchical analysis organizing these skills and making explicit the subskills involved.

3) Certain of the skills are listed in such a manner that it is not apparent whether they are at a knowledge level or an application level. Judgments about their susceptibility to simulation are thereby more difficult.

4) Certain skills might be judged to have pronounced susceptibility to simulation, yet developing a simulation relating to the skill might not be rational, since there are much more simple and direct ways to teach the skill.

5) Listing susceptibility to simulation for each individual skill might be misleading and overly fractionating; that is, a single simulation could be designed to relate to several of the skills.

Therefore, the reader is cautioned appropriately to view the tables as a first generation effort that requires considerable refinement and empirical validation. One approach would be to ask for similar judgments from a much larger group of research and research-related personnel. Another validation technique might be to survey a small sample of research and research-related personnel, having them denote what were the severest problems faced by them in the field, and the skills required to solve these problems. An instrument listing these problems might then be sent to a larger sample to determine frequency of occurrence. From the resulting list of severe problems frequently occurring (getting at a priority dimension not currently represented in the tables), a panel of judges might be asked to select the alleviating skills most amenable to simulation.

Regardless of subsequent steps taken, the tables presented here should be considered highly tentative. However, they should be useful for making molar decisions about areas in which simulation development might be undertaken.[9]

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[9] It can be noted that this procedure essentially "jumps" to Step III in simulation design as presented in the second section above. This was done because of the great number of contextual situations that might and do exist and that would be considered in Steps II and III. In unusual contexts, certain of the judgments presented in the tables might be altered.

Table 5.2

Potential Utility of Simulation for Training in Research Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1. Drawing implications from prior research	M - G	M	IP[a]
2. Identifying and delineating significant researchable problems	L	G	U
3. Procuring research resources	G	G	A[b]
4. Managing research resources	G	G	IP[c]
5. Interpreting, evaluating and synthesizing relevant literature	M - G	M	IP[a]
6. Formulating hypotheses to be tested in the study	M - G	M - G	U
7. Specifying data necessary for rigorous test of hypothesis	M	M	U
8. Identifying population to which results should be generalized	L	L	U
9. Using appropriate sampling techniques to draw a sample	M - G	M	U
10. Understanding experimental and other systematic approaches to inquiry	L	G	U
11. Drawing on knowledge of 10 to design a study appropriate for the problem	M - G	M	A[d]
12. Applying the research design recognizing and acting on threats to validity	M - G	M	A[d]
13. Identifying behavioral outcomes for measurement	G	M	U
14. Selecting specific variables and treatments to be used	L	G	U
15. Selecting appropriate techniques of measurement	G	M	U
16. Developing measuring instruments	L	G	U
17. Assessing the validity of outcome measures	M	G	U
18. Using a variety of data gathering methods	M	M	U

(Continued)

Table 5.2

Potential Utility of Simulation for Training in Research Skills

(Continued)

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
[illegible]rganizing data for analysis	L	L	U
[illegible]nderstanding types and assumptions underlying various statistical techniques	L	G	U
[illegible]rawing on knowledge of 20 in selecting appropriate data analysis technique.	M - G	M	U
[illegible]sing aids in data processing, such as a computer	L	M	U
[illegible] Interpreting and drawing conclusions from data analyses	M - G	M	U
24. [illegible]ormulating theoretical statements about the studied behavior	L	G	U
[illegible] Reporting research findings, orally and in writing	L	M	U

[illegible] D. Gowin & J. Millman, Cornell University

[illegible] Market Place, R. E. Horn, Information Resources Inc., Cambridge, Mass.

[illegible] R & D Project Managers, D. H. Dillman & D. L. Cook, Ohio State Univ.

[illegible] J. Crawford, Jefferson, Oregon

[illegible]
M - Moderate
L - Little

A - Available
IP - In Progress
U - Unavailable

Table 5.3

Potential Utility of Simulation for Training in Research-based Development Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1. Interpreting information concerning educational goals	M	M	U
2. Drawing on research results in planning developmental activities	M	M	U
3. Conceptualizing systems, their elements, and interrelationships among elements	L	G	U
4. Specifying desired performance outcomes of instruction	G	M	IP[a]
5. Devising techniques to identify entry capabilities of learners	G	M	U
6. Identifying alternative instructional and media techniques	G	G	IP[b]
7. Determining appropriate sequences of topics in instruction	G	M	IP[b]
8. Describing the product to be developed	G	L	IP[a]
9. Constructing effective oral and written forms of instructional communications	G	M	IP[a]
10. Directing the work of production personnel	G	M	U
11. Selecting or devising appropriate techniques for measuring outcomes	M	M	U
12. Designing initial laboratory tests of developed techniques and materials	M	M	U
13. Managing initial laboratory tests of developed techniques and materials	G	M	U
14. Designing field tryouts and tests	M	M	U

