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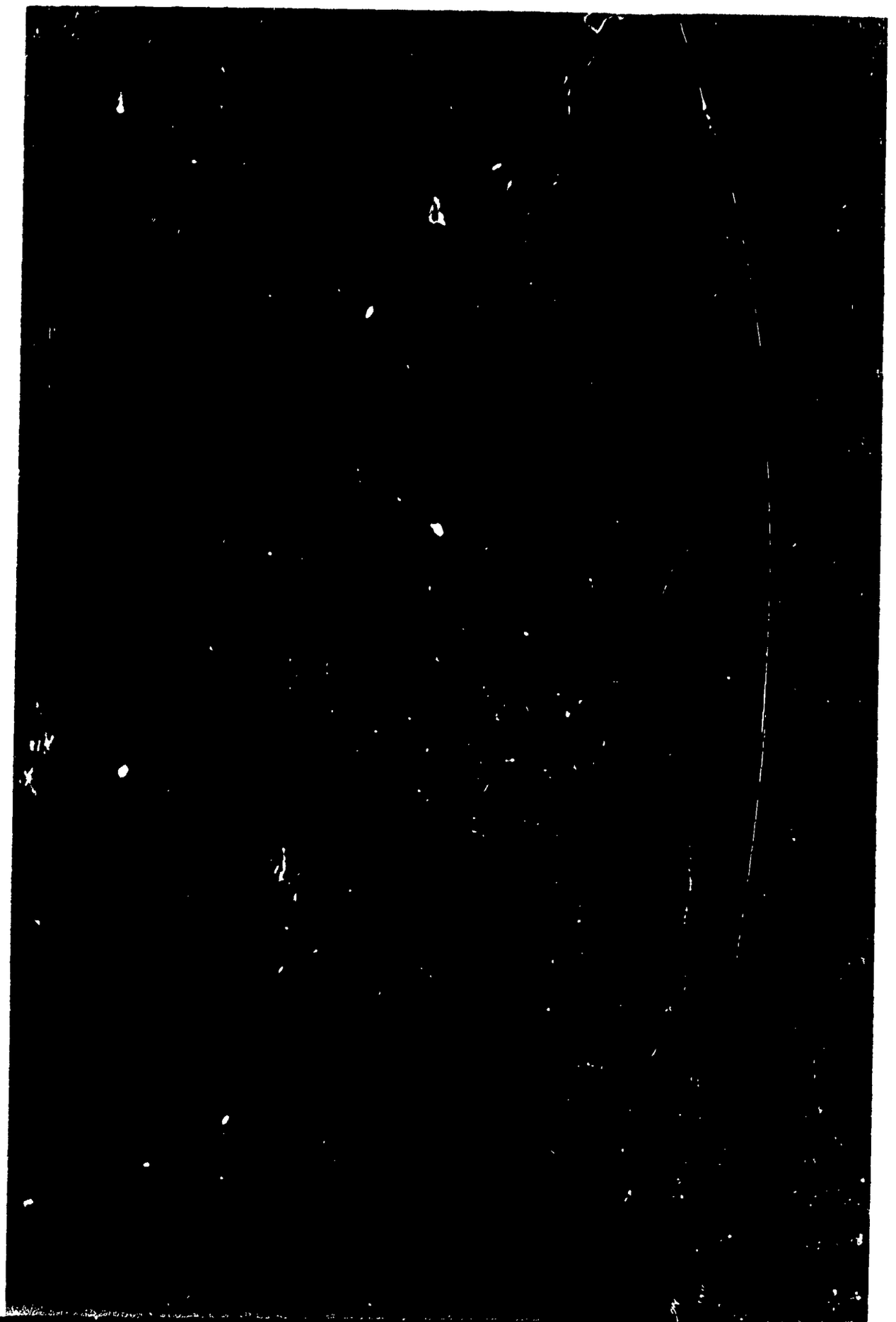
ABSTRACT

This manual describes procedures for conducting a program to train personnel for educational research and development (R & D). It is intended as a guide for any institution planning to administer such a training program. The program may be utilized in several ways. They are: (1) for training various types of personnel for educational R & D; (2) as an independent training program; (3) for inservice training; (4) as an adjunct to regular academic training; and (5) in helping to meet the economic conversion problem, that is, preparing unemployed professionals for new fields. The manual is divided into four areas. They are: (1) a program overview which includes program objectives, rationale, and description; (2) the instructional model including the curriculum outline, instructional system, and apprenticeship; (3) recruitment and general program management considerations, that is, publicity and application and selection procedures; and (4) job placement activities focusing on job hunting strategies and relevant federal programs. The manual is based on a 1971 pilot program experience that cross-trained physical scientists for work in educational R & D. (Author)



PROCEDURES FOR CONDUCTING
AN APPRENTICESHIP WORK-STUDY PROGRAM

by

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American Institutes for Research

1972

PREFACE

This manual describes procedures for conducting a program to train personnel for educational research and development. It is intended as a guide for any institution which is planning to administer such a training program.

The program may be employed to train various types of personnel for educational R&D. It can serve as an independent training program. But it can also be used for in-service training or as an adjunct to regular academic training. In addition to its other uses, the program is also useful in helping to meet the problem of economic conversion. In the coming decades, significant changes in national priorities may result in unemployment in certain fields. The program provides a method for preparing unemployed professionals for new fields in which their skills are in demand.

The program is designed to run approximately three months; it emphasizes the transfer of existing skills and it features individualized learning. An individual set of objectives is established for each trainee. Learning activities, including seminars, independent study, and apprenticeship work, are then prescribed to help each trainee meet his objectives. Trainees spend about half of their time studying topics and problems in education, and half of their time working on actual R&D projects.

This manual is divided into four chapters. The first presents an overview of the program and the others describe procedures and materials for administering the various components of the program.

The information in this manual is based on the experience of a pilot program conducted in late 1971. The pilot program cross-trained physical scientists for work in educational research and development. A final report* describes that experience in detail. Much of the information contained here is also contained in that final report. This manual, however, focusses on how to conduct a future program while the final report focusses on what happened in the pilot program.

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*Millstein, E. Final report. Development of an apprenticeship work-study program model for the cross-training of physical scientists for work in educational research and development. Palo Alto: American Institutes for Research, 1972. Grant No. OEG-0-71-7412. United States Office of Education, National Center for Educational Research and Development.

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OVERVIEW OF THE PROGRAM

Objectives and Rationale of the Program

The program is designed to train personnel for educational research and development. For the most part, traditional training employs classroom techniques, emphasizes doctoral degrees in pure research, and requires several years for completion. There is a need for new training programs which provide effective short-term training in applied research and development at levels other than the doctoral. This program helps to meet that need. It is a three-month program which focusses on applied work; it is targeted for people with B.A. and M.A. degrees; it is individualized and provides "real-time" experience through apprenticeship work.

From the point of view of the trainees, the program is designed to give them the opportunity to:

- study educational R&D;
- analyze the knowledge, interests, and skills they now possess which are applicable to educational R&D;
- establish, with professional assistance, a set of personal learning objectives;
- pursue the development of those additional skills and knowledge required to meet the new career goals they establish for themselves;
- acquire experience through supervised apprenticeships on actual R&D projects;
- take advantage of job leads and contacts provided by the program.

The program aims to cross-train rather than train or retrain. Cross-training is defined as a process in which students are taught to apply their existing skills to new situations. Transfer of skills rather than the teaching of new skills is emphasized. This approach is adopted because it takes full advantage of existing talents and skills, and therefore results in very efficient preparation for work in educational research and development.

Description of the Program

Length of program--Approximately three months, but flexible.

Site--An educational research and development organization.

Target population--Flexible. Program may be targeted for in-service trainees, for students, or for other persons wishing to enter the field of educational R&D.

Instructional system--Individualized program of studies for each trainee based on a set of personal instructional objectives.

Curriculum--Learning theory. Instructional methods and materials. Evaluation and evaluation models. Measurement. Educational statistics. Legal, social, and political aspects of education. Employment possibilities.

Recruitment procedures--Depends on target population.

Selection criteria--Evidence of interest in education. Existence of specific personal career objectives in education. Existence of skills useful in education. Reasonable salary expectations. Evidence of success in college and employment.

Stipend--Depending on the target population the program may or may not include a trainee stipend.

Assistance with job placement--Assistance in locating openings and applying for jobs. Employment recommendations.

CHAPTER 2

THE INSTRUCTIONAL MODEL

This chapter is divided into three sections. The first outlines the curriculum. The second describes procedures for administering the instructional system. It includes information on how to identify individual objectives, how to prescribe learning activities, and how to monitor trainee progress. The third section deals with administering the apprenticeship component. It includes information on how to select, assign, and monitor apprenticeship tasks.

Outline of Curriculum

The cross-training program features individualized instruction. Trainees are given assistance in selecting a set of individual objectives. They then participate in learning activities which help them meet these objectives. The individual progress of each trainee is monitored. Learning activities include the apprenticeship, guided independent study, and group instruction. This section is devoted to the content or curriculum within this instructional system. Specifically, it focusses on the content of the group instruction and the guided independent study. The content of the apprenticeship is discussed in another section.

The instructional objectives define the overall curriculum of the program. Appendix A contains a list of the 130 instructional objectives which may be used in this program. A variety of sources were consulted in the development of objectives including materials produced by the Far West Consortium for DD&E Training. The list is organized by the following skill categories:

- library skills,
- instrumentation,
- data collection,
- data analysis,
- proposal preparation,
- product development,
- evaluation,
- marketing, dissemination,
- implementation,
- write-up and publication,
- scheduling and management.

At the beginning of the program a relatively large amount of time will probably be spent in group activities and assignment. As the program progresses, however, trainees should begin to spend more time in individual activities.

Group Activities

Group activities and assignments include lectures, seminars, reading assignments, films, field trips, and other activities. Lecture and seminar topics should probably include the following:

- Introduction to and overview of the training program
- Overview of educational research and development
- Summary of educational R&D projects currently being conducted at the host institution
- Kinds of apprenticeship positions available
- General skills involved in educational R&D
- Job search strategies

These topics are designated for seminars because they are most likely relevant to all of the trainees. Depending on the individual objectives of the trainees, there may be enough commonality to warrant conducting seminars or lectures on other topics such as behavioral objectives, incentives and accountability, behavior modification, proposal writing, test construction, evaluation, and programmed instruction.

Resources and materials for group activities are included in Appendix B. An excellent source for assistance in the selection of appropriate films should be pointed out, however. It is Schneider, J. M.; Barnett, A.; and Addis, M. Films in the Behavioral Sciences: An Annotated Catalogue. The catalogue contains descriptions of approximately 1300 films. They are organized both by title and subject area.

Group activities may be further described by presenting some examples from the pilot test of this program. The prescribed activities for studying behavioral objectives will serve as a general example. Trainees read Mager's book Preparing Instructional Objectives. They wrote three behavioral objectives in a subject of their own choosing. They then reviewed the behavioral objectives specified in Project PLAN, selected five well-written objectives and five poorly written objectives, and explained the reasons behind their selection. The assignments were

checked individually. Trainees who experienced difficulty writing objectives were asked to write more. Each trainee was expected to demonstrate mastery of the basic concepts. Near the close of the day trainees participated in an hour seminar on behavioral objectives. As a team, they tackled a problem more difficult than the individual assignments worked on earlier in the day.

The events on another day exemplify a different kind of group activity. The morning consisted of a field trip to the Brentwood School--a public elementary school in a black neighborhood. It featured innovative instructional procedures and a sophisticated computer-assisted instruction system developed in part by Patrick Suppes of Stanford. The early part of the morning was spent in a round table discussion with Brentwood's principal and three teachers. The discussion centered on skills that physical scientists have which are relevant to educational problems in the Brentwood school and schools like it. Next trainees were given a tour of the computer-assisted instruction system while it was being used by the elementary school students. Trainees also had the opportunity to sit at a computer terminal and experiment with this mode of instruction. In the afternoon a lecture-seminar was held at AIR on computer-assisted instruction. Discussion focused on special advantages and limitations of the technique. This was followed by a presentation for those interested in the more technical aspects of C.A.I. including an overview of the computer language and a review of cost factors.

A third kind of experience was provided when the trainees attended the 2-day Eighth Invitational Conference on Systems Under Construction for Career Education and Development hosted by AIR. Papers presented at the conference fell into two categories: (1) models for career education and (2) reports on the status and progress of various guidance systems. Trainees attended all sessions of the conference. It provided the opportunity to review the most recent accomplishments in the field, to meet professionals in the field, and to witness professional customs and modes of operating.

Guided Independent Study

Guided independent study includes activities such as reading, writing position papers, discussing educational issues with staff members at the host institution, and attending lectures, conferences, etc., which are of professional interest. Individual interests of trainees will probably vary greatly.

As an example of an independent study project which occurred in the pilot test of this program, one trainee wrote a 21-page position paper on his hypothesis that school curriculum must be changed to put heavier

emphasis on the development of problem-solving skills. In order to write the paper he reexamined and studied works by Dewey, Shaw, Oettinger, Coleman, Simon, Berg, Hebb, and Bloom.

As another example, one of the trainees attended the U.S.O.E., Region 9, small grants review panel in Reno, Nevada. He was thus given the opportunity to study the criteria and procedures whereby U.S.O.E. funds small grants in educational research. Upon his return, he conducted a lecture-seminar for the other trainees on this topic. Procedures for taking advantage of unique learning opportunities such as this are discussed further in the section on the instructional system.

Instructional Materials and Resources

A list of instructional materials and resources is shown in Appendix B. The list contains basic works relevant to all trainees and examples of more specific works which might be relevant to the individual objectives of trainees in the program.

Consideration should be given to the use of three sets of materials currently being developed to train personnel for educational research and development. Materials are being developed independently by Eva Baker at U.C.L.A., George Gropper at American Institutes for Research in Pittsburgh, and the Far West Consortium for Development, Dissemination, and Evaluation Training. Early pilot versions of these materials were available in 1971.

When completed, the Far West Consortium program will contain materials for courses at the professional and paraprofessional levels in information/data collection and organization, communication skills, planning and design, developmental engineering, evaluation, dissemination marketing, analysis and definition, and management. George Gropper's materials will cover tasks such as analyzing criterion behaviors, developing tests, formulating instructional strategies, developing materials, field testing materials, and revising materials. Gropper's materials consist entirely of pencil-and-paper self-instructional units.

General Comments on the Curriculum

In order to meet the requirements of individualization, the curriculum should be a fluid resource rather than a fixed one. It should constantly expand and change to meet the needs of trainees enrolled in the program.

Objectives will vary in importance depending on the individual interests and goals of the students. The curriculum must be fluid enough to accommodate these variations. If possible, there should be a variety of resources appropriate to each of the objectives.

Every new program should result in an addition to the curriculum materials base. This should be the natural result of programs which cater to individual interests and goals in the context of a field which constantly changes and progresses.

As an interesting side point, it might be noted that materials and reports produced by the host institution as part of their regular R&D activity are particularly effective for curriculum use. Professionals at the host institution have special knowledge about these works and consequently communicate a particular enthusiasm and interest.

Almost all materials described in this outline of the curriculum and in Appendix B are readily available. It will be necessary, however, for any host institution to have a library or very easy access to one. The library must have a substantial collection of materials in psychological and educational research and development.

Instructional System

Overview

The instructional system is established to perform three basic functions.

- Assist the trainees in determining an individual set of objectives.
- Prescribe learning activities--including group activities, guided independent studies, and apprenticeships--which will help trainees meet their individual objectives.
- Monitor trainee progress toward his objectives. Help him redefine and focus his objectives. Prescribe further learning activities on the basis of these redefined objectives.

The system is maintained by an instructional manager or training director who works closely and individually with each of the trainees to insure that the three functions are performed.

Determining Individual Objectives

A possible array of objectives which may be used in the program has already been described in the Outline of the Curriculum and in Appendix A. It is the use of these objectives which is of concern in this section.

The list of objectives provides the trainees with an overview of the different skill areas in educational research and development. It serves as a general framework to which all study can be related.

At the outset of the program, trainees will probably be unprepared to select a very specific set of objectives. They are new to the field, and their knowledge of what the different areas of educational R&D involve is hazy. Personal goals at this time usually involve sampling many of the areas in order to achieve a more comprehensive view of the field. As the program progresses, trainees are able to select more specific objectives.

The trainees are assisted in their selection of objectives in two major ways. First, the instructional manager meets individually with each of the trainees to discuss the individual's general goals and interests and his educational and employment background. From this discussion an

attempt is made to establish a set of appropriate objectives. As the program progresses, periodic meetings with the instructional manager lead to refinement and focus in this set of objectives.

Second, each trainee is asked to study a comprehensive list of possible objectives in the program. Appendix A is an example of such a list. For each objective he is to note one of the following:

(1) could do before program,
(2) acquired during program,
(3) cannot do,
(4) if "can do," note degree of expertise,
    (a) slight,
    (b) moderate,
    (c) strong,
(5) would like to emphasize in balance of program

This exercise can be repeated during the program to assist the trainee in the refinement of his personal set of objectives.