(Continued)

Table 5.3

Potential Utility of Simulation for Training in Research-based Development Skills

(Continued)

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
15. Managing field tryouts and tests	G	M	U
16. Reporting evaluation of outcomes	L	M	U
17. Interpreting evaluation findings	G	M - G	IP[b]
18. Specifying revision requirements based on outcome evaluations	G	M	IP[b]

[a] P. A. Twelker, Special Media Institute Teaching Research, Monmouth, Oregon

[b] Special Media Institute, Teaching Research, Monmouth, Oregon

G - Great
M - Moderate
L - Little

A - Available
IP - In Progress
U - Unavailable

Table 5.4

Potential Utility of Simulation for Training in Diffusion Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
Dissemination			
1. Defining and analyzing characteristics of target groups	G	M	U
2. Selecting from developed packages those most effectively disseminable	G	M	U
3. Selecting most effective dissemination vehicles for target groups	G	M	U
4. Composing information for accurate and pervasive dissemination	G	M	U
5. Implementing actual dissemination	G	M	U
6. Directing technical production personnel	G	M	U
7. Designing techniques for evaluating dissemination effectiveness	M - G	M	U
8. Implementing design for evaluating dissemination effectiveness	G	M	U
Demonstration			
1. Specifying nature of demonstration	G	L - M	U
2. Selecting appropriate setting for demonstration	G	L - M	U
3. Selecting appropriate personnel for demonstration	M - G	L	U
4. Managing and coordinating the demonstration effort	G	M	U
5. Evaluating the demonstration's effectiveness	G	M	U

(Continued)

Table 5.4

Potential Utility of Simulation for Training in Diffusion Skills
(Continued)

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
Facilitating Adoption			
1. Analyzing differences between adopting organization and development site	M	L - M	U
2. Designing product modifications to fit adopting organization	G	M	U
3. Designing adopting organization modifications to fit product	G	M	U
4. Training personnel in adopting organization	L	M - G	U
5. Identifying potential barriers to implementation	G	M	U
6. Devising long-range evaluation of the installed package	M	M	U
7. Conducting long-range evaluation of the installed package	G	M	U

G - Great
M - Moderate
L - Little

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IP - In Progress
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Table 5.5

Potential Utility of Simulation for Training in Context Evaluation/Situations Analysis Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1. Identifying goals of the system	M - G	M - G	A[a,b]
2. Assessing the social relevance of these goals	M	G	A[b]
3. Identifying values that are implicit in the system goals	L - M	G	U
4. Identifying standards decision-makers use in interpreting data provided	G	M	U
5. Clarifying and explicating desired outcomes of the system	G	M	A[a,b]
6. Measuring current actual system outcomes through demographic analysis	M - G	G	U
7. Measuring current actual system outcomes through economic analysis	M - G	G	U
8. Measuring current actual system outcomes through psychometric analysis	M - G	G	A[a]
9. Measuring current actual system outcomes through systems analysis	M - G	G	U
10. Measuring current actual system outcomes through observational techniques	M - G	G	U
11. Comparing actual with intended system outcomes to identify discrepancies and needs	G	L - M	A[a,b]
12. Explicating problems creating the needs and diagnosing causes of the problems	M - G	G	A[a,b]
13. Assisting system personnel to develop objectives to satisfy needs or solve problems	L	L	A[a,b]
14. Designing a monitoring system to provide feedback on the operating system	G	L - M	U

[a] B. R. Worthen & M. D. Hock, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

[b] M. D. Hock & B. R. Worthen, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

G - Great
M - Moderate
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IP - In Progress
U - Unavailable

Table 5.6

Potential Utility of Simulation for Training in Program Planning/Input Analysis Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1. Assisting system personnel determine operational feasibility of proposed objectives	L - M	L - M	U
2. Assisting system personnel establish priorities for the selected objectives	L - M	L - M	A[a,b]
3. Identifying and rating alternative strategies for attaining the selected objectives	L - M	L - M	A[b]
4. Identifying and rating available resources for support	L	L	A[a,b]
5. Selecting an implementation strategy	L	L	A[a,b]
6. Selecting support sources and resources to be used in implementing program	M	M	U
7. Predicting potential barriers to success and strategy's potential for overcoming them	M - G	M	A[a]
8. Identifying most-likely-successful tactics to implement selected strategy	M - G	M	U

[a] B. R. Worthen & M. D. Hock, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

[b] M. D. Hock & B. R. Worthen, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

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M - Moderate
L - Little

A - Available
IP - In Progress
U - Unavailable

Table 5.7

Potential Utility of Simulation for Training in Process Evaluation/Program Monitoring Skills

	Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1.	Designing and selecting indicators of progress in educational progress	M - G	M	U
2.	Monitoring the program using multiple techniques to detect deviations from design	M	G	A[a,b]
3.	Anticipating barriers and remaining alert to unanticipated problems	M - G	M	A[a,b]
4.	Providing immediate feedback to decision-makers for their use	M	M	A[a,b]
5.	Perceiving human relations problems that threaten the program	M	M - G	A[b]

[a] B. R. Worthen & M. D. Hock, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

[b] M. D. Hock, & B. R. Worthen, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

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Table 5.8

Potential Utility of Simulation for Training in Outcome Evaluation Skills

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
1. Applying appropriate designs to evaluation studies	G	M	A[a,c,d,e]
2. Designing criteria and data collection procedures to measure the effectiveness and efficiency of existing innovative practices and products	G	M	A[c,d]
3. Translating objectives into behavioral terms, if necessary	L	L	A[b]
4. Identifying situations where designated behavior can be observed and recorded	M	M	A[c,d]
5. Establishing standards for judging whether objectives have been attained	M	M	A[c,d]
6. Selecting or developing measurement techniques to yield data bearing on standards	L	M	A[a,c,d]
7. Assessing the validity of outcome measures	L	M	U
8. Collecting data prior to analysis	L	G	A[e]
9. Organizing data prior to analysis	L	M	U
10. Selecting an appropriate technique to analyze data	G	M	A[e]
11. Analyzing the evidence yielded by evaluation	L - M	M	U
12. Judging strength of plans and procedures employed to meet objectives	M	M	U

(Continued)

Table 5.8

Potential Utility of Simulation for Training in Outcome Evaluation Skills

(Continued)

Skill	Susceptibility to Simulation	Probable Amount of Work Required	Present Availability of Simulation Materials
13. Explaining the outcomes as a function of plans, procedures, and resources	M	G	U
14. Deciding upon recommendations based on outcomes	M	M	A[e]
15. Estimating impact of outcomes on problem area being served	L	M	U
16. Providing information to allow decision-makers to continue, modify, or terminate program	M	M	A[c,d]
17. Specifying needed changes in context evaluation system due to decisions about program continuation	M	M	U

[a] Impact Evaluation Game, P. A. Twelker, Teaching Research, Monmouth, Oregon

[b] R. Hammond, EPIC, Tucson, Arizona; Special Media Institute, Teaching Research, Monmouth, Oregon

[c] B. R. Worthen & M. D. Hock, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

[d] M. D. Hock & B. R. Worthen, Worthington, Ohio: Charles A. Jones Publishing Co., In Press

[e] UCLA Center for Study of Evaluation and Instructional Programs

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Important Issues Involving Simulation in the Training of Persons in Research and Research-related Functions

The basic issue, mentioned previously, is the extent to which simulation is an appropriate instructional mode for training in research, development, diffusion and evaluation. While a direct answer to this query is not possible, three positive factors can be pointed out. First, several of the advantages listed in the second section of this paper for simulation as an instructional technique are nearly unique to simulation. For example, simulation would allow the trainee to be exposed to a variety of realistic situations, involving him by requiring decisions on his part. Comparable realism would surely be as obtainable (even more obtainable) in an actual field situation, but exposure to a variety of such experiences in a relatively short time period under "controlled" conditions would not. A second factor bearing on this issue is that a limited number of simulations has been developed in this area, and developers and users almost unanimously report satisfaction with the performance of these products.[10] Finally, there is an apparent need for the development of viable alternative training procedures in this area; simulation seems to qualify as an alternative of some potential. Thus, although not directly resolving this issue, the authors feel warranted in concluding that there should be support for a sustained developmental effort in research and research-related role training to determine the operational strengths and weaknesses of simulation.