Trainees often improve in their ability to refine their set of objectives because of their experience in the program. As they work on apprenticeship projects, and as they speak with various professionals at the host institution, their understanding of the field becomes deeper and they are thus better able to assess their own interests and abilities vis a vis educational R&D.

Prescribing Learning Activities

Based upon the individual set of objectives of each trainee, a set of learning activities is prescribed. The actual learning activities--group activities, independent studies, and apprenticeships--are described in the sections on the Curriculum and the Apprenticeship. It should be noted, however, that these activities are suggested in response to individual objectives.

One of the instructional manager's most critical tasks is the prescription of learning activities in response to individual objectives. The instructional manager must be familiar with the literature in educational R&D. He must also be familiar with the people and resources in the host institution, and in institutions in the surrounding area. In this way he will be able to prescribe learning activities appropriate to varied sets of objectives. In situations in which the instructional manager lacks the required knowledge of a specific area, he should draw upon the knowledge of colleagues at the institution.

To prescribe a learning activity, the instructional manager should follow these steps:

1. Consider the instructional objective.

2. Suggest an appropriate learning activity to the trainee.

3. Discuss the activity with the trainee. Consider his reactions to the assignment. Outline a schedule for completion.

Some activities depend on unique conditions. B. F. Skinner may happen to appear on educational television or a professional conference or convention may happen to occur in the area during the training program. In order to take advantage of unique events, the instructional manager should be very alert to educational R&D events in the area. Professional conferences, important lectures, research facilities, model educational programs, all offer the potential for rich learning activities responsive to specific individual objectives.

Monitoring Trainee Progress

To insure effective learning, careful monitoring of each trainee's progress should be performed. Monitoring may be accomplished in two ways--periodic individual meetings with trainees and weekly logs submitted by trainees. Meetings between the instructional manager and individual trainees can take place twice a week. Meetings focus on progress to date, future objectives, and strategies for attaining these objectives. The instructional manager may recommend specific objectives, suggest particular learning activities, or alert the trainee to various staff members at the host institution who are working on projects of interest to the trainee. The meeting is also an opportunity for the trainee to make complaints or suggest improvements in the overall program.

In addition to these individual meetings, it has been found effective to have each trainee submit a weekly log of his activities, progress, and reactions to various components of the program. This is a useful complement to the meetings because certain individuals are more expressive in a written mode, others are more expressive in a conversational mode. The log may be structured to have a specific format which provides answers to the following questions:

- Describe your apprenticeship activities.

- Note any meetings you had with staff members. Describe the general purpose of the meeting.

- List your readings during the week. Note whether they were related to apprenticeship activities, independent study, or group activities.

- Describe your job search activities.

- Think about and list transfer skills and new skills you have which would be attractive to potential educational R&D employers.

- Further comments.

Incentive System

Trainees may be expected to differ considerably in their conscientiousness. It is believed that performance by less conscientious trainees can be improved if a specific incentive system is adopted. As the program was structured, the only real external incentive was the prospect of receiving a valuable job recommendation. Several incentive systems have been considered for recommendation for future programs. A monetary incentive, say an increase in stipends at regular intervals, was considered undesirable for the following reason. The trainees are accustomed to making a great deal more money than the stipend. Raising the stipend, even by a large percentage, will still seem rather petty and is unlikely to cause changes in trainee behavior.

The system might be based on evaluation ratings. These ratings could be made by the instructional manager and the apprenticeship supervisor at regular periods, say once every four weeks. The ratings would help trainees identify their weak and strong points. They would have incentive power because higher ratings would quite naturally lead to better job recommendations. Ratings must be handled in a dignified, constructive manner.

The program should also make provision for dropping trainees from the program if after several weeks of training they appear entirely unsuitable.

General Comments Regarding the Instructional System

The instructional system model provides a comprehensive array of objectives and a large selection of learning materials, suggested activities, etc. For operation, the model does require an instructional manager who

understands the objectives and is familiar with the learning materials. The instructional manager should also be familiar with the people and resources of the host institution and the educational R&D activities in the area.

The instructional manager does not teach in the traditional sense of the word. Rather he performs three basic functions. He assists trainees in determining their individual objectives. He prescribes learning activities which help trainees meet their objectives. And he monitors the progress of these trainees in meeting their objectives.

In general, the system seems to work well. Training in the pilot program was judged to be effective and efficient. Demands on the instructional manager's time and abilities were quite reasonable.

Several potential problems and issues should be mentioned, however. Guided independent study is an important component of the training. One problem is the difficulty of measuring student progress in these activities. For example, suppose a trainee is interested in investigating research on the teaching of reading. To meet these objectives he is assigned to read Chall's book Learning to Read. When he completes this book, we have no ready method for measuring his understanding or progress toward his goal. Tests are certainly not available for measuring progress toward all the different objectives. The problem is handled by having the instructional manager assess progress through his frequent meetings with the trainee. This method, by itself, is an admittedly weak approach. There do not appear to be any more effective alternatives at the present time, however. It is certainly not possible for the instructional manager to design tests for all the different objectives trainees are working on. This problem is not unique to this training program. It is encountered in most instructional models.

Perhaps the only potential strain placed on a host institution actively engaged in R&D work is the presentation of lectures and seminars for the group instructional activities. Preparation time can be lengthy, and the cost of and strain on various employee's time can be considerable. It should be mentioned, however, that occasional lectures or seminars are sometimes quite effective and even inspiring.

The Apprenticeship

The apprenticeship is probably the most important learning component of this program. In order to fully describe its role and function, this section contains five subsections: identifying potential apprenticeship positions; selecting apprenticeship positions; monitoring apprenticeships; descriptions of actual apprenticeships; and conclusions.

Identifying Potential Apprenticeship Positions

For the success of the program, it is important that there be many apprenticeship positions from which to choose. This permits the assignment of positions most appropriate to individual objectives.

To locate positions each program director at the host institution should be briefed on the purpose and procedure of the cross-training program and the particular skills and backgrounds of the trainees. When a program director does have a possible task, the instructional manager should collect the following information:

- amount of time required for the task,
- beginning date,
- due date,
- required knowledge and skills,
- description of the task trainee is expected to perform,
- supervisor's assessment of how the task might benefit the trainee,
- names of professional staff with whom the trainees will have contact,
- any written materials on the case in general--proposals, progress reports, etc.

The instructional manager should then determine whether the task meets two basic eligibility requirements. First the task must be compatible with the time constraints of the program. The time required to perform the task must not exceed the amount of time available to trainees; the beginning and due dates must be appropriate, etc. Second, the task must represent a rich learning experience. Emphasis should be placed on

identifying tasks which will require the trainee to learn the basic concepts, approaches, and research designs of the projects involved. The instructional manager should eliminate tasks which will not benefit trainee development. Examples include excessively clerical tasks such as coding.

In general, apprenticeship tasks which are part of ongoing projects should be selected. The task should have the potential for allowing a trainee to feel that he is a member of a team working on a contract. Artificial assignments should be avoided. Trainees are expected to make real contributions to projects.

In order to maximize the number and variety of potential apprenticeship opportunities, positions outside of the host institution may also be sought.

The steps followed in identifying, assigning, and monitoring external apprenticeships are quite similar to those for internal positions. In order to formalize the agreement, a representative from the institution sponsoring the apprenticeship should be asked to write a letter detailing the arrangement. Letters should include name of trainee, name of supervisor, name of institution, period of apprenticeship, description of apprenticeship task, and description of the professional supervision and institution resources available for the trainees. A sample of a letter is shown in Figure 1.

Selecting Apprenticeship Positions

The instructional manager should suggest possible apprenticeship positions to trainees in the periodic individual meetings. Suggestions are based on the trainee's set of objectives. Every trainee should be provided with several alternatives. If a trainee is interested in a particular project, he should read the written materials available on it. After reading these materials, if he is still interested, a meeting should be arranged between the trainee and the appropriate project director. The trainee is asked to read written materials first so that he will have a relatively good understanding of the project before taking up the project director's time. The final selection of the apprenticeship is based on the meeting between the trainee and the relevant project or program director.

Figure 1. Sample Letter from the Supervisor of an External Apprenticeship

DE ANZA COLLEGE

FOOTHILL COMMUNITY COLLEGE DISTRICT

21250 Stevens Creek Blvd.
Cupertino
California 95014
(408) 257-5550

September 22, 1971

Dr. Eugene Millstein
American Institutes for Research
P. O. Box 1113
Palo Alto, California 94302

Dear Dr. Millstein:

In accordance with our conversation, this is to advise you that Mike Ausloos is assigned to work with Florin Caldwell, Director of Institutional Research at De Anza College, on a supervised apprenticeship basis for the period of September 22, 1971 to December 15, 1971.

The apprenticeship will include professional supervision, work experience, provision for office/work space, access to the library, and other instructional materials, use of research facilities and equipment, staff consultation, and limited clerical assistance.

During Mr. Ausloos' apprenticeship period, I see four major areas of concentration which should take up most of his assigned time:

1. To write and implement a proposal to the Luke B. Hancock Foundation for developing educational programs in Environmental Education in the Sunnyvale Elementary School District and in the San Jose Unifed School District.

2. To develop the curriculum for an in-service training workshop for elementary school teachers in the area of Environmental Education and an in-service workshop for teachers in the use of computers to help solve environmental problems.

3. To complete a proposal to the United States Department of Health, Education, and Welfare under the Environmental Education Act of 1970 (Public Law 91-516) which would provide for a state-wide program of in-service Environmental Education for elementary school teachers.

4. To become knowledgeable in the area of "Grantsmanship" and particularly in the areas of funding evaluations of on-going educational programs.

Sincerely yours,

A. Robert DeHart
President

ARD:e

Monitoring Apprenticeships

There are several objectives in monitoring the performance of trainees in the apprenticeship. Most importantly, it is to assure that each trainee makes continuous progress toward his personal objectives. Trainee awareness of the monitoring will probably also encourage conscientiousness. Finally, monitoring will serve to remind supervisors that the trainees are there not only to work, but to learn.

The instructional manager may monitor the apprenticeship by collecting information from the trainee and the trainee's supervisor in the task. Information from the trainee may be collected via the periodic meetings and the logs. The following issues should probably be noted and discussed:

- Do you feel you are making efficient progress toward your objectives?
- What knowledge and skills have you learned in the apprenticeship?
- What knowledge and skills do you hope to learn in the near future?
- Are there any particular problems? Unclear directions? Lack of supervision? Etc.

Care should be taken to insure that the project supervisors do not feel they are being examined or criticized.

Information from the trainee's supervisor may be attained through periodic individual meetings which focus on the following questions:

- How well is the trainee performing? What are his weak points, his strong points?
- What do you believe the trainee has learned in terms of skill, knowledge, and affect?
- In what areas do you believe he needs further study?
- Are there any particular problems?

The information attained from these discusions with both trainee and supervisor is used to make any adjustment necessary to improve the effectiveness of the apprenticeship. Frequent adjustments will probably not be required. In a few cases, tasks may be terminated earlier than originally anticipated, and trainees switched to other apprenticeship positions. This is not awkward since the program is structured so that all trainees would work on several different kinds of apprenticeship tasks.

Description of Apprenticeships

Each trainee participates in several different kinds of apprenticeship tasks during the program. These tasks may differ widely among individuals. Examples of tasks which were performed during the pilot tests of this program include the following:

- Development of a proposal on environmental education for a Community College.

- Review and analysis of the development of one educational product. Part of a contract to examine the process of development of successful educational products.

- Assistance in the writing and production of a paper on employer-based career education.

- Assistance in the development and definition of evaluation criteria. Part of a contract to develop a system for evaluating regional educational laboratories and R&D centers.

- Research and review of the literature on the evaluation of educational administrators.

- Assistance to a school system in using its computer to work on educational problems.

- Critical review and revision of a Community College Five Year Plan. Emphasis on student enrollment predictions.

- Assistance on a Cooperative Longitudinal Study of Demonstration Educational Programs. Work on the design of three questionnaires for parents and teachers of children in the study.

- Research and presentation of information on sources of funding, nature of studies, and proposal due dates.

It may be useful to describe in more detail two of the apprenticeship tasks performed in the pilot program. One trainee served his apprenticeship at DeAnza Community College under the supervision of the Director of Institutional Research. This trainee wrote one proposal for the college which involved establishing workshops in environmental education for secondary school teachers. The trainee made contact and enlisted the cooperation of the Sunnyvale school district. The proposal was submitted to the Luke B. Hancock Foundation. The college was pleased with the proposal and the trainee quite clearly learned a great deal from the experience of writing it. Recent information indicates that the proposal was unfortunately not funded. It will be submitted to other foundations and agencies, however.

Another trainee became very involved in a project in Employer-Based Career Education (EBCE). Employer-based career education is a proposed alternative to traditional secondary schools. The project involved writing position papers on the system's feasibility to two areas--individualization and pupil personnel services. The trainee involved in this project performed two tasks: (1) he coordinated final production of the papers including printing and distribution, and (2) under supervision of the project director, he drafted a section of one of the papers.

Conclusions

The apprenticeship component of the cross-training program offers a number of advantages for both the trainee and the host institution. In terms of advantages for the trainee, the following points may be made.

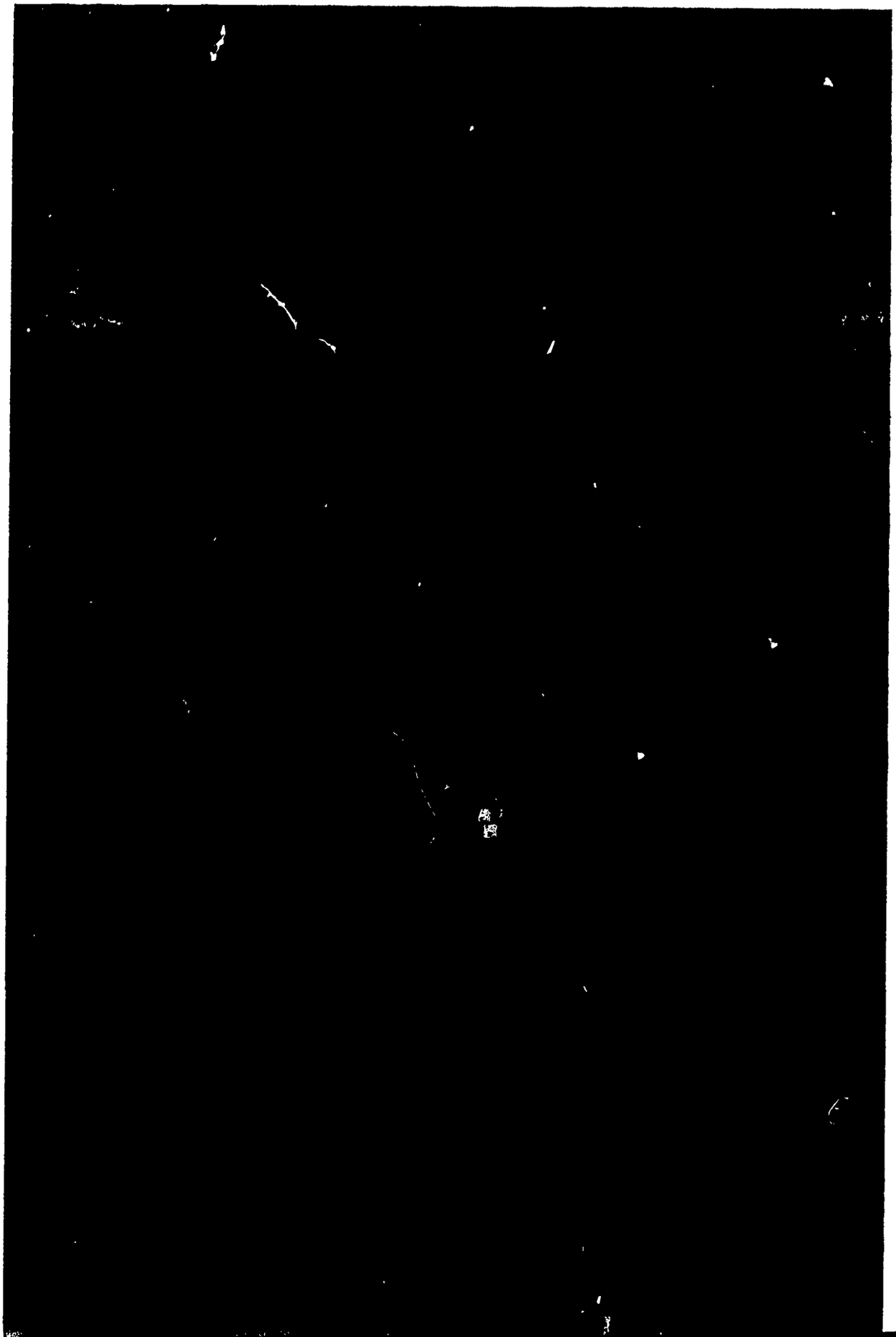
- The experience highlights the relevancy of the seminars and the guided independent studies. It helps the trainee identify and refine his set of learning objectives.
- The experience produces very efficient learning. Task demands reinforce relevant skills and knowledge frequently.
- The apprenticeship provides the trainee with a real world framework by which to guide his own career pursuits. He has first-hand experience with what educational R&D jobs are like and what employees do from day to day.
- The apprenticeship gives the trainee relevant R&D work experience which may be listed in his resume.
- The apprenticeship may provide the trainee with important professional contacts. Among other advantages, these contacts may lead to employment either at the host institution or elsewhere.