Considered below are other issues grouped into development issues and administrative issues. No attempt has been made to be exhaustive; several

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[10] Of course, such satisfaction may be true of developers of most products, but satisfaction of users is a more rare commodity.

development issues raised by Cruickshank and Broadbent (1969) are not included (e.g., game quality, feedback and realism), nor are issues related to simulation instructors (e.g., role of the director) or simulation evaluators (e.g., specificity of outcomes and transfer of training). The development issues that are considered here are not considered elsewhere for the most part; they reflect the authors' thinking on some of the apparently more critical issues.

A key issue in development is the lack of basic research that bears on the development of simulation. This type of research has been neither funded nor undertaken independently. There is little agreement as to the design parameters that such research should have; there is little consensus as to which are the crucial variables to study, or as to which dependent variables to use. Thus, this lack of a programmatic research effort on matters related to simulation creates a number of problems and uncertainties that the developer must face.

A second issue in development, related to the first, revolves about the relative effectiveness and efficiency of simulation compared to other instructional alternatives. Hard data on this issue essentially do not exist. For example, in the area of simulation games, few games lend themselves well to researching their own effectiveness/efficiency (and essentially none were developed primarily for research); often the pronounced differences permitted in game administration are more than sufficient to mask effects of studied variables on game outcomes. Important questions about the relative effectiveness and efficiency of simulation experiences compared to internships/apprenticeships have not been answered, e.g., there is no empirically supported estimate of the extent to which an effect during a simulation approximates that experience in the related phase of an internship.

Another issue concerns how the simulation development is to proceed. Guidelines for simulation design and development that have been extensively and empirically validated are unavailable. There are very few "if-then" principles that have been derived in this area; little has been done to link design format to the context in which the simulation will be used. Particularly missing are agreed upon standards for the evaluation of simulations; procedures have not been established to determine the external validity of simulations (in the absence of the developer, certain simulations have been known to operate poorly); and little information exists bearing on the degree of acceptability of simulation in differing operational settings.

The issue of resource cost of the simulations looms as a particularly critical one. This includes both monetary and time costs during development periods and subsequently when the simulation is being used. These costs are essentially unknown and should not be underestimated; properly developing a simulation can be a costly and complex undertaking, and in operational settings, staff beginning to use the simulation who are unfamiliar with the technique may need inservice training. The comparative costs of different types of simulation (interpersonal ascendant, machine/media ascendant, and nonsimulation games), during both development and use, must also be considered.

Other development issues center around the possible uses that can be made of simulation. Already alluded to has been the matter of whether simulations can be used as appropriately for assessment as for instruction. How appropriate is it to think of developing simulations to train the educator to be a wise evaluation-consumer or research-consumer?

Another development issue is whether the simulation should be designed to replicate a portion of, or a total, system (e.g., in researcher training, whether the simulation involves only applying for grant funds or whether it involves carrying out several elements of the study, from securing resources to data interpretation). It can be noted that a series of unrelated, short simulations might take on the characteristics of exercises and, as such, be less likely to generate the involvement or affective potential that a longer, articulated simulation would. In this connection, it can be speculated (as noted above, no hard data are available on this issue) that very few field internships provide experiences characteristic of those required of the "whole" researcher. Allowing for exceptions and depending upon the site and length of the internship, the trainee is likely to experience only the construction of measuring instruments, or only data collection, or only data scoring, or only data analysis, etc. Realistically, trainees normally seem to get a massive dose of training in one or a few skills and little else. Opportunities to work with a "master" or even an experienced researcher are limited, at best. A carefully worked out simulation could provide a series of integrated experiences in a short time period, experiences that would not be duplicated in most internship situations. (Note, though, that such simulations ordinarily would be used in addition to internships rather than in lieu thereof; internships provide learning experiences of other kinds.)

Turning from development of simulations to a brief consideration of administrative issues, one major issue involves the incorporation of the simulation(s) into research training programs. Whether they are better used for orientation or for synthesis near the end of training (see La Grone, 1964) is an open question. Gagné (1962) feels that simulations are more appropriate for later than for earlier learning. On the other hand, simulations might make beginning trainees feel more involved, more quickly, in educational research (possibly helping to reduce the number of capable trainees who drop out, etc.).