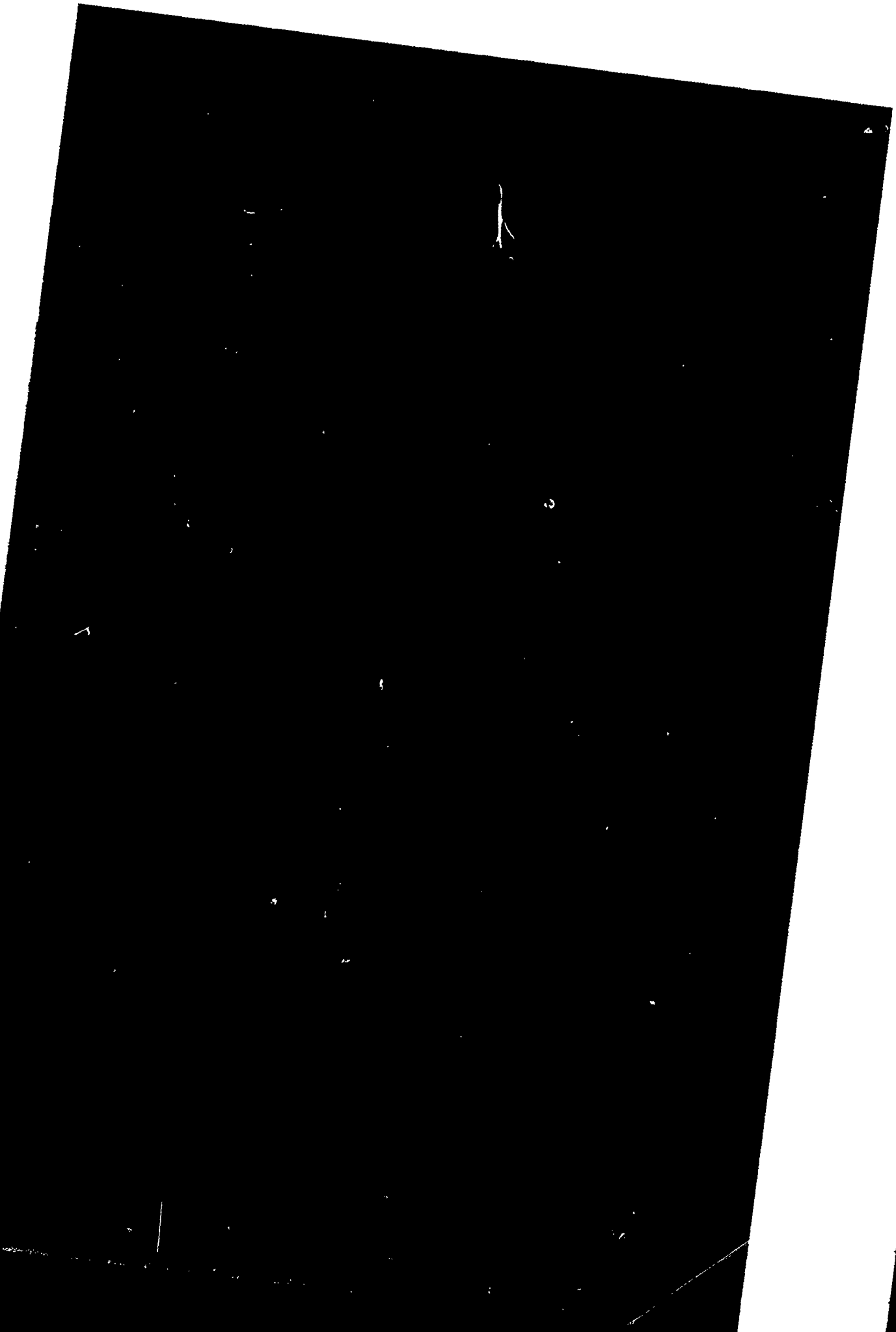
Two advantages to the host institution may be listed.

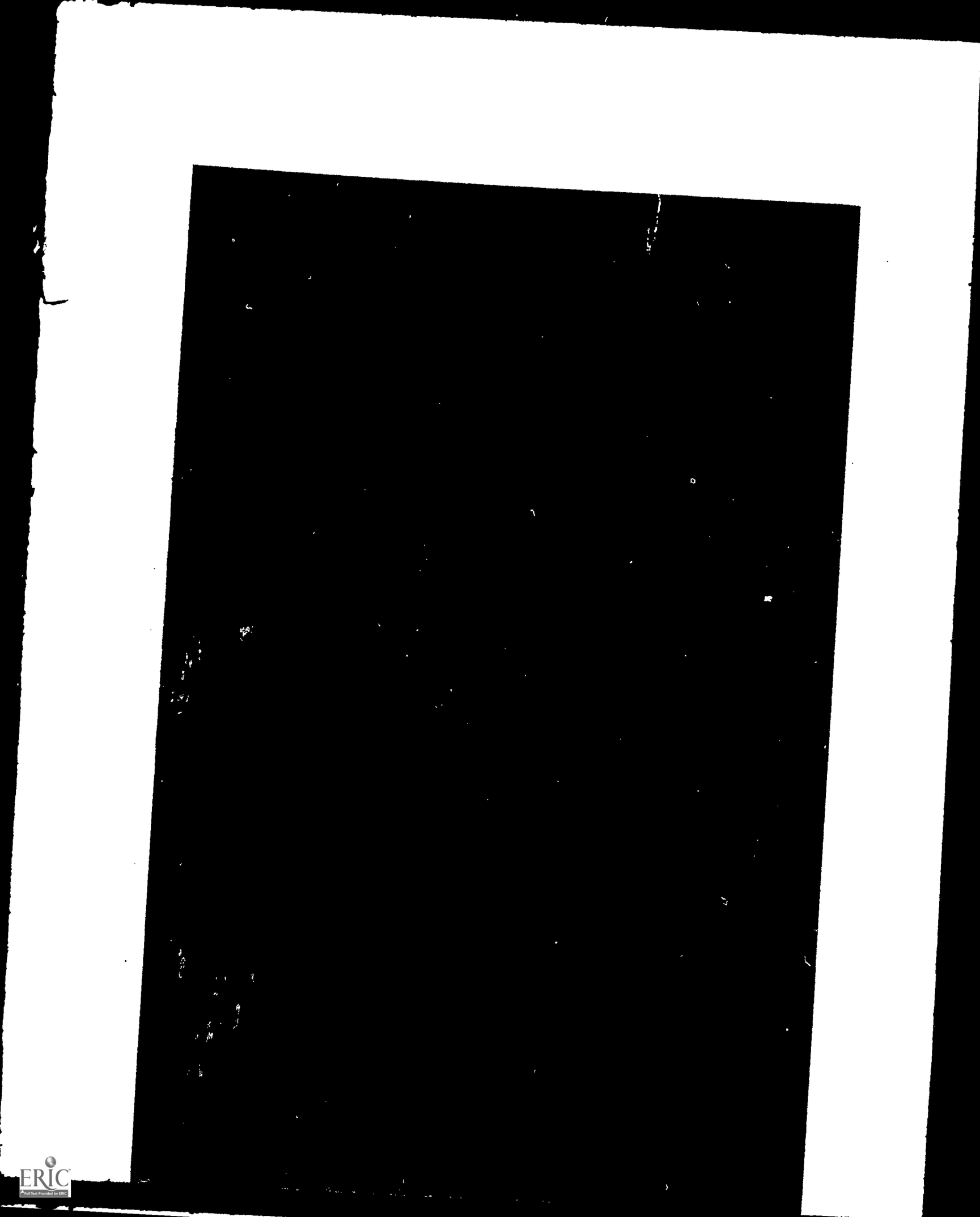
- The apprenticeship may lead to employment at the host institution. When this occurs, the institution will have benefited from a free trial period in which to evaluate the trainee.
- The host institution may benefit from the ideas and skills the trainee brings from the physical sciences.

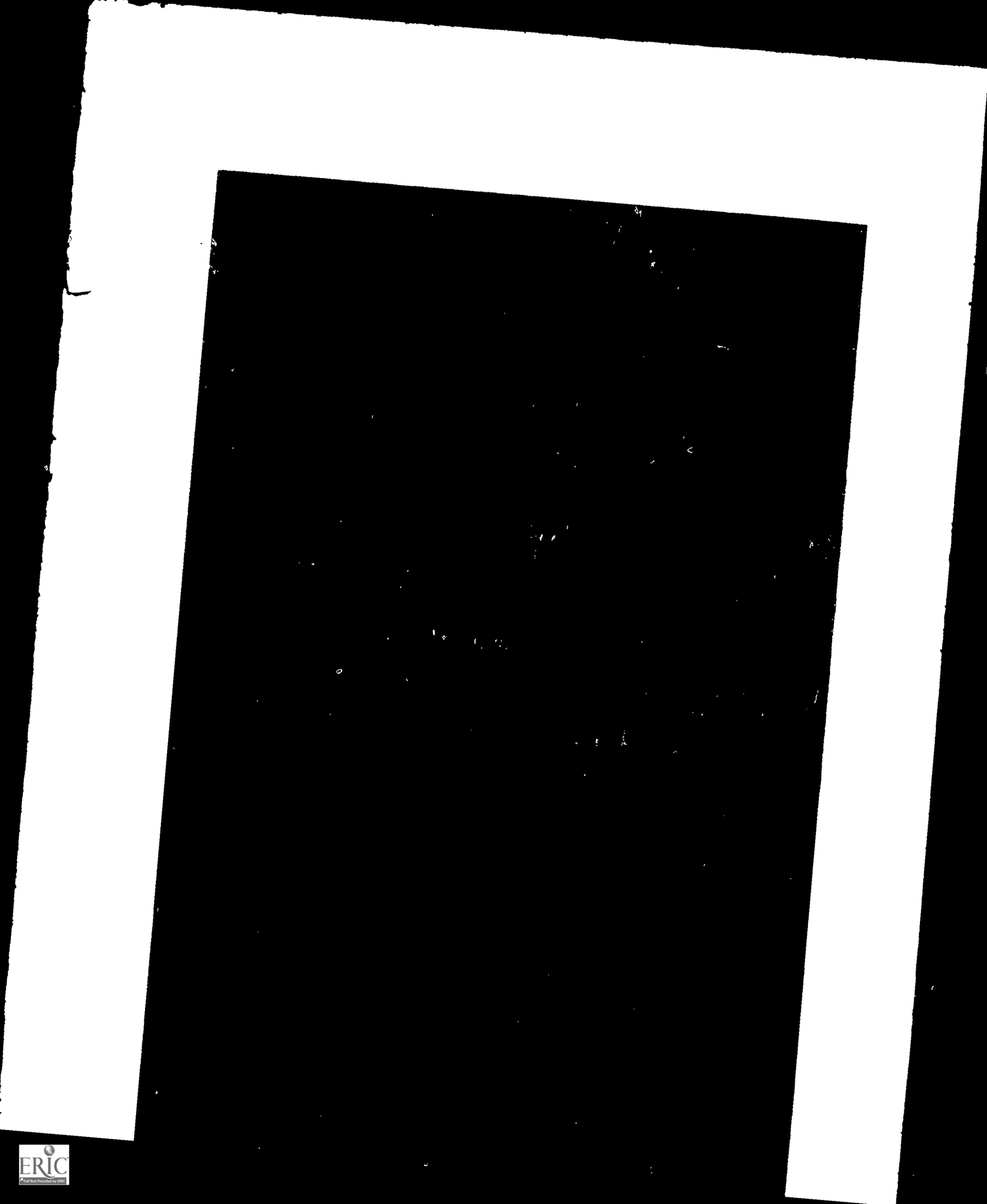
The fact that the trainee provides free labor on contracts is not a clear advantage. It is probably balanced by the necessity to provide very thorough supervision. Host institutions should be clearly aware of this.

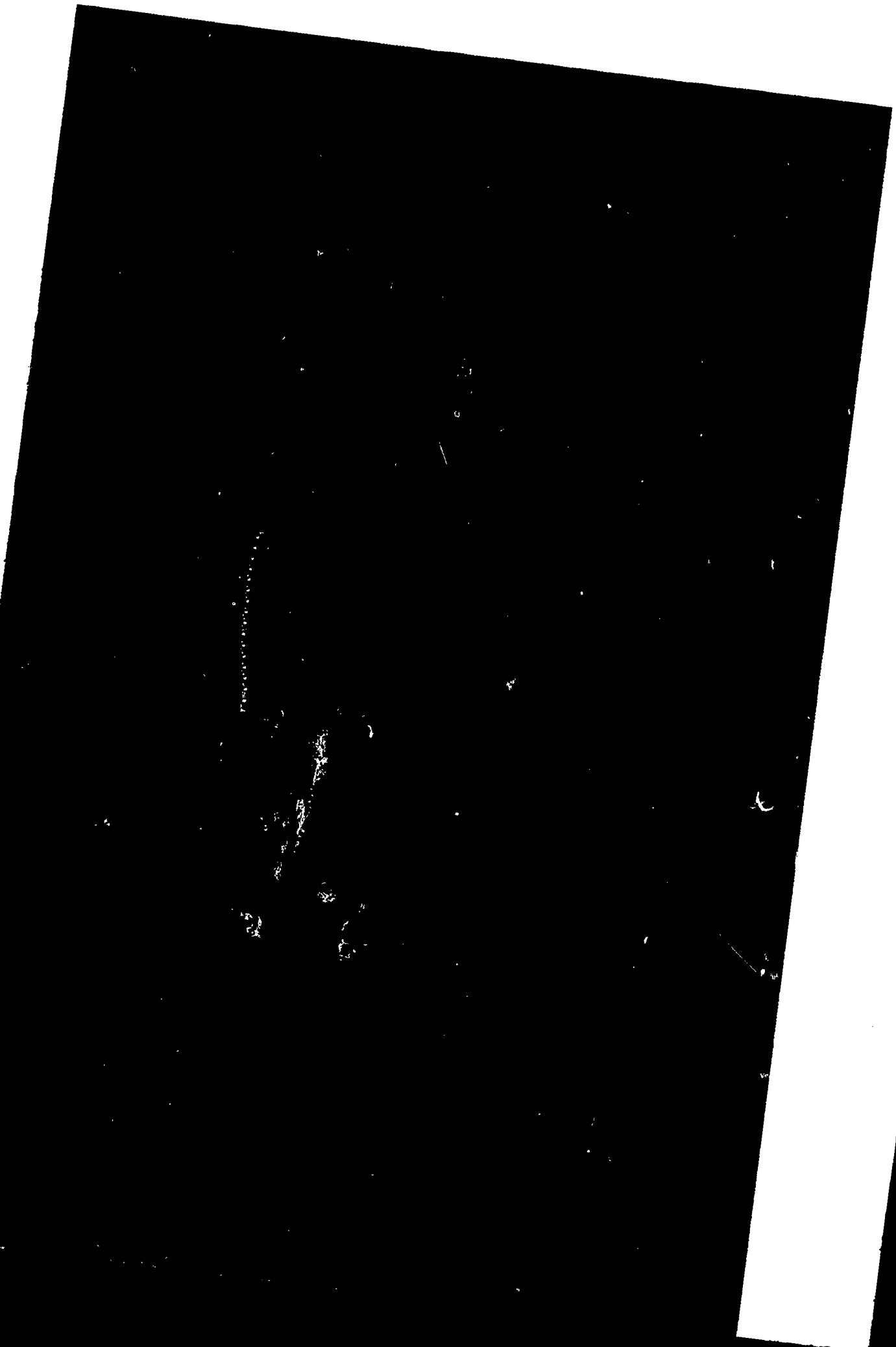
In terms of the apprenticeship component, the most important requirement for an institution planning to host a cross-training program is that it have a number of different projects with a variety of potential apprenticeship tasks.

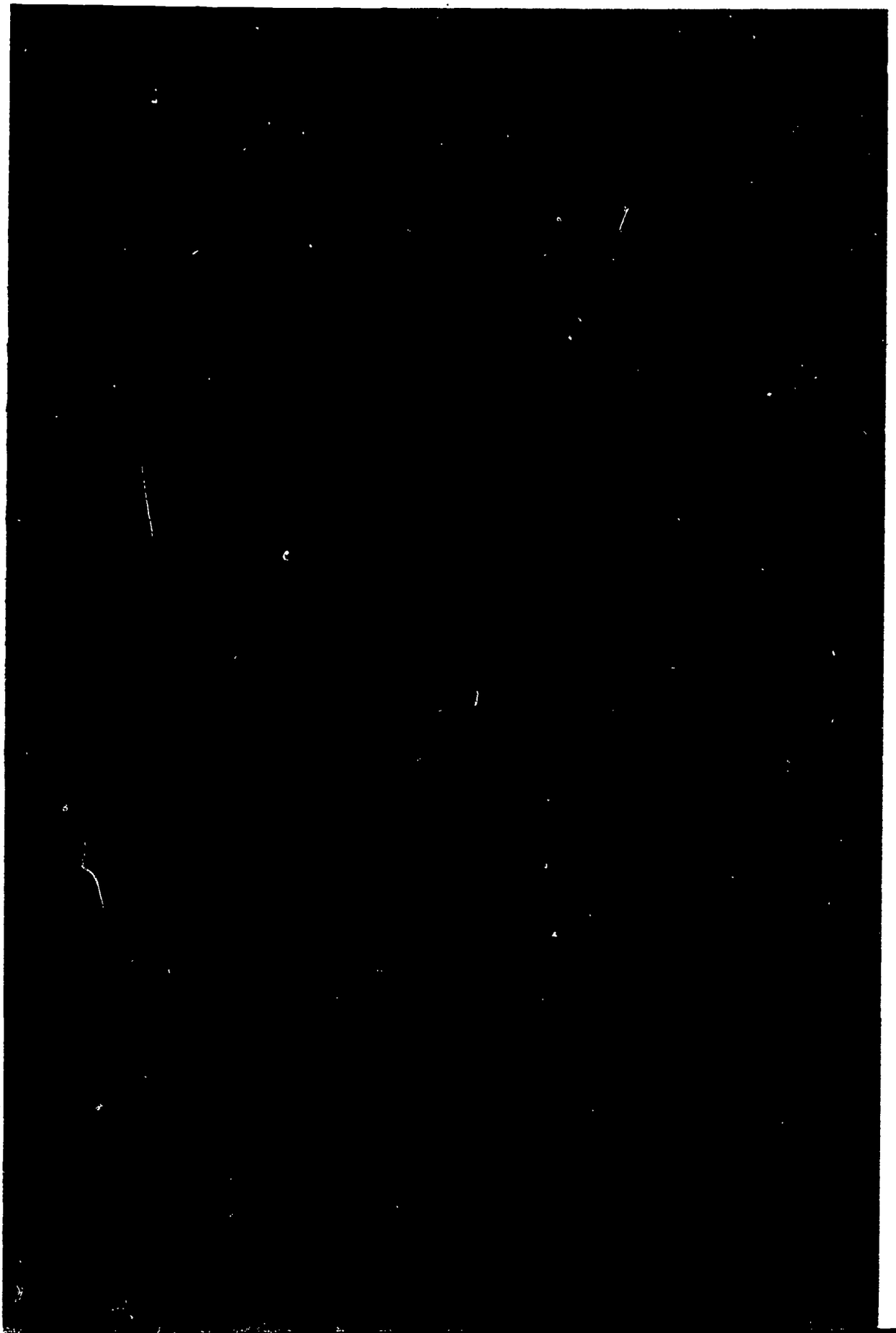


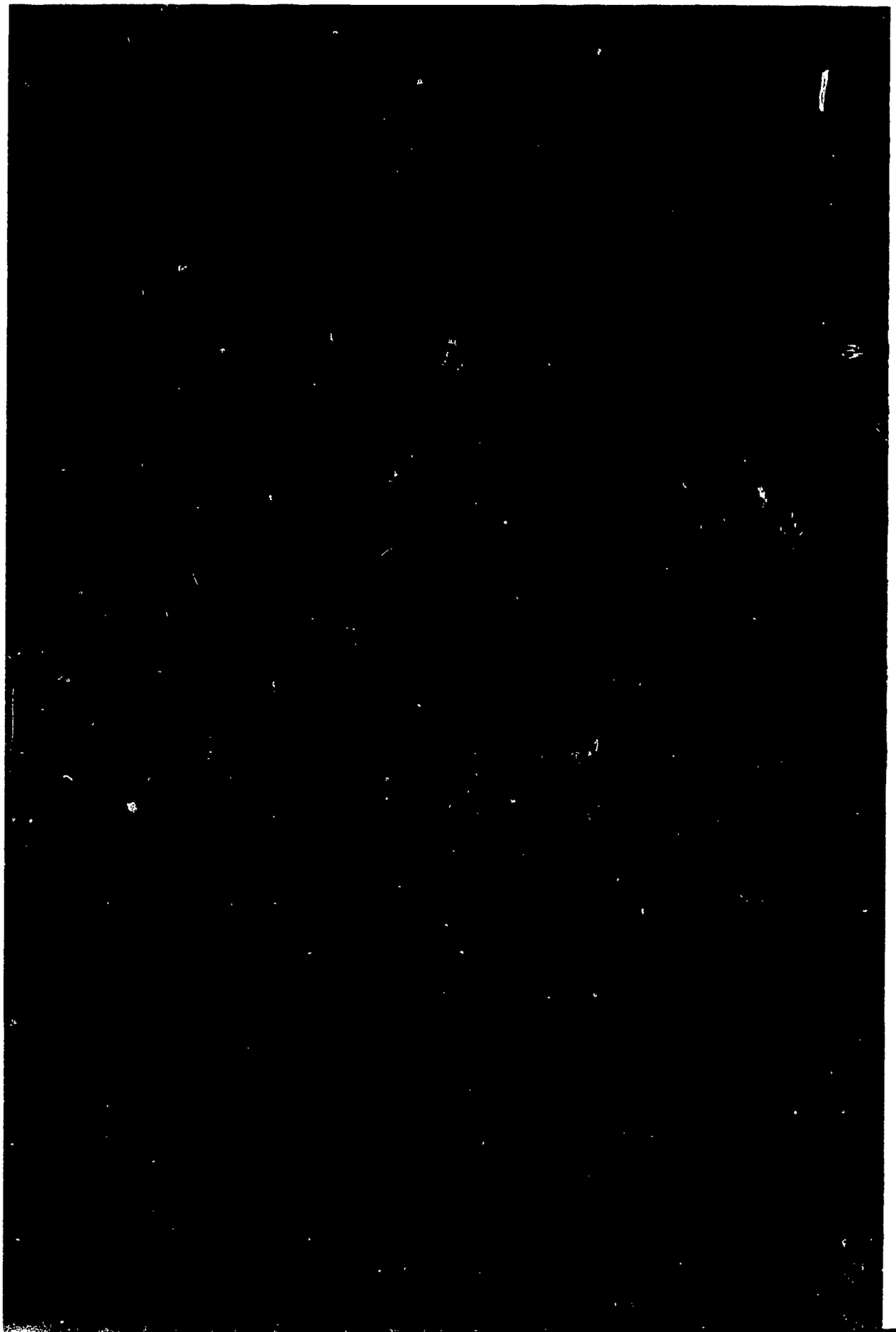


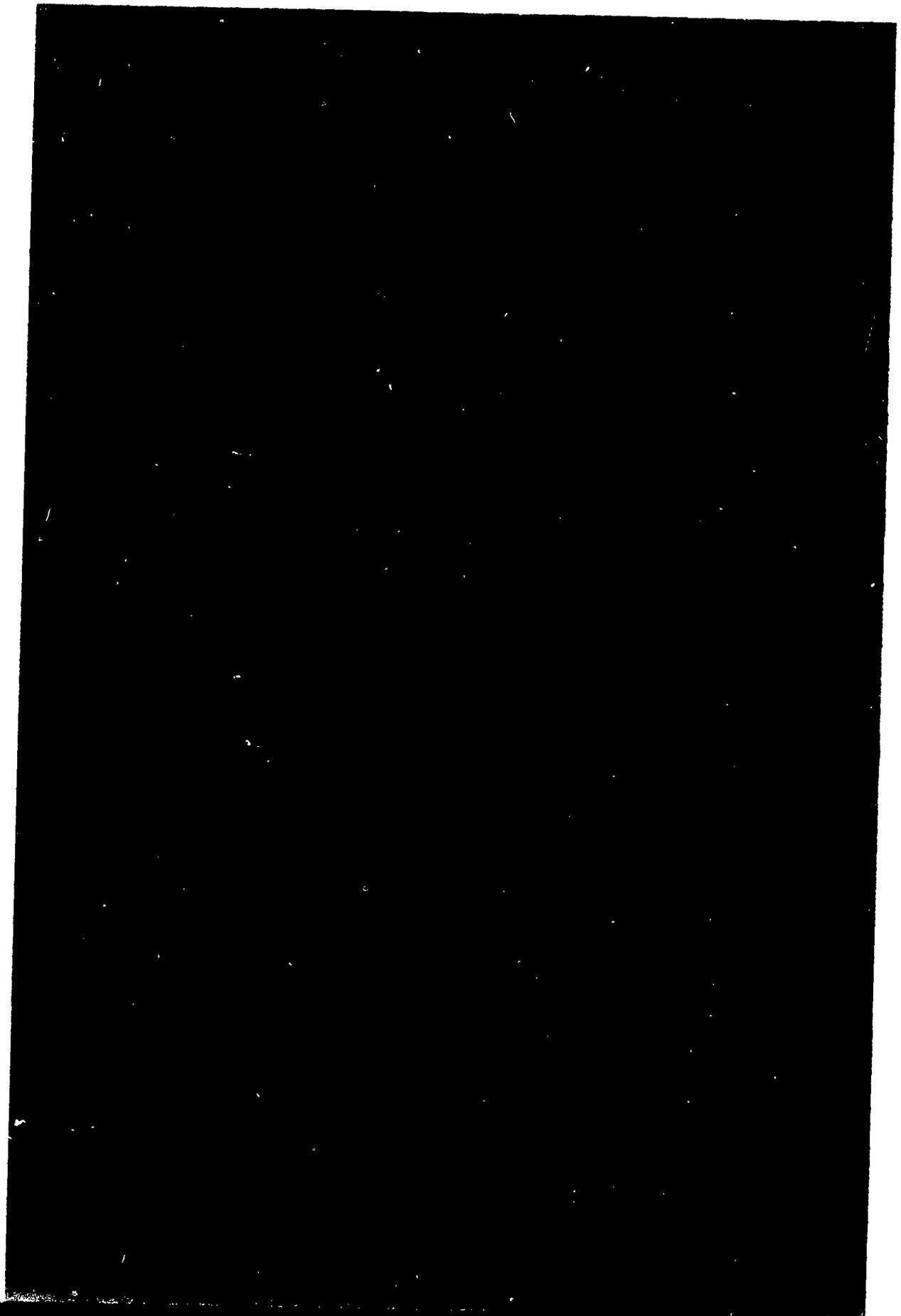


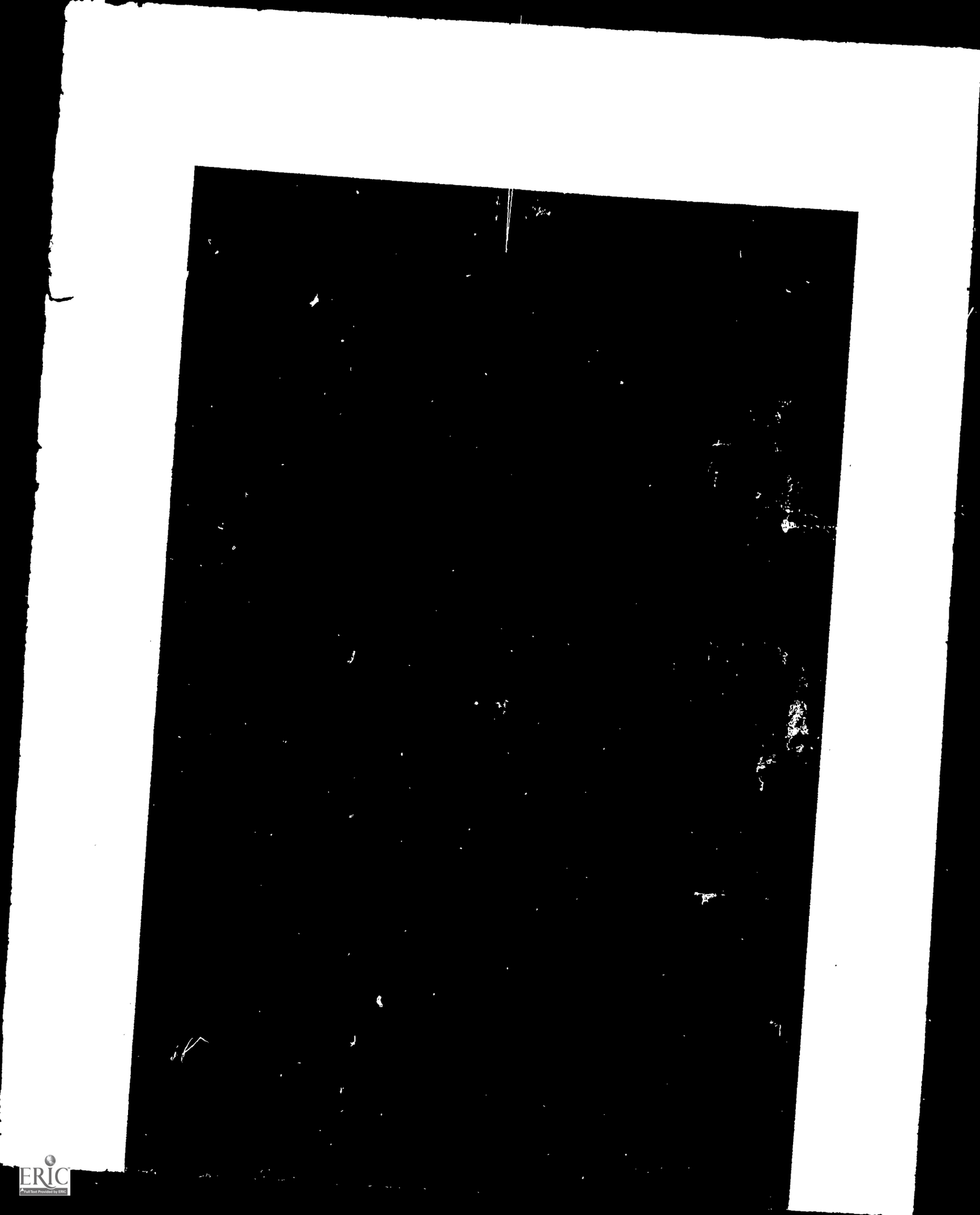


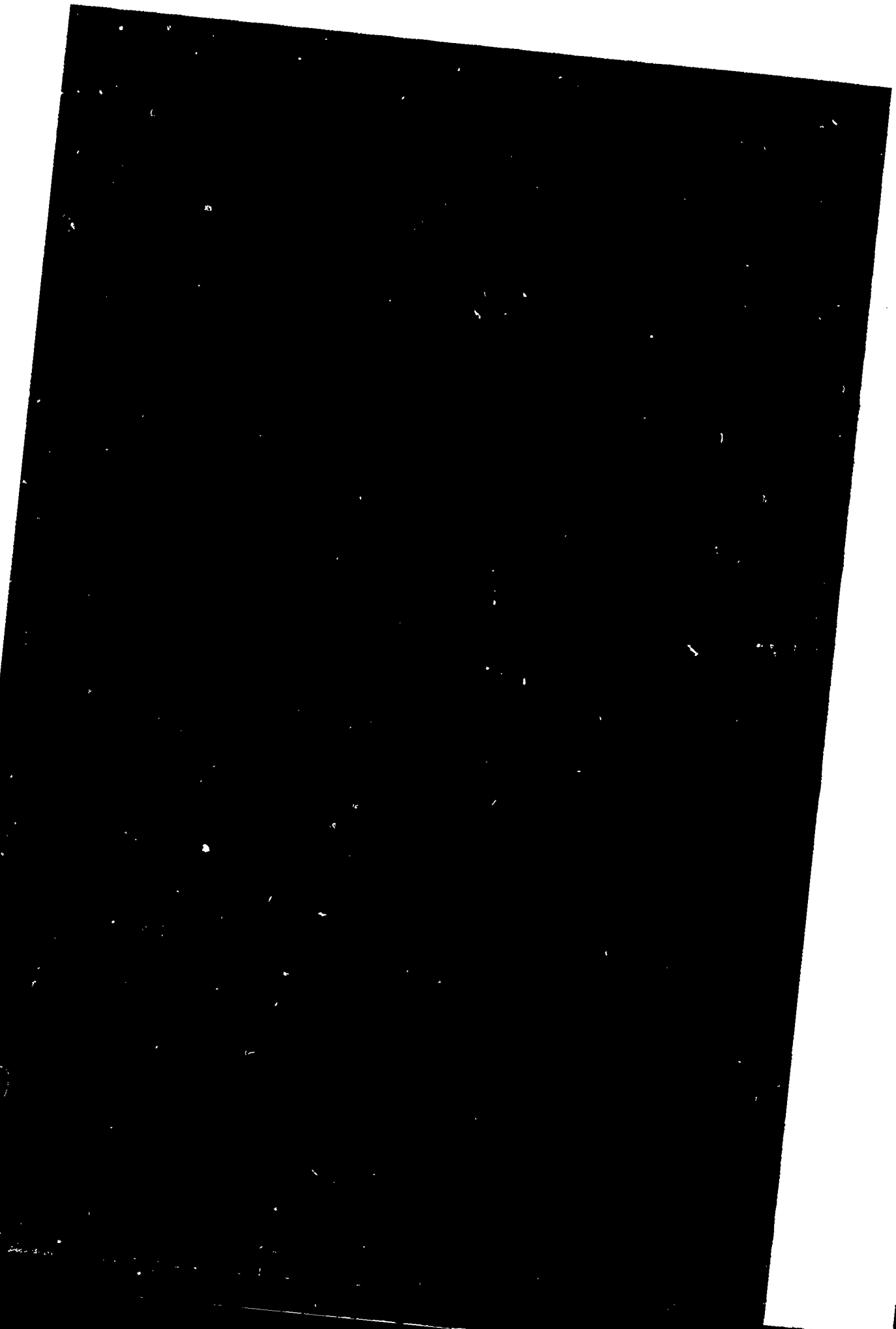


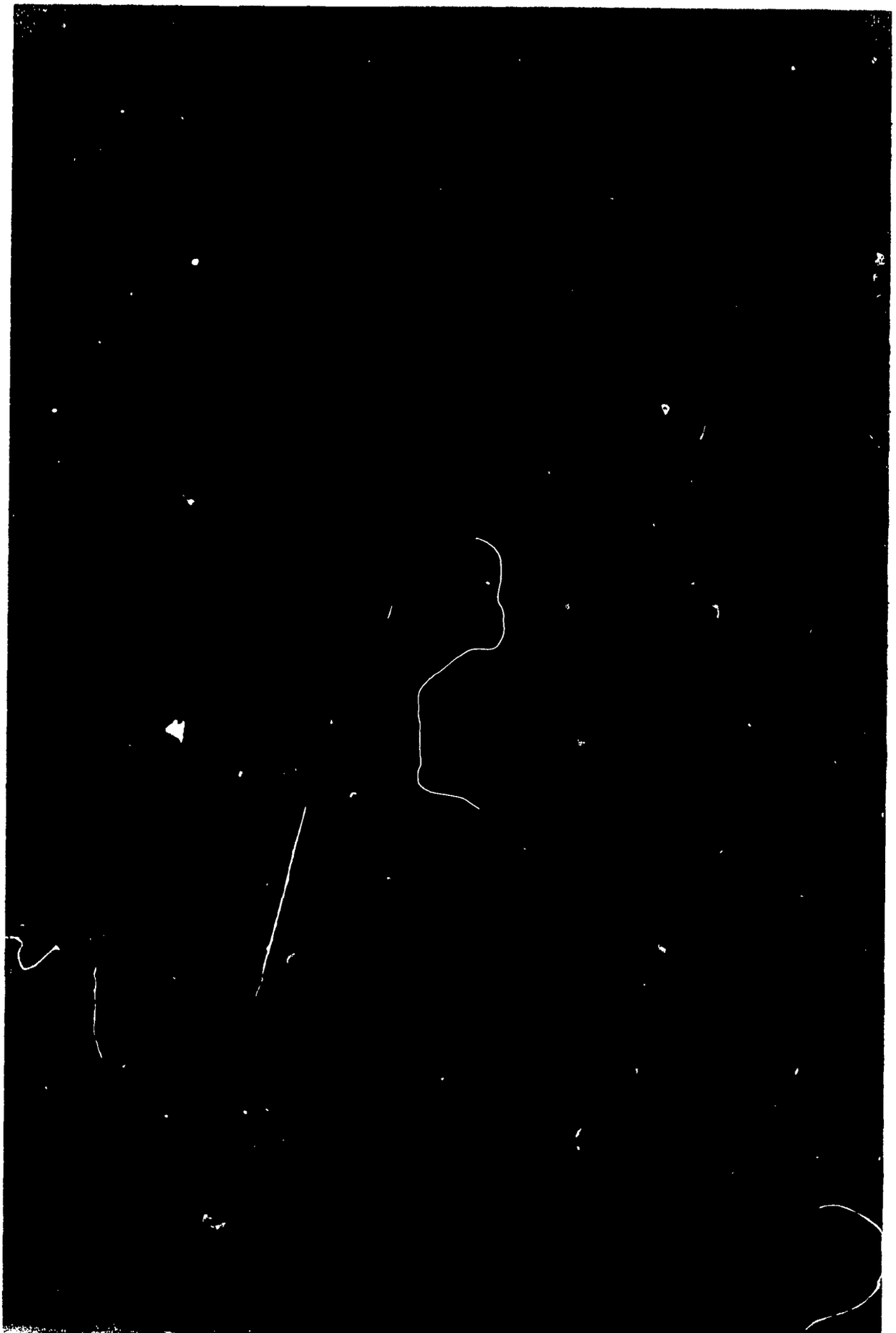


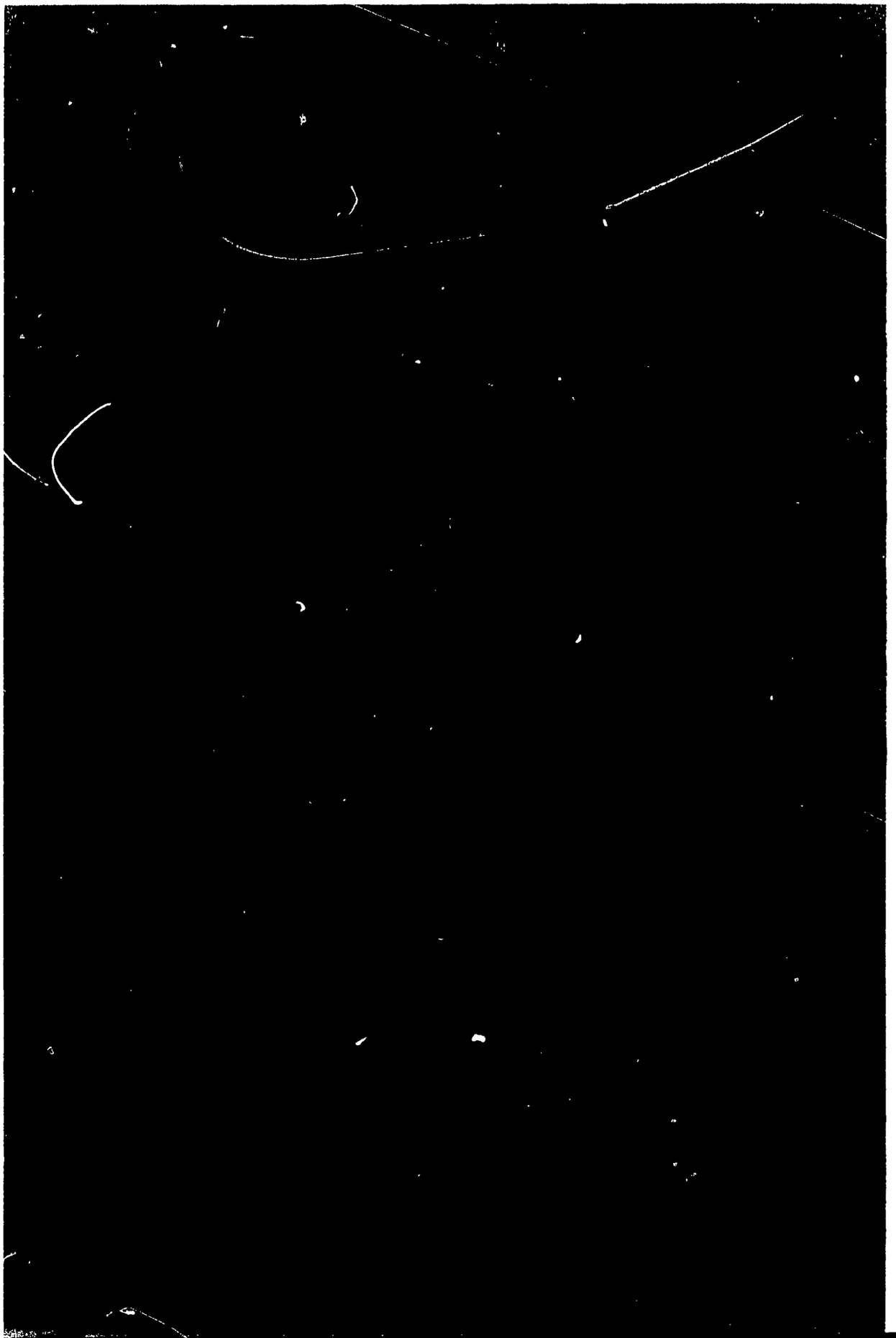


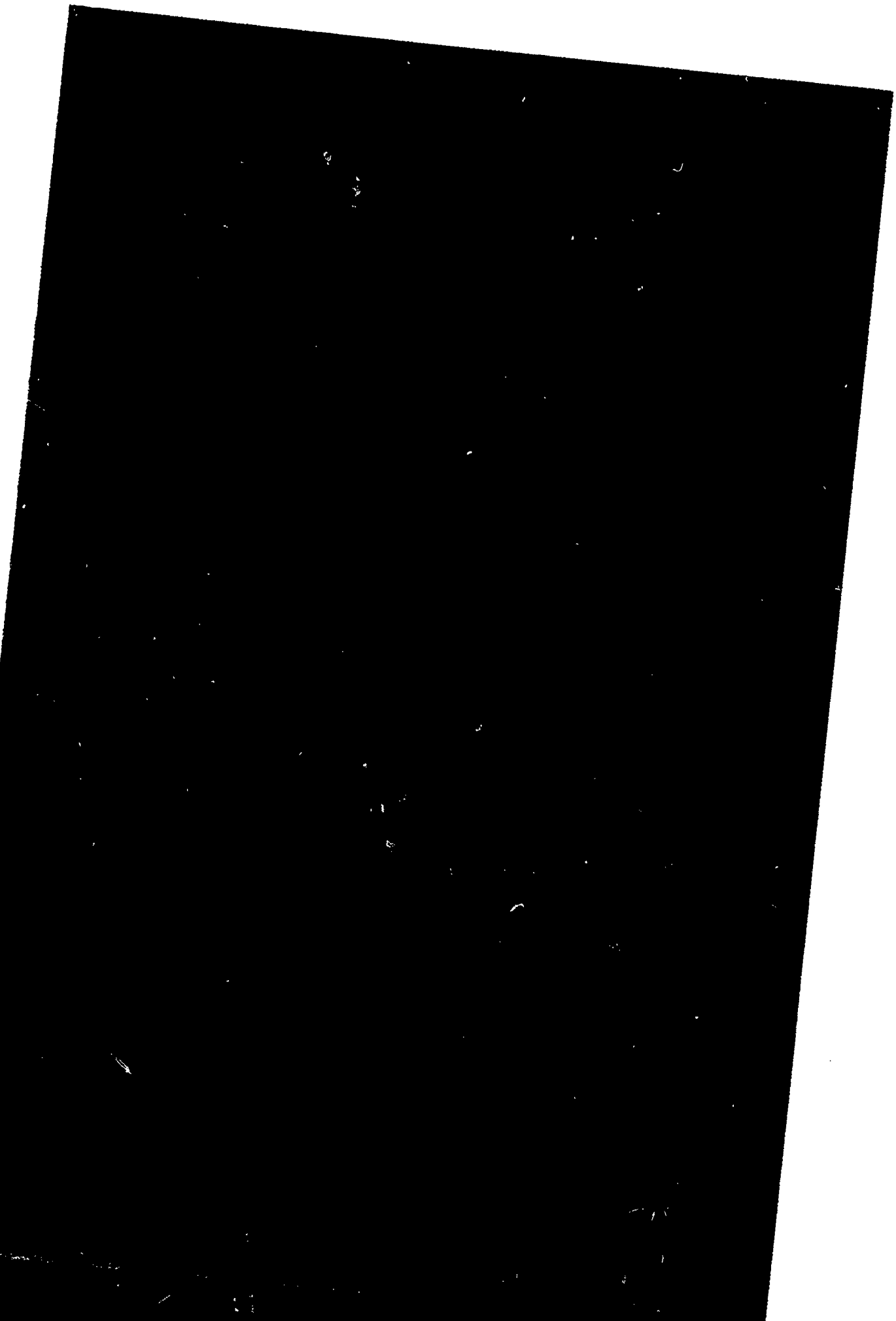


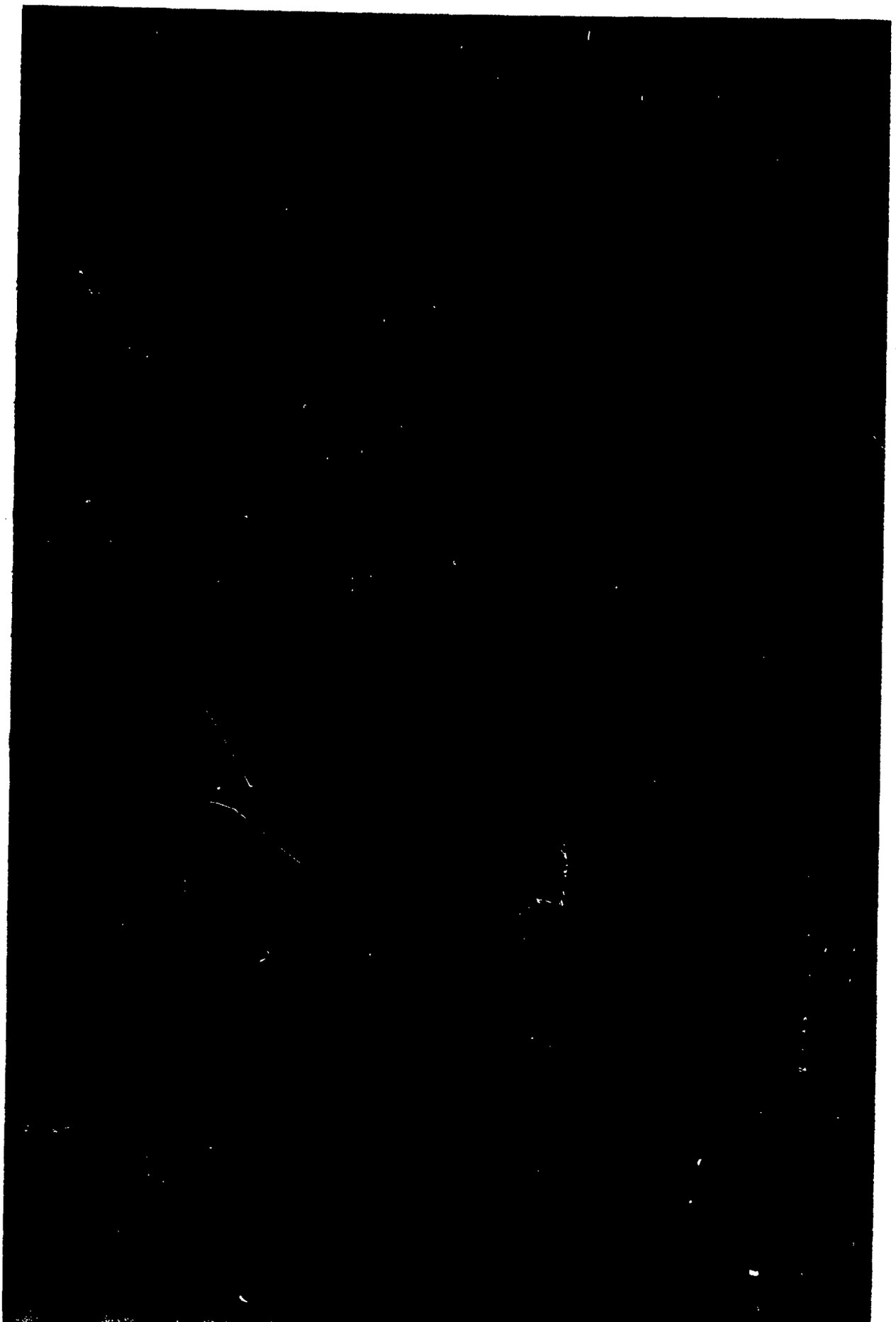


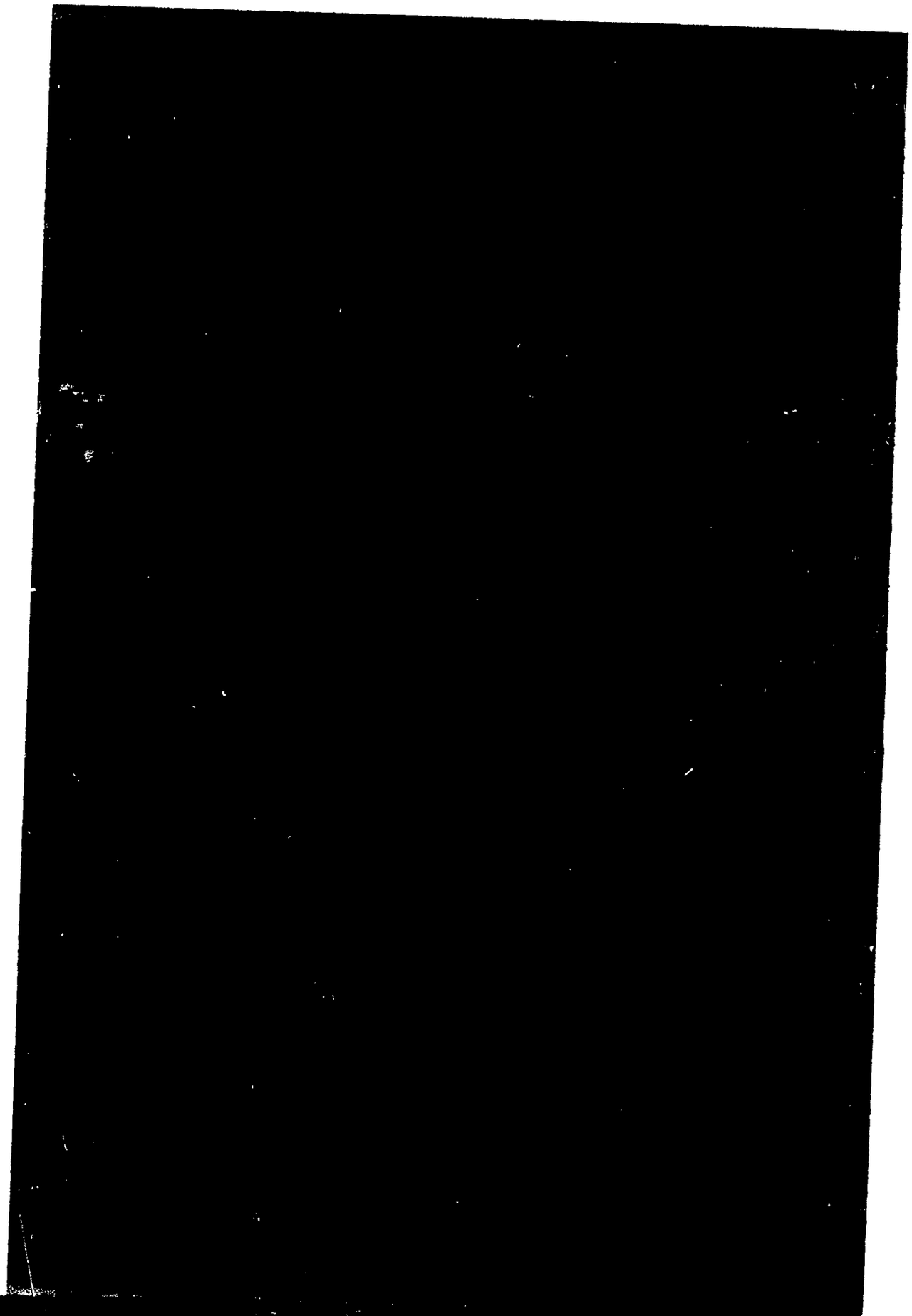


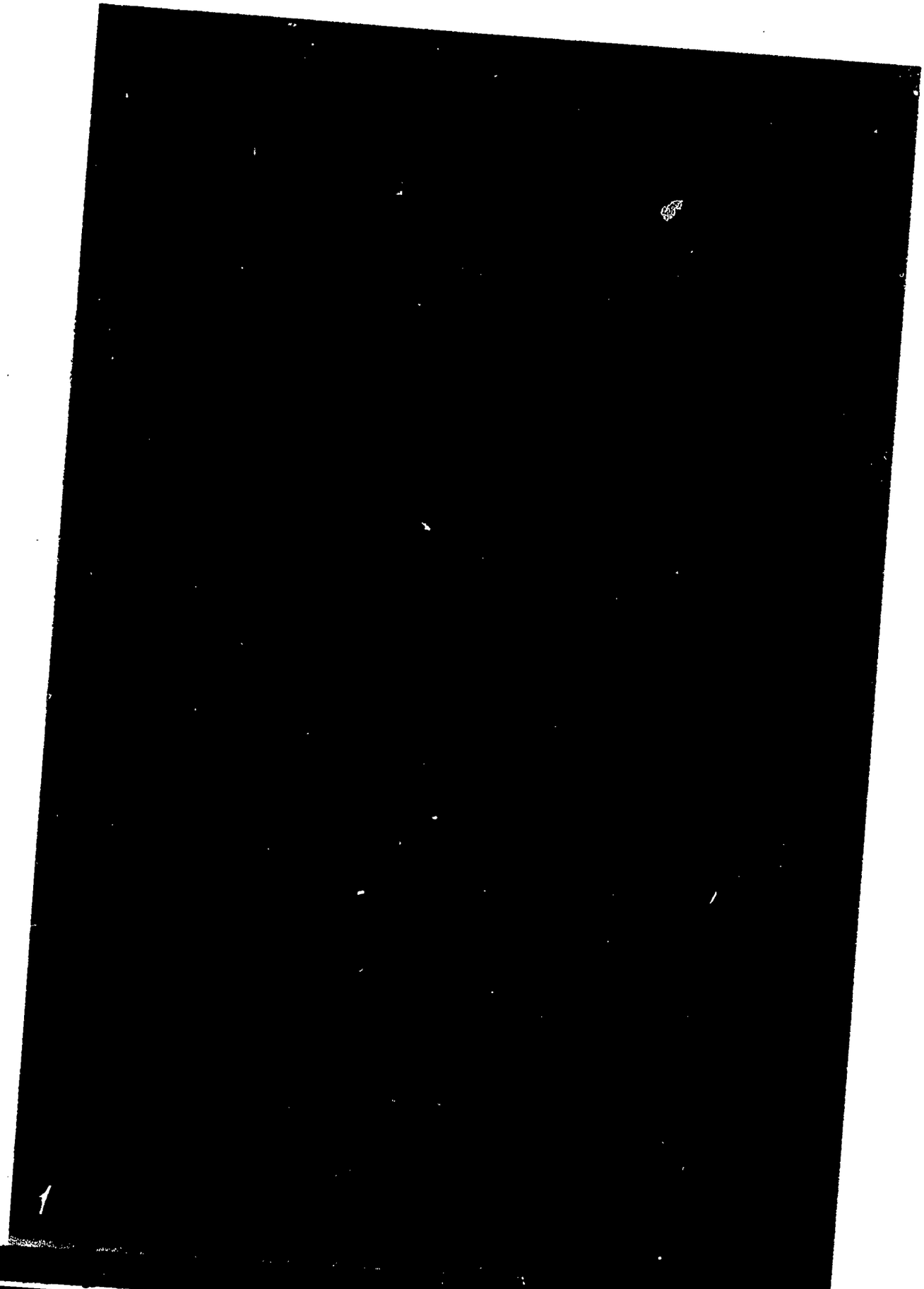


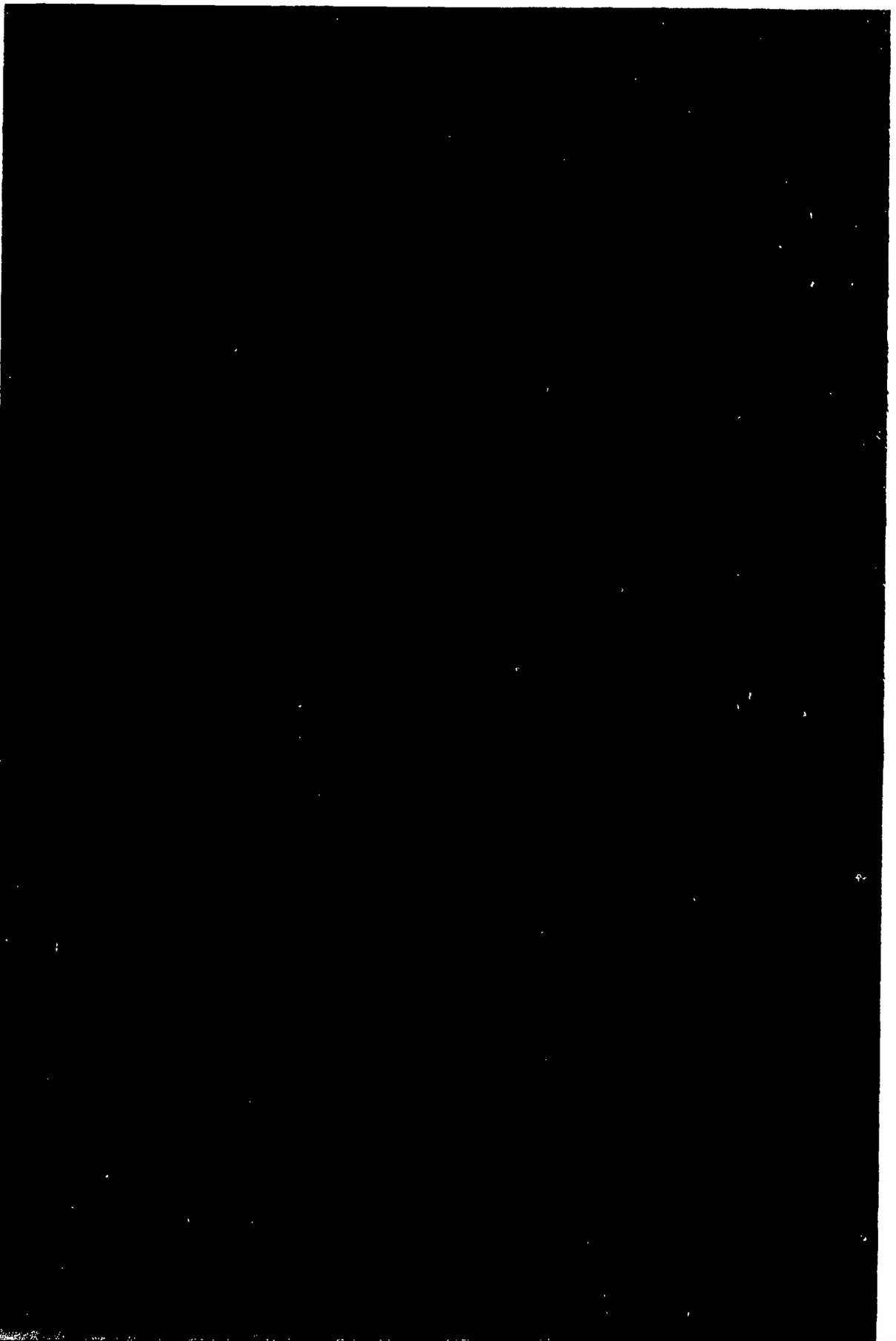


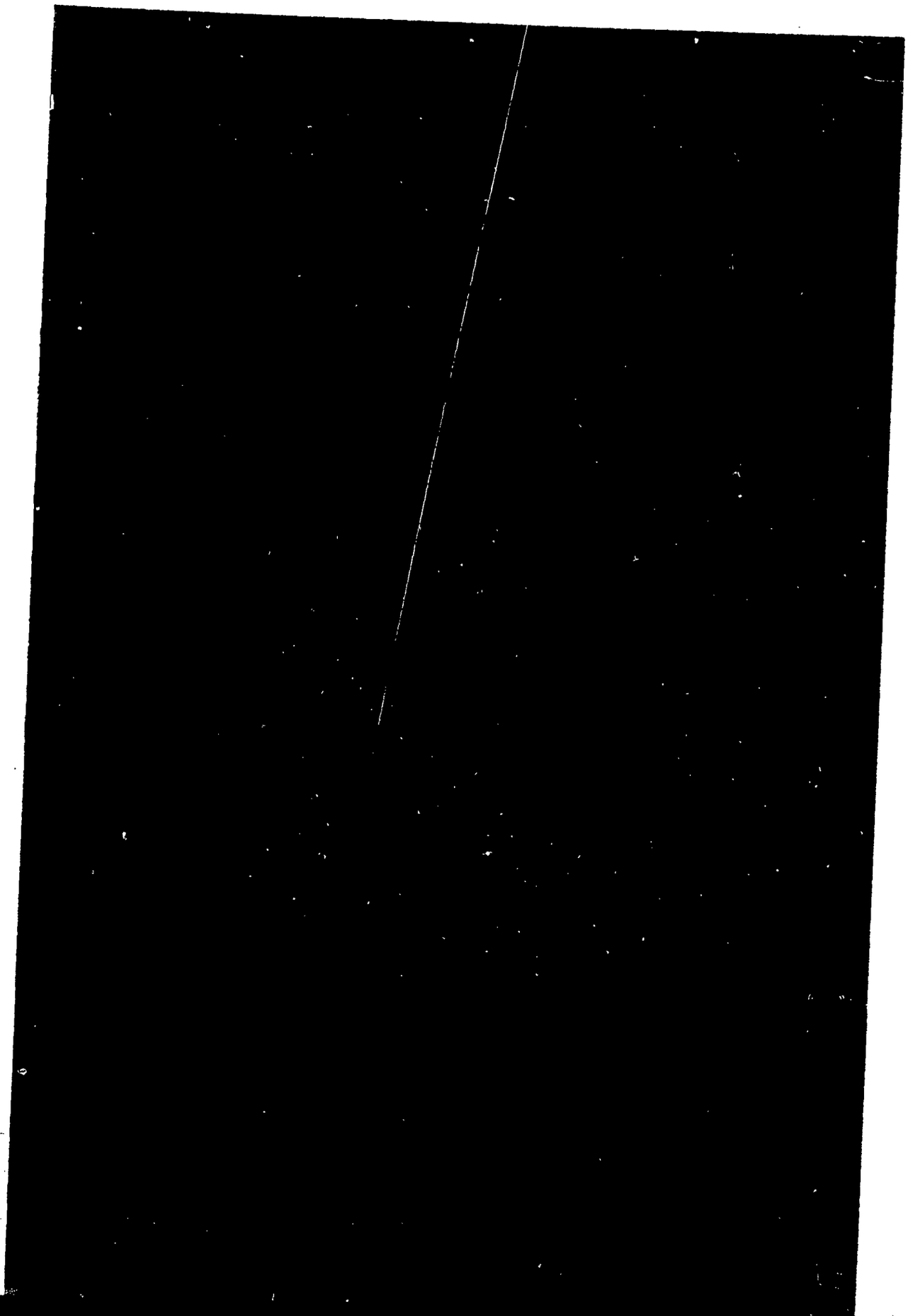












CHAPTER 4

JOB PLACEMENT ACTIVITIES

If the program is used for in-service training, job placement activities are unnecessary. If, however, the program is used as an adjunct to regular academic training, or as an independent training program, job placement activities are an important component and emphasis should be placed on locating openings and applying for jobs. This chapter will discuss such activities.

One of the first tasks is the rewriting of resumes to reflect skills and experience relevant to educational R&D. Trainees all have such skills yet they are not easily identified. If the trainees are physical scientists, they may not know enough about educational R&D to identify relevant skills themselves. Similarly, educational researchers do not know enough about the various fields of physical science to make the identification. This program should help bridge the gap. In their resumes, trainees may emphasize skills such as report writing, proposal writing, scheduling, data analysis and presentation, evaluation procedures, administrative systems, and technical writing. A trainee's experience may seem irrelevant when explained in engineering terms, but very relevant when described in the language of educational R&D.