Other administrative issues include how long the simulation should be, whether practice is spaced or massed, and the size of the group involved in the simulation (Cruickshank and Broadbent, 1970). Expanding somewhat on the last issue, it can be observed that by designing and conducting certain simulations for teams, and by placing on teams (with the trainees) educational practitioners of various types (e.g., superintendents, principals, supervisors, teachers and board members), the trainees might gain some highly maturational "hard knocks" in the security of a simulated school situation. Such experiences might make them more knowledgeable in important humanistic ways (e.g., learning of constraints on persons filling these educational roles, their motivations, their perceptions of university researchers).

Related to the issues of spacing of simulation experiences and length of the simulation, and noteworthy, is consideration of the merit of a simulation carefully designed and validated to be used in a controlled, sequestered setting; i.e., it would be a "live-in" simulation conducted at a simulation training center. The control possible in an intensive live-in experience, say, of a week's duration has much to be said for it, particularly when many well developed products fail when used by persons lacking specific training in their use. There would be a continuing role at such a center for trained instructors, and a role for R, D, D and E experts (both in the design and validation of the simulation and as a jury during early tryouts of the simulation at the center). And how often is it possible for trainees to be exposed to the thinking of a master researcher? Given appropriate staffing, such a center might make this possible. The intensity and quality control possible at such a center would suggest that due deliberation and consideration be given to such an undertaking.

Suffice it to say, from the issues considered briefly above, that a great number of issues relate directly to simulation. These issues and others should be made even more explicit for those contemplating the development or use of simulation in the training of evaluators, diffusers, developers or researchers.

Summary

This section has included (a) a general review of the use of simulation as an instructional aid, (b) suggested steps in developing simulations, (c) a listing of research and research-related skills that might be taught through simulation, and (d) a discussion of some issues that are in need of resolution before simulations can be confidently developed and administered in programs designed to train research and research-related personnel. Much work needs to be done before precise specifications can be outlined for use in developing relevant simulations for training such personnel. In the meanwhile, it is the opinion of the authors that the technique holds sufficient promise to warrant attempts to develop, use and evaluate it as an alternative method of training educational research, development, diffusion and evaluation personnel.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The activities reported in the previous chapters were undertaken in response to an obvious need for a coordinated approach to the training of research and research-related personnel in education. The expertise possessed by such personnel is essential in building a knowledge base which will make possible the massive improvement needed in American education. In this initial project, therefore, the Task Force concentrated on furnishing preliminary information concerning the kinds of knowledge and skill required by research and related personnel and baseline data on programs for training in educational research and research-related areas. It should be stressed that this is a report of research and developmental efforts per se and, consequently, the conclusions and recommendations included in this chapter are restricted to those that can be inferred rather directly from the data and procedures discussed in this report. Task Force deliberations have resulted in other positions and recommendations that are based more on collective judgements than on data; these position statements will be presented later in a separate document (Technical Paper No. 18, to be distributed in February of 1971).

Summary and Conclusions

Four major areas of investigation were undertaken in the course of this study. The first was the development and testing of a classification system of skills necessary for the conduct of research, development, diffusion and evaluation in education. The second was an analysis of the AERA employment service data from 1968, 1969 and 1970, with special attention to the demand for and availability of research and research-related competencies. The third study was an analysis of characteristics of trainees in Graduate Research Training Programs funded under Title IV of the Elementary and Secondary Education Act of 1965. The fourth effort involved examination of alternative approaches to the training of educational researchers in specific areas of competence.

Classification System for Research-related Skills

The development and testing of a classification system for research and research-related skills in education was reported in Chapter 2. Initial discussions among members of the Task Force resulted in the listing of several functions related to educational inquiry; these discussions were followed by individual conceptual efforts which yielded lists of skills required for the several functions. The skill lists were modified and organized into a classification system which was then tested in telephone interviews on a sample of 58 employers or supervisors of educational research and research-related personnel in ten institutional settings.

Results of the telephone interviews showed that the most important skills and those which are in shortest supply are skills involving, in a broad sense, identification and description of problems and goals, and evaluation of success in solving those problems and reaching those goals. It is accurate to say that the skills which are most urgently needed are those requiring the exercise of judgement, and not simply the application of standard methods and techniques to standard problems and situations.