Several seminars should probably be held in which job hunting strategies are planned. The seminars might include both structured discussion of pre-planned ideas and brain-storming by trainees and staff.

Job Hunting Strategies

At least five basic strategies can be followed in searching for jobs.

(1) An attempt must be made to take full advantage of contacts developed at the host institution. Attention should be given both to potential jobs at the host institution itself, and jobs in other organizations in which staff members might have contacts. All program directors should be alerted to the fact that trainees are looking for jobs. Informal meetings with program directors and other staff members might be used to explore possibilities.

Trainees with expertise in specific areas may be included in proposals submitted by the host institution. This strategy adds another possibility for a job.

It is suggested that employment inquiry letters be sent to staff contacts in other R&D organizations. Written by the project director, the letters might describe the cross-training program and the background of the trainees. Resumes of appropriate trainees should be included with each letter. An example of a letter is shown in Figure 10.

(2) Trainees and staff members should remain alert to all important new contracts awarded in the field of educational R&D. Resumes may be submitted to organizations which receive such contracts. A number of procedures may be followed to locate the new contracts. Newsletters, such as Behavior Today and Review of Educational Research, announce newly awarded grants and contracts. The business section of newspapers frequently carries articles on companies which receive large contracts. The host institition may have information on contracts on which it has bid and lost.

(3) Trainees should be strongly encouraged to rethink their own personal contacts in the light of their new profession. A trainee, for example, might have a brother-in-law who works at an educational R&D organization. Trainees will not necessarily think of these contacts without some prodding. They may overlook important personal contacts simply because they are not yet accustomed to thinking of themselves as educational researchers.

(4) Trainees should explore the standard methods of locating jobs in educational R&D. The APA Employment Bulletin should be examined each month; the Educational Researcher employment ads should be read; civil service employment explored. It should be noted that most of the jobs listed in the APA Employment Bulletin are academic positions and may not be very helpful. Civil service employment does offer some potential. Trainees should investigate the city, county, state, and federal levels.

(5) After all contacts, contract leads, etc., are explored, trainees should probably send their resumes to all the remaining R&D organizations which interested them. This is a long shot strategy, but it is certainly worth the effort.

Figure 10. Example of Employment Inquiry Letter

November 22, 1971

Dear Dr.

Dr. _____ suggested I write to you with regard to several physical scientists who are seeking jobs in educational R&D. These people are participating in a three-month AIR program designed to help them extend their skills into the field of educational R&D. Their skills include expertise in systems analysis, statistical techniques, computer programming, report writing, proposal development, etc. The program has been quite successful; all participants have worked effectively and made important contributions to ongoing AIR projects. In general, participants have the combination of experience and training in educational research in addition to a broad background and extensive experience in engineering and the physical sciences. I might add that of the more than 170 engineers and scientists who applied to the program, the six participants were selected because they possessed special skills and interests very useful in educational R&D.

I am enclosing the resumes of two of the participants who are from the Northwest. Both are quite flexible about position and salary. Please let us know if you wish to talk with any of them about employment. There is a possibility that federal funds administered through the states of California or Washington will pay for an applicant's interview trip. In addition there is a federal program administered through the states which is designed to help unemployed defense workers shift to new industries. Thus it is possible, depending on specific job definitions, that up to $2,000 of new employee's salary would be subsidized.

Thank you.

Sincerely,

_____
Project Director

Relevant Federal Programs

A number of federal programs may be available to assist engineers, scientists, and technicians locate and begin work in new jobs. These programs should be investigated and used whenever possible.

One provision of a federal program operating in 1971 provides a reimbursement for employers when they hire someone not fully trained for the position. To qualify for the reimbursement, the employer must pay a salary of at least $8,000 per year. He can be reimbursed up to $2,000, the total depending upon how much training is required. The total is negotiated between the employer and the state unemployment agency which administers the federal funds. Negotiation can take place on a contingency basis, that is, before a firm employment offer is made or accepted. The program also provides funds for the employee to travel to the location of his new job.

If still operating, the above program might be explained to potential employers. It adds one more attractive element to the hiring of trainees.

Probably the most useful provision of a federal program operating in 1971 is one which provides funds for unemployed engineers, scientists, or technicians to travel for job interviews.

APPENDIX A

PROPOSED INSTRUCTIONAL OBJECTIVES

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Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Library Skills							
Can describe the organization of a card catalogue and locate entries regarding: a. author-title b. subject c. documents d. pamphlets e. tests							
State the general structure and types of information given in sources particularly associated with education: a. Education Index b. Psychological Abstracts c. Encyclopedia of Educational Research d. Dissertation Abstracts e. Relevant ed. sections of Guide to Periodical Literature							
Describe the types of information available and be able to locate and obtain documents and information from the DATRIX and ALERT systems.							
State the function and organization of the ERIC system.							
Describe the types of information stored in the ERIC system, the various reference tools used, and the forms in which ERIC documents are supplied.							
Explain the procedure for ordering hard copy and microfiche copies from ERIC.							
State the content and structure and locate and interpret entries in the ERIC reference tools of Research in Education and Current Index to Journals in Education.							
State the function and organization, interpret, and use the Thesaurus of ERIC Descriptors.							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Library Skills (cont.)							
Describe the function of and state the general procedure for retrieving information through the ERIC DIALOG system.							
Can locate and use special equipment and devices typically found in libraries, such as microfilm readers.							
Prepare a statement of purpose of a survey of the literature related to a given topic or problem in education.							
States descriptors or key words to guide the search.							
Prepares a detailed search strategy.							
Retrieves bibliographic entries and documents and prepares bibliographic cards according to a standard format.							
Can scan and screen retrieved documents for relevance.							
Prepares abstracts or annotated bibliography of relevant documents covering brief statements of problem, sample, method, findings, discussion.							
Classifies, indexes, and organizes bibliography cards and abstracts with such as McBee sort cards.							
Instrumentation							
Describe, state the functions of, and discuss the advantages and disadvantages (where applicable) of equipment with application in education. (eg. programmed learning machines, student response systems equipment in area of teaching/learning; equipment commonly used in experimental situations, automated assessment equipment).							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Instrumentation (cont.)							
Be able to locate sources of hardware							
Name and describe the common types of data gathering and assessment instruments, eg. questionnaire, essay, interview schedule, critical incident instruments, and the various types of objective tests--multiple choice, true-false, short answer, matching, etc.							
State the purpose (or common applicability of), advantages and disadvantages of various types of instrumentation							
Discuss the guidelines for quality commonly associated with various types of instruments (as to presentation and layout).							
Summarize the basic statistical concepts associated with tests such as reliability, validity, item sampling, correction for guessing, measurement error, item analysis, etc.							
State the general principles in writing objective test items such as appropriateness of content and difficulty, brevity, accuracy, single answer, grammatical correctness, positive wording, absence of dependent cues, etc.							
Discuss a general strategy for planning and developing assessment and informational instruments.							
Describe general content and structure of a variety of commonly used instruments, eg. Stanford-Binet, MMPI, etc.							
Be able to locate or obtain specimen sets of tests through libraries or companies.							

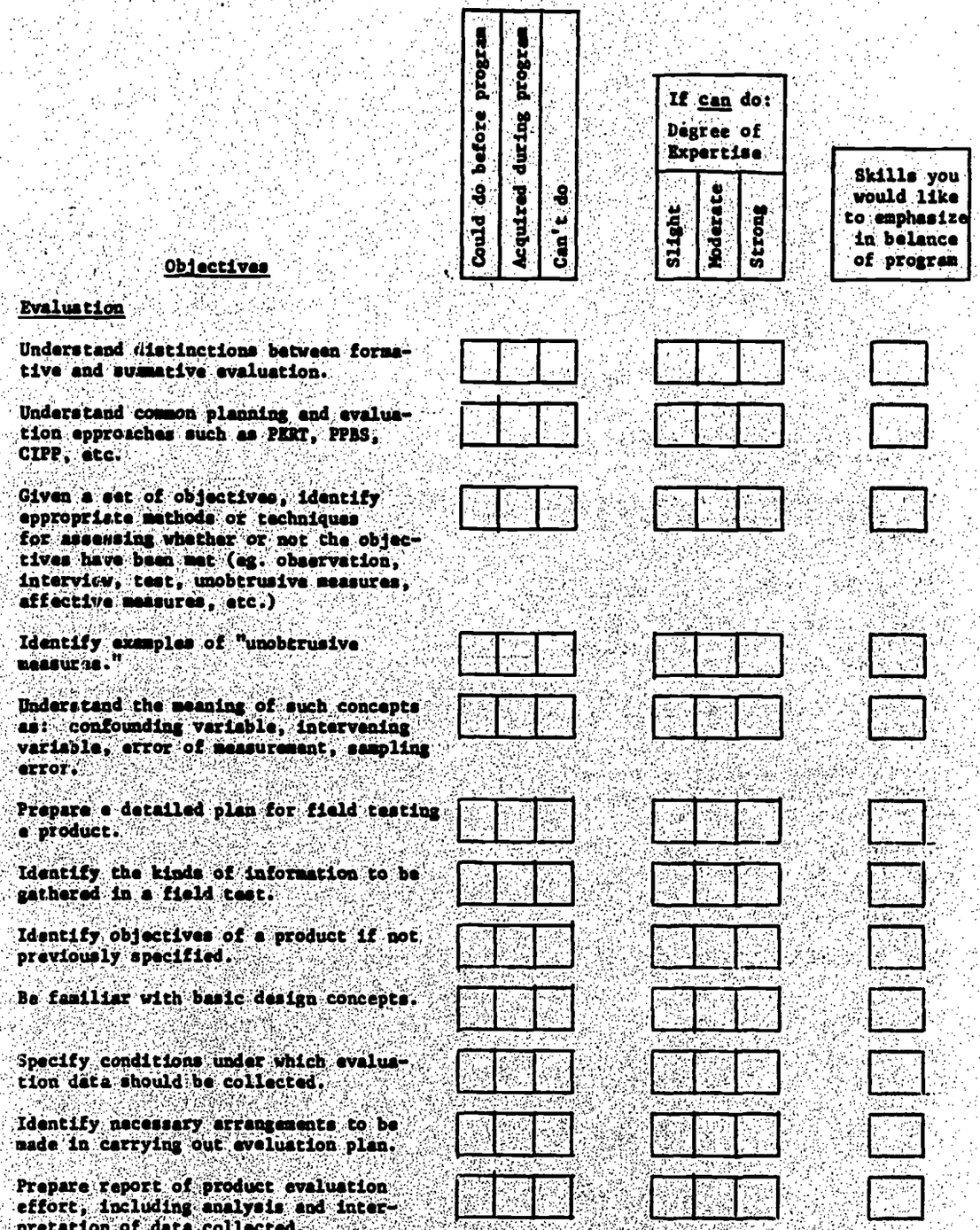
Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Data Collection							
Can describe the general nature of a variety of interviewing techniques (eg. structured, focused, etc.)							
Can plan and develop interview schedules which represent various interview techniques.							
Given specific R&D problems, discuss the application, advantages, and disadvantages of various interview techniques.							
Can apply appropriate interview techniques in conducting interviews of the types likely to be used in R&D projects.							
Can describe the general nature of a variety of observation techniques (eg. time sampling, anecdotal record, etc.).							
Can plan and develop observation schedules which represent various observation techniques.							
Given specific R&D problems, discuss the application, advantages, and disadvantages of various observation techniques.							
Can apply appropriate observation technicues in conducting observations of the types likely to be used in R&D projects.							
Summarizes the basic principles associated with standardization (eg. commonness of directions, timing, etc.)							
Explains why standardization is important and can identify those assessment situations with which it is most likely to be associated or not particularly associated.							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Data Collection (cont.)							
Identify the ranges of expertise and training required to administer various types of tests under certain conditions such as group, individual, children, etc.							
Identify common problems for which specific types of tests are used to collect data.							
Identify the conditions under which various tests are commonly given.							
Discuss how certain external conditions may affect administration or outcomes.							
Differentiate "instrument administration" from "testing," as it is commonly used (general clarity of all those definitions)							
Discuss the issues of protection of subjects in experimentation, confidentiality of data, subject awareness of a test situation, etc.							
Explain how affective considerations, such a rapport, might influence testing process and results.							
Given an experiment, discuss the kinds of measurements which would be appropriate for data collection.							
Define the major and common terms associated with experimentation, such as "research design," "dependent and independent variables," "control groups," "hypotheses," "random sampling," "significance,""confounding," and "intervening variables," etc.							
Identify some of the common areas of education in which basic research occurs.							
Discuss the role of basic experimentation in educational R&D.							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Data Analysis							
State the characteristics of and give examples of data that are based on nominal, ordinal, interval, and ratio scales.	☐	☐	☐	☐	☐	☐	☐
Describe procedures for organizing data such as tallying frequencies or ratings, alphabetizing, rank ordering, etc.	☐	☐	☐	☐	☐	☐	☐
Given specific types of data, prepare an organizational format.	☐	☐	☐	☐	☐	☐	☐
Identify various types of data displays such as pie charts, bar graphs, histograms, etc.	☐	☐	☐	☐	☐	☐	☐
State general guidelines for the preparation and construction of visual data presentations.	☐	☐	☐	☐	☐	☐	☐
Given an organizational format containing specific types of data, prepare a visual display such as chart, graph, etc.	☐	☐	☐	☐	☐	☐	☐
Compare and contrast the amounts and kinds of information provided by different data displays.	☐	☐	☐	☐	☐	☐	☐
Define basic statistical terms such as normal distribution, standard scores, measures of central tendency and dispersion, norms, derived scores, confidence interval, Type I and Type II error, significance, etc.	☐	☐	☐	☐	☐	☐	☐
Compute common statistics such as mean, standard deviation, t's, etc.	☐	☐	☐	☐	☐	☐	☐
State what questions various tests of significance address themselves to.	☐	☐	☐	☐	☐	☐	☐

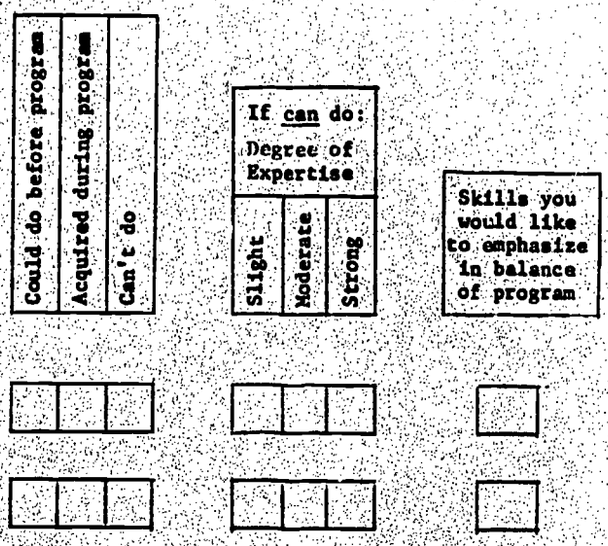
Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Proposal Preparation							
Plan research studies using defensible statistical techniques and research designs.							
Be familiar with basic concepts of research design (eg. random sampling, pre- and post-testing, control groups, etc.).							
Identify a variety of funding sources and describe the kinds of R&D efforts typically funded by each (whether RFP or unsolicited or both; what special areas of interest, eg. voc. ed., etc.)							
Estimate the number of manhours needed to complete specified tasks.							
Prepare statements describing agency facilities and personnel relevant to the project proposed.							
Define, and describe the distinctions between, the following terms: proposal prospectus, bid, RFP, letter of interest.							
Given an RFP, identify the topics which must be covered in the proposal according to the specifications.							
Write a clear statement of the problem your proposed project is addressing.							
State the objectives and anticipated products of a proposed project.							
Given a project, identify the kinds and sources of data to be collected and specify appropriate methods for collecting the data.							
Product Development							
Design, produce, and validate effective instructional materials							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Product Development (cont.)							
Identify sources of information on available materials.							
Review and examine existing products for relevance to current product effort.							
Identify elements of the current product effort which will need to be 1) adopted, 2) adapted or modified, and 3) developed or created.							
Specify the objectives of the product.							
Make constructive recommendations for changes in the product based on field test data.							
Identify sources of information regarding the content of the product.							
Prepare detailed specifications regarding product development or modification							
Know procedures for ordering/obtaining materials to be adopted/adapted.							
Know when copyright or patent releases need to be obtained and how to obtain them.							
Identify characteristics of product users which will have implications for product development (eg. reading level, etc.)							
Establish quality-control procedures.							
Identify sources of assistance in activities your agency is not qualified to carry out (eg. printing, photography etc.)							



Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Evaluation							
Understand distinctions between formative and summative evaluation.							
Understand common planning and evaluation approaches such as PERT, PPBS, CIPP, etc.							
Given a set of objectives, identify appropriate methods or techniques for assessing whether or not the objectives have been met (eg. observation, interview, test, unobtrusive measures, affective measures, etc.)							
Identify examples of "unobtrusive measures."							
Understand the meaning of such concepts as: confounding variable, intervening variable, error of measurement, sampling error.							
Prepare a detailed plan for field testing a product.							
Identify the kinds of information to be gathered in a field test.							
Identify objectives of a product if not previously specified.							
Be familiar with basic design concepts.							
Specify conditions under which evaluation data should be collected.							
Identify necessary arrangements to be made in carrying out evaluation plan.							
Prepare report of product evaluation effort, including analysis and interpretation of data collected.							

Objectives	Could do before program	Acquired during program	Can't do	If can do: Degree of Expertise: Slight	Moderate	Strong	Skills you would like to emphasize in balance of program
Marketing, Dissemination, Implementation (cont.)							
Specify procedures for assessing effectiveness of marketing, implementation effort.							
Write-Up and Publication							
Prepare abstract of project report.							
Be familiar with APA manual on style.							
Write succinct descriptions of the purpose, method, results, and implications of a project.							
Given a variety of specific paper topics, identify a) appropriate publication sources, and b) appropriate oral presentation forums for each.							
Given a draft of an article or a report, review and critique it for 1) content, 2) style, and 3) technical soundness.							
Scheduling/Management							
Estimate number of man hours necessary to complete specified tasks.							
Estimate costs associated with completing specified tasks.							
Write detailed job description for (assumed) vacancy.							
Interview candidate for job position.							
Outline methods for planning, monitoring, and evaluating accomplishment of tasks.							
Identify work objectives							



Objectives

Apprenticeship Experiences (cont.)

Assume responsibility for, and take seriously, the adequate completion of a task.

Be sensitive to and compatible with the surrounding work style, customs, and environment.

APPENDIX B

INSTRUCTIONAL MATERIALS AND RESOURCES

Instruction

Dunn, J.D. The PLAN approach to curriculum definition. Education, 1970, 90, 221-226.

Flanagan, J.C., How instructional systems will manage learning. Nation's Schools, 1970, 86(4), 65-69/120.

Flanagan, J.C. Individualizing education. Education, 1970, 90, 191-206.

Flanagan, J.C. The role of the computer in PLAN. Journal of Educational Data Processing, 1970, 7(1), 1-10.

Holt, J.C. How children fail. New York: Pitman, 1964.

Holt, J.C. How children learn. New York: Dell, 1970.

Jung, S.M., Lipe, D., & Wolfe, P.S. Study of the use of incentives in in education and the feasibility of field experiments in school systems. Final report prepared under contract OEC-0-70-5025. Submitted to Office of Program Planning and Evaluation, U.S. Office of Education, U.S. Department of Health, Education, and Welfare. Palo Alto, California: American Institutes for Research, 1971.