It would appear, in other words, that the most needed skills are those which, in the opinion of the interviewees, are hardest to train for. This conclusion is evident in Appendix D, where the interviewees' opinions regarding the level of difficulty involved in training for the needed skills are reported. Nearly all of the skills requiring judgements were categorized as requiring long term training, and in many cases an internship/apprenticeship/practicum experience was suggested by the interviewees. There were also frequent references to the fact that on-the-job experience and exposure to real problems are necessary for the development of some of the most important skills.

In the final section of Chapter 2, the classification system was re-examined and the skills required for educational research and educational evaluation were reconsidered. Under the research heading, thirteen major skills were identified and their importance was discussed for three separate types of educational research: empirical, behavioral research; empirical, nonbehavioral research; and research on methodology. For educational evaluation, ten general skill areas were identified as important. A discussion followed of essential knowledge of methodology required by educational researchers. It was held by the authors of this section that many educational researchers may not need as detailed knowledge about each specific research technique as is often supposed; on the contrary, they need to have only a working knowledge about each area of research methodology relevant to the discipline within which they work. In-depth knowledge of the discipline is a more critical concern and, in and of itself, demands extensive preparation. It was argued in this section that only for specialists in particular techniques (e.g., statisticians) would one need to go beyond mastery of these essential skills and content of the relevant discipline.

It was noted at the conclusion of this section that, until more effective ways to train persons and inculcate in them the necessary skills are developed, such skills might best be learned through apprenticeship training of some type. At present, direct teaching of many necessary skills is not included in formal coursework and it appears likely that it will be some time before techniques are developed to effectively transmit many of these skills in the classroom. In the interim, it may be not only desirable but necessary to depend on apprenticeship training to transmit many important skills.

Analysis of AERA Employment Service Data

In an effort to provide information on the relative demand for and availability of research skills and areas of competency, the Task Force examined the AERA employment service records for 1968, 1969 and 1970 (see Chapter 3). For each year, the competencies required by employers for specific job openings and those listed by applicants for positions were compared and apparent discrepancies were noted and discussed.

In addition, for the 1970 employment service the Task Force administered a checklist containing 39 skills derived from the original classification system. Employers and applicants were asked to indicate the degree of skill required or possessed for each item, and chi-square tests were run to determine the significant differences between employer and applicant responses, and between university and non-university employer responses. Although several items did yield significant values, no pattern was evident in the differences between employer and applicant responses. In the other between-groups comparison, it was found that evaluation skills are required in a higher degree for non-university positions than for those inside the university.

Overall the employment service data for the three years indicate the following:[1]

1. Whereas the number of applicants remained relatively stable from 1968 to 1970, the number of positions has declined markedly; the ratio of applicants to positions rose from 1.17:1 in 1968 to 1.76:1 in 1970. It was noted, however, that if those positions (both those available and those sought) which are classified as nonresearch are eliminated from consideration, then the ratio of applicants to positions is about the same for 1968 and 1970--roughly two to one each year.

2. In 1970 (as compared to 1968) applicants had dramatically fewer potential positions to choose from in competence areas such as educational research, research design, survey or institutional research, evaluation of instructional products, instrument development and construction, and elementary and advanced statistical techniques.

3. Results from the 1970 telephone interviews (reported in Chapter 2) revealed many competence areas that are considered both important and in short supply by project directors, research organization heads and other employers of research and research-related personnel. There was only limited correspondence, however, between those competence

[1]It should be noted that it is not known whether these findings are true for the educational research community in general or only for that portion of it represented by users of the AERA employment service.

areas and the skills which were in most demand at the 1970 AERA employment service. Two possible explanations were offered. Perhaps the relatively recent budget restrictions placed on program directors and other employing organizations are such that their critical personnel needs are not accurately reflected in vacancies on the job market. Or perhaps the lack of correspondence represents an implicit criticism by employers of the level of competence of present or available personnel in certain important skill areas.

4. In none of the three years was there evidence of the large numbers of vacancies in the areas of educational development and diffusion that had been predicted by Clark and Hopkins (1969).

5. Examination of the data concerning geographic location showed that there were marked discrepancies between the number of positions available and the number of applicants preferring positions in the South, the Midwest and the Pacific/West Coast regions (fewer applicants than openings in the South and Midwest, and more applicants than openings in the Pacific/West Coast region). Overall, however, a very large proportion of the applicants expressed no strong geographic preference at all.

Title IV Graduate Research Training Programs

As a first step in determining what research skills and knowledge are being learned in formal training programs, the Task Force undertook to describe the graduate research training programs funded under Title IV and to compare the 1969-70 trainees with those studied earlier by Sieber (1968) for 1966-67. The following observations were noted in Chapter 4.

1. While the characteristics of the 1969-70 trainees were similar to those of the 1966-67 group, there were some important differences: The 1969-70 group was somewhat younger and more of them were recruited directly from their previous degree program; this group also had a broader disciplinary base and tended more often to be seeking the Ph.D. rather than the Ed.D.

2. The training programs, for the most part, were located at good research institutions and included a strong interdisciplinary emphasis; the trainees were very talented academically, receiving GRE and MAT scores on a par with or higher than those of a majority of students in virtually every professional and substantive field referenced.

3. Although the trainees, the program directors and the research units in which the programs are located have been well described, the actual experiences of the trainees in the course of their work -- i.e., the substance of the Title IV programs -- are not adequately known; thus it is difficult to know whether the graduate research training programs are providing the skills and knowledge which are essential for the conduct of educational research.

4. On balance, the Title IV programs are deserving of strong continuing support.

Alternative Approaches to Educational Research Training

Chapter 5 contains a discussion of alternative approaches to the training of educational researchers. The discussion is in three parts: (1) a survey of inservice training programs of professional organizations in areas outside educational research, (2) a brief description of training possibilities stimulated by the Task Force, and (3) a detailed examination of one of the training techniques proposed as a result of Task Force solicitation.

Examination of the inservice training programs of six professional organizations showed that the most common training vehicle is a traveling course of one to three days' duration. The course subjects are generally solicited informally from the membership or selected from current literature, and the course content is developed within the organization. Participants are selected through self-screening and a tuition fee is usually charged. It was concluded that some elements of the training programs examined held promise for future AERA educational research training efforts.

Investigations of three training possibilities were stimulated by Task Force activities. The first of these is the development of a library of cassette tapes on current research topics. The second involves transportable packages of training materials which might be developed from existing AERA presession materials. The third is a consideration of the uses of simulation techniques in the training of educational researchers.

The possibility of applying simulation to educational research training was examined in detail in Chaper 5. Consideration was given to the use of simulation for instructional purposes in general and its use for training personnel in educational inquiry roles in particular. Special attention was then directed to a determination of those areas within educational research, development, diffusion, and evaluation which may be amenable to a simulation format.

Specific examination of the possible use of simulation to transmit those skills which were judged earlier to be most important and in shortest supply (from Chapter 2) led to the following observations:

1. The most needed research skills are also those which seem least susceptible to simulation, require the greatest amount of work to develop relevant simulation materials, and currently have no simulation materials available.

2. In both development and diffusion, the most needed skills seem more susceptible to simulation and developing relevant simulations entails a more moderate amount of work; again, however, no simulation materials are currently available.

3. The evaluation skills were judged as quite susceptible to presentation by simulation and developing relevant simulations requires only a moderate amount of work; in this category, simulation materials are available and are currently in use.

Chapter 5 concluded with a discussion of developmental and administrative issues which must be taken into account in considering the uses of simulation for research training.

Recommendations

On the basis of the summary above and the more detailed presentations in the previous chapters, the following recommendations seem in order.[2] These do not constitute a panacea for all the problems of the educational research community; such was not intended. Rather this was viewed as a pilot effort to explore the training needs of educational researchers and research-related personnel, to suggest possible methods

[2]Many of the recommendations in this section are incorporated in the proposal for further Task Force activity during 1970-71, which appears in Appendix N. In some cases, that document provides a more detailed statement of specific tasks to be accomplished and objectives to be met.

for improving the training of such personnel, and to recommend new or continuing studies where appropriate.

1. The classification scheme developed so far in the course of this project represents substantial progress in describing the skills needed by educational research personnel. Nonetheless it is incomplete. It needs refinement in some areas; extension and expansion in others. Specifically:

   (a) Greater attention must be devoted to activities involving historical and philosophical inquiry -- activities which were neglected in earlier work.

   (b) A way must be found to get at the substance of educational development and diffusion activities. (These activities are inadequately described at present; consequently the requisite skills and knowledge are ill-defined.)

   (c) Partly to achieve these goals, further testing of the classification system should involve a wider and probably a larger sample; in particular, the sample should include greater numbers of individuals engaged in historical and philosophical inquiry.