Lessinger, L.M. Every kid a winner: Accountability in education. New York: Simon and Schuster, 1970.

Oettinger, A.G. & Marks, S. Run, computer, run: The mythology of educational innovation--an essay. Cambridge, Mass.: Harvard University Press, 1969.

Postman, N. & Weingartner, C. Teaching as a subversive activity. New York: Delaconte Press, 1969.

Silberman, C.E. Crisis in the Classroom: The remaking of American Education. New York: Random House, Inc., 1970.

Psychology of Learning

Bloom, B.S. Stability & change in human characteristics. New York: Wiley, 1964.

Bruner, J.S., Goodnow, J.J. and Austin, G.A. A study of thinking. New York: Wiley, 1956.

Fleishman, E.A. (Ed.). Studies in personnel and industrial psychology. Homewood, Illinois: Dorsey Press, 1967.

Hilgard, E.R. (ED.) Theories of leaning and instruction. National Society for the Study of Education, Committee on Theories of Learning and Instruction. Chicago: University of Chicago Press, 1964.

APPENDIX B

INSTRUCTIONAL MATERIALS AND RESOURCES

This list contains some of the more important materials which may be used in a cross-training program. It is not an exhaustive list. For ease of use it is organized by several basic topics.

Evaluation

Hawkridge, D.G., Campeau, P.L., & Trichett, P.K. Preparing evaluation reports: a guide for authors. Final report prepared under contract OEC-0-9-502013-2808(099). Submitted to U.S. Office of Education, U.S. Department of Health, Education, and Welfare. Palo Alto, California: American Institutes for Research, 1969.

Sawin, E. Observing and interviewing. Pre-publication draft. Berkeley: Far West Laboratory for Educational Research and Development, Consortium for Development, Dissemination, and Evaluation Training, 1971.

Scriven, M. The methodology of evaluation. AERA monograph series on curriculum evaluation I: perspectives of curriculum evaluation. Chicago: Rand McNally & Co., 1968.

The Southwest Educational Development Laboratory. Calipers: Planning the systems approach to field testing educational products. Austin, Texas: Southwest Educational Development Corporation, 1969.

Steel, L. & Canter, R. A survey of information/data handling activities in educational DD&E. Pre-publication draft. Berkeley: Far West Laboratory for Educational Research and Development, Consortium for Development, Dissemination, and Evaluation Training, 1971.

Stufflebeam, D.I., Foley, W.J., Gephart, W.J., Guba, E.G., Hammond, R.I., Merriman, H.O., & Provus, M.M. Phi Delta Kappa National Study Committee on Evaluation. Educational evaluation and decision making. Itasca, Illinois: F.E. Peacock Publishers, Inc., 1971.

Suchman, E.A. Evaluative research.: Principles and practice in public service and social action programs. New York: Russell Sage Foundation, 1967.

Wholey, J.S., et al. Federal evaluation policy: Analyzing the effects of public programs. Washington, D.C.: Urban Institute, 1970.

Holland, J.G. & Skinner, B.F. The analysis of behavior. New York, Toronto, London: McGraw-Hill Book Company, Inc., 1961.

Newell, A. & Simon, H. Human Problem Solving. New York: Prentice-Hall, 1971.

Piaget, J. Science of education and the psychology of the child. New York: Orion Press, 1970.

Skinner, B.F. Science and human behavior. New York: Macmillan, 1953.

Skinner, B.F. Cumulative record. (Enl. ed.) New York: Appleton-Century-Crafts, 1961.

Proposal Writing

Crawford, J. & Kielsmeier, C. Proposal writing: A manual and workbook. Corvallis, Oregon: Continuing Education Publishers, 1970.

Statistics

Campbell, D.F. and Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally & Company, 1963.

Elzey, F. A first reader in statistics. Belmont, California: Wadsworth Publishing Company, Inc., 1967.

Gorow, F.F. Statistical Measures: A programmed Test. Central Tendency, Dispersion, Correlation. San Francisco: Chandler Publishing 1962.

Huff, D. How to live with statistics. New York: W.W. Norton, Inc., 1954.

McCollough, C. & Van Alta, L. Statistical concepts: A program for self-instruction. New York, San Francisco: McGraw-Hill Book Company, Inc., 1963.

Spence, J.F., et al. Elementary statistics. New York: Appleton-Century-Crafts, 1968.

Steel, L. Data analysis. Pre-publication draft. Berkeley: Far West Laboratory for Education Research and Development, Consortium for Development, Dissemination, and Evaluation Training, 1971.

Test Construction

Cronbach, L.J. Essentials of Psychological Testing. Second Edition. New York: Harper & Row Publishers, 1949, 1960.

Harcourt, Brace & World, Inc., Test Department. Test Service Notebook Number 13. New York: Harcourt, Brace & World, Inc., (no publication date given).

Wood, D.A. Test construction. Development and interpretation of achievement tests. Columbus, Ohio: Charles E. Merrill Books, Inc., 1961.

Other Topics

Berg, I. Education & jobs: The great training robbery. New York: Beacon Press, 1970.

Buckley, W.F. (Ed.) Modern systems research for the behavioral scientist: A sourcebook. Chicago: Aldine Publishing Co., 1968.

Dewey, J. How we think. Boston: D.C. Heath & Co., 1910.

Dillman, F.E., Jr. Instructional Objectives: Specificity and Behavior. Menlo Park, California: Dillman Associates, 1971.

Flanagan, J.C., Davis, F.B., Dailey, J.F., Shaycoft, M.F., Orr, D.B., Goldberg, I., & Neyman, C.A., Jr. The American high-school student. Final report for Cooperative Research Project. No.635, U.S. Office of Education, Department of Health, Education, and Welfare. Pittsburgh: Project TALENT Office and University of Pittsburgh, 1964.

Flanagan, J.C., Shaycoft, M.F., Richards, J.M., Jr., & Claudy, J.G. Five years after high school. Final report prepared under Grant No. OEG-0-9-610065-1367(085). Submitted to U.S. Office of Education, U.S. Department of Health, Education, and Welfare. Palo Alto, California: American Institutes for Research and University of Pittsburgh.

The Foundation Directory: Third Edition. New York: Russell Sage Foundation, 1967.

Lansky, L.M. & Rebelsky, F.G. Edge-punched cards: A method for storing and retrieving social science references. Psychological Reports, 1963, 13, 51-62.

Mager, R.F. Preparing Instructional Objectives. Palo Alto, California: Fearon Publishers, Inc., 1962.

Markle, S.M. Good frames and bad: A grammar of frame writing, 2nd edition. New York: John Wiley & Sons, Inc., 1969.

Russell, B.R. Human knowledge: Its scope and limits. New York: Simon and Schuster, 1948.

Tiedeman, D.V. & O'Hara, R.P. Career Development: Choice and adjustment. New York: College Entrance Examination Board, 1963.

Tiedeman, D.V. & Miller, A.L. An educating research machine game. Chapter for Education and the behavioral sciences, Rallo Handy (ED.) In press.

U.S. Department of Health, Education, and Welfare, Office of Education/ National Center for Educational Communication. How to use ERIC. OE-12037-C Washington, D.C.: United States Government Printing Office, 1969. Revised 1970.

U.S. Department of Health, Education, and Welfare, Office of Education/ Bureau of Research. Computer-based vocational guidance system. OE-25053. Summary of papers presented at the Fourth Symposium for Systems under Development for Vocational Guidance. Washington, D.C.: United States Government Printing Office.

APPENDIX C

SAMPLE FACT BOOKLET FOR PROSPECTIVE APPLICANTS

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SAMPLE FACT BOOKLET FOR PROSPECTIVE APPLICANTS

A Program to Prepare Unemployed Aerospace Workers

for

Jobs in Educational Research and Development

QUESTIONS AND ANSWERS FOR APPLICANTS

AMERICAN INSTITUTES FOR RESEARCH

Post Office Box 1113 / Palo Alto, California 94302

WHAT IS THE PURPOSE OF THIS PROGRAM?

There are many male and female unemployed aerospace workers whose skills and talents are being lost by society. One solution to this problem is to redeploy these skills from problem solving in the physical sciences to problem solving in the social sciences. This program is designed to help aerospace workers transfer their scientific research and development skills to the field of education through a short-term apprenticeship work-study program. At the present time, the program is viewed as a pilot study of the feasibility of this approach. Only a small number of trainees will be selected. If the pilot study is successful, plans for an expanded program will be considered.

WHO ARE THE SPONSORS OF THE PROGRAM?

The design of the program and responsibility for its administration lie with the American Institutes for Research in its Palo Alto, California office. AIR is a private non-profit educational and scientific research institution engaged in research and service in the behavioral, social, and educational science areas. Over the years, AIR has completed more than 800 projects in education and the behavioral sciences. The 450 persons employed by AIR in its 5 locations include researchers, technical staff, administrative and clerical personnel, and other support staff. Approximately 100 of the employees are senior scientists who hold doctoral degrees in education, psychology, sociology, statistics, engineering, and other areas of the physical and social sciences.

Financial support is provided through a grant from the Division of Research and Development Resources, National Center for Educational Research and Development, United States Office of Education.

WHERE WILL I BE TRAINED?

Most of the training experiences will take place at AIR in Palo Alto, where office space, instructional materials, and staff will be located. Field trips and some experiences at other educational research and development institutions are scheduled.

WHEN DOES THIS PROGRAM START AND HOW LONG DOES IT LAST?

Trainees will begin the apprenticeship work-study program on Wednesday, September 15, 1971. The program will run 13 weeks, terminating on Wednesday, December 15, 1971. The normal work day is from 8:30 am to 5:00 pm. Trainees may also expect to spend some after-time hours in directed study, personal research projects, and the like.

WHAT WILL THE TRAINING INVOLVE?

Instructional experiences will include seminars, directed independent studies, and specific project apprenticeships. Morning sessions will be devoted to formal seminars and independent study. Afternoons will be devoted to apprenticeship work. Instruction will be handled by various AIR staff members and will be tailored to the particular needs of the individual trainees. Visiting speakers will also be invited to participate in the seminars.

The following general subject areas will be covered:

1) Orientation to Education and Educational Problems. This area is designed to introduce the trainee to the basic educational setting. Trainees will talk with teachers and administrators, view videotapes of schools in action, and make field trips to schools. They will become familiar with the structure and administration of public schools and the legal, social, and political constraints within which they operate. Educational problems including learning and classroom management will be covered.

2) Introduction to Educational Research and Development. This will be an overview of the major topics, efforts, and activities in educational research and development. The content will include such topics as learning theory, evaluation, educational technology, behavioral research methods and instrumentation, and basic terminology. Field trips to other educational research and development institutions will be included.

3) Comparative Task and Skill Transfer Analysis. The objective of this topic area is to compare and contrast the tasks and requisite skills of research and development in the physical sciences with research and development in the behavioral sciences and particularly education. Areas of comparison might include settings, problem areas, organization and administration, and approach to problem solving. A good deal of this content depends heavily on the trainees themselves. The comparison will serve to highlight those areas in educational research in which they are already competent and to point out task and skill areas in which trainees need more familiarization or study. These identifications will be particularly valuable in defining individual objectives for each person in the training program.

4) Requisite Skills Development. This area will be treated through formal sub-group seminars whenever trainee needs coincide. Typically, however, directed independent studies will be more appropriate. Special problems or topics will be trainee electives. Decisions will be based on their existing skills, the conclusions of the formal sessions on comparative task analysis, and the nature of their project apprenticeship and interests. The number of individually treated topics will depend on all of these factors, plus the intensity with which a trainee wishes to pursue a topic.

While the total pool of topics will evolve and finalize as the work-study program progresses into its third and fourth weeks, the pool would probably include: a) systems analysis, planning and control techniques (e.g., PERT, PPBS); b) data processing; c) educational statistics and data analysis; d) data collection, organization, and presentation; e) instrument development, questionnaire design, standardized testing; f) material production and distribution; g) field testing; h) sampling; i) research report writing; j) scaling; and k) educational information retrieval (e.g., ERIC system).

5) Job Prospects and Career Development Strategies. This area will include a summary of employment opportunities. The various settings in which educational R & D takes place will be analyzed. Long range career plans will be discussed. Proposal writing and project funding will also be covered.

A number of sessions of formal instruction toward the end of the three month program will be devoted to the format, art, and technique of proposal writing. Trainees will examine and discuss a variety of proposal types and topics. During this time each trainee will actually write proposals.

Discussions in the area of project funding will include: 1) a survey of educational R&D sponsors, 2) the system of contacts and contracts, and 3) project type or topic and logical funding sources.

Topics 1, 2, 3, and 5 will be covered in formal seminars. Topic 4 will be covered primarily in the directed independent study. Although instruction will be largely sequential, frequent overlap and review will occur. Learning in all five areas will be reinforced in the project apprenticeship. During the apprenticeship, trainees initially will survey a large number of ongoing projects; they will receive specially prescribed project experience, and then engage in project work based on their own interests.

WHAT KIND OF BACKGROUND MUST I HAVE TO BE ELIGIBLE?

To apply for the training program, an applicant must be an unemployed aerospace worker who holds a B.S. or B. A. degree. For survey purposes, the application form will include questions on routine demographic data on such factors as age, sex, and marital status. In no way whatsoever, will this information be used to influence eligibility or selection. Individuals of all ages, sex, and ethnic backgrounds are encouraged to apply.

HOW WILL TRAINEE SELECTION BE MADE?

Selection will be based on a written application, a test of general knowledge of selected topics in education, academic ability, and work history and experience. Relevant experiences which indicate interest in the field of education and the possibility of interest in a long range career commitment are desirable.

WILL I BE PAID DURING TRAINING?

Trainees will receive a stipend of $75 per week for the 13 weeks of the program. In addition, support for dependents will be provided at the rate of $15 per week per dependent fo 13 weeks.

For trainees from out of state, transportation costs equivalent to one round trip air fare per trainee will be provided.

DO I PAY INCOME TAX ON MY STIPEND?

No

WHAT KINDS OF ACTIVITIES ARE INVOLVED IN EDUCATIONAL RESEARCH AND DEVELOPMENT?

Educational R & D occurs in a variety of institutions including federally sponsored centers and laboratories, profit and non-profit research organizations, private corporations, school systems, federal and state departments of education, and publishing companies. There are a broad range of activities. Examples include developing new learning materials, evaluating the effectiveness of educational projects and products, performing background research on programs such as Sesame Street, designing scheduling systems for big city schools, and assisting educational administrators in making systematic decisions.

WILL I BE GUARANTEED A JOB?

No. Job placement is not guaranteed. However, a recent manpower needs study in the Bay Area has suggested the need for educational research and development workers. AIR will make preliminary contact with potential employers, assist trainees in making personal contacts and job inquiries, and assist in interview arrangements.

In addition, contact will be maintained with California's Human Resources Development Agency, the Department of Labor's Manpower Administration, and other agencies active in implementing the administration's new aid program for the unemployed. Under this program, funds are made available to assist the jobless in investigating job possibilities away from home, cover moving costs necessitated by job changes, and underwrite on-the-job training.

WHAT KIND OF JOB RESPONSIBILITIES AND SALARY CAN I EXPECT IF I AM SUCCESSFUL IN FUTURE JOB PLACEMENT?

Trainees who successfully locate jobs in educational R & D cannot expect to enter the field at the same high levels of responsibility or salary which were probably typical of their employment in the aerospace industry. Entry level salaries of R & D personnel with a B.S. or B.A. and some experience might be as low as $8,000 to $12,000. Additional degrees, specific technical skills, such as

data processing skills and/or a base of related experience could raise these figures by as much as $4,000.

The entry level professional is likely to have some opportunity of responsibility for his own work, but is unlikely to be autonomous in final decision-making. The field has significant advancement opportunity potential and on-the-job development opportunity. As in any industry, experience and demonstrated competency are reflected in increased staff and decision-making responsibilities.

WHERE ARE EDUCATIONAL R & D JOBS LOCATED?

Jobs are likely to be located in or near large urban areas which are major commercial and educational centers for their region of the country.

WHAT ARRANGEMENTS WILL BE MADE FOR LIVING ACCOMMODATIONS DURING TRAINING?

Arrangements for special motel rates will be made by AIR for those trainees so desiring. Rates can be obtained for approximately $5 per day per person with double occupancy. Others may wish to rent a room, apartment or house, or defray living expenses by sharing facilities with other trainees. Furnished studio apartments in the area start at approximately $125 per month; furnished one bedroom apartments start at approximately $145, while furnished two bedroom apartments and modest houses are unlikely to start at less than $180 per month. The costs of these arrangements will be the trainee's responsibility.

WILL I NEED A CAR?

Some personal transportation will be essential. AIR is located in the foothills overlooking Stanford University and is not near public transportation. A car pool with other trainees might be considered, but the trainee might wish more independence in his mobility. All transportation expenses while in the area are borne by the trainee.

WHAT PROVISION WILL BE MADE FOR MY HOUSEHOLD AND FAMILY?

No specific benefits for the households and families of trainees other than the $15 per week per dependent allowance are available.