   (d) In addition, validation of the classification system should utilize a task analysis approach and other techniques to identify skills and knowledge omitted from the present lists and to make possible the description of major areas of activity which may have been overlooked in the present system.

2. It is not known to what extent personnel now involved in educational research, development, diffusion, and evaluation (RDDE) actually possess the skills and knowledge which are regarded as necessary for

the successful performance of research-related tasks. Similarly, it is not known to what extent participants in current research training programs are acquiring the essential skills and knowledge. It is therefore recommended that the following activities be undertaken as steps toward providing this information:

(a) Devise a means of assessing the level of competence of RDDE personnel in critical skills and knowledge.

(b) On the basis of careful, in-depth examination of program content, assess the degree to which existing training programs -- specifically under Title IV -- provide the requisite skills and knowledge.

(c) Examine products (graduates) of individual research training programs in terms of career indices such as research involvement and productivity and relate these to differential patterns within individual programs.

3. Since passage of the Elementary and Secondary Education Act of 1965, it has been widely held that there will be (or is) a great demand for RDDE personnel -- a demand which almost certainly cannot be met by existing training programs. The Task Force cannot say with certainty whether such a situation now exists in the educational research community as a whole. On the basis of AERA employment service data for 1968, 1969 and 1970, however, it appears that there is not presently a serious undersupply of personnel in research and research-related fields. On the contrary, the number of positions open has declined over the three years studied, while the number of applicants has remained constant. It is therefore recommended that:

(a) Considerable effort should be devoted to determining the numbers of RDDE positions which will exist over the next 3 to 6 years and the numbers of RDDE personnel who will be available to fill them.

(b) As a part of that effort, an attempt should be made to determine the functional orientation of positions and available personnel, with particular attention to educational development and diffusion.

4. The accomplishment of the tasks included under 1, 2 and 3 above should establish the basis from which specific, substantive recommendations may be made concerning an optimal approach to research training. In the interim, however, it is still possible to suggest ways in which current training efforts might be improved. To that end the following statements and recommendations are offered for consideration:

(a) Since there is too much to communicate to graduate research trainees in the amount of time normally spent in a training program,[3] greater attention should be given to recruitment. If trainees are recruited who already possess considerable knowledge and skill relating to the discipline, then more time may be spent within the training programs on those competencies which are peculiar to research, development, or evaluation.

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[3]This is true even if one accepts the earlier premise that not all educational researchers need in-depth training in all research specialities. Even the few essential skills mentioned and knowledge of a relevant discipline represent more content than can be communicated to a trainee in the time normally allotted to graduate training.

(b) Outside of graduate programs, those involved in research training must <u>at present</u> depend on ancillary strategies for teaching many of the essentials.[4] Specifically, AERA should initiate efforts to provide short-term learning opportunities -- such as workshops, institutes, and self-contained, exportable, programmed materials -- which have promise of reaching broad audiences and providing training in some skills and knowledge now in short supply.

(c) Given the adaptability of many of the development and diffusion skills to training through simulation, and the paucity of materials for such training, it is urged that AERA initiate the development and testing of materials for appropriate skills in these activities.

(d) Many of the skills which have been described as critical for the successful conduct of educational inquiry are not now being effectively taught through formal coursework or through the ancillary strategies listed in (b) above. Rather, these skills (e.g., drawing conclusions, assessing goals, and reporting results) are generally learned through experience, often under the tutelage of a senior researcher. For this reason, it is strongly urged that graduate training directors make every attempt to provide meaningful practicum experiences -- preferably of an apprenticeship nature -- for their trainees, since it

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[4] The present is stressed here in cognizance of the possibility that as more effective techniques are developed, we may be able to do a more adequate job in formal training and reduce dependence on some of these ancillary strategies. This simply remains to be seen.

seems to be the sole vehicle at present for inculcating certain critical skills and sensitivities.

5. The recommendation that can be stated most unequivocally is that studies of the type proposed in Appendix N herein be continued. We know far too little about many important variables and parameters of training research and research-related personnel in education. It is ironic that researchers, who as a group spend a great deal of time generating data to test the effects of educational practices, have spent so little time generating information that would shed light on the efficacy of current practices in training educational researchers. Such information is badly needed before we can be assured that our training programs are based on a sound knowledge base and on systematic tryout and evaluation of alternative training modes. The present report represents only a tentative first step in this direction and further studies in the area are obviously needed.

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