The institute was designed to provide intensive exposure to evaluation models and some important new evaluation techniques for persons employed in key administrative, supervisory, consultant, or instructional roles in science education. Seventy-seven persons participated in the Institute. A Semantic-Differential scale in pre- and post-response situations was administered in an attempt to determine if significant attitude shifts occurred during the Institute. Participant daily reaction sheets were used and thoroughly reviewed by the Institute staff each day. An "Institute Evaluation" instrument was developed and administered at the end of the Institute. Participant evaluation of the institute was highly favorable. The analysis of responses to the Semantic-Differential Scale demonstrated a highly significant difference between pre- and post-scores surpassing the .001 level in the direction of a positive shift in attitude. (BC)
FINAL REPORT
Project No. 8-8045
Grant No. OEC-1-7-070006-3789

INSTITUTE ON EVALUATION FOR SCIENCE PROGRAMS

April 1968

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education
Bureau of Research
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Acknowledgments

The Director is particularly indebted to Dr. Blaine Worthen, Dr. Robert Hammond and Dr. Albert Eiss. As senior instructors and team leaders, Dr. Worthen and Dr. Hammond played key roles in the success of the Institute. Their contributions during the planning phases were also invaluable. Dr. Eiss had large responsibilities for the initiation and preparation of the proposal and in the detailed planning for the Institute. He was also extremely helpful with the details involved in arranging appropriate physical facilities and in the day to day operation of the Institute.

Herbert A. Smith
Institute Director
# TABLE OF CONTENTS

| Introduction                                      | 1 |
| Method                                           | 2 |
| Results                                          | 3 |
| Discussion                                       | 3 |
| Conclusions                                      | 4 |
| Appendix A:                                      |   |
| Announcement Letter                              | A-1 |
| Application Blank                                | A-3 |
| Acceptance Letter                                | A-4 |
| Rejection Letter                                 | A-5 |
| Program                                          | A-6 |
| Appendix B:                                      |   |
| List of Participants Accepted                    | B-1 |
| Occupational Classification and Geographical Distribution of Participants | B-7 |
| Appendix C:                                      |   |
| Semantic-Differential Scale                      | C-1 |
| Participant Daily Reaction Sheet                 | C-2 |
| Institute Evaluation Instrument                  | C-3 |
| Appendix D:                                      |   |
| Perspective for Evaluation of Science Education  | D-1 |
| Evaluation--The Process of Providing Information to Aid in Decision Making | D-11 |
| Indicators of Change by Metfessel and Michael     | D-17 |
| Product Evaluation Worksheet #1                   | D-23 |
| Selected References in Evaluation                | D-25 |
| Simulation Problem Materials                     | D-26 |
| Some Methods of Data Collection                   | D-76 |
| Appendix E:                                      |   |
| Appendix Table 1: "Responses by Teachers and Supervisors to Statements About the Institute." | E-1 |
| Appendix Table 2: Evaluation by Teachers and Supervisors of Specific Activities by Days | E-2 |
| Analysis of Responses to the Semantic-Differential Scale | E-3 |
Introduction

Science education has been characterized in recent years by many significant changes involving theory, curriculum, facilities, and instructional materials. Although innovations have been plentiful, there has often been little attempt to evaluate the effectiveness of such efforts and many changes can be viewed in retrospect to have been ill-advised. One of the major problems is the lack of individuals experienced in evaluating science programs. A large number of science supervisors have risen through the ranks of classroom teaching, with little or no specialized training for their new positions. College and university teachers who are retained as consultants for developing science programs are experienced in their subject matter fields, but often lack specialized training in education, particularly in evaluation. As a result, many of the evaluative procedures are carried out in a haphazard fashion and effective procedures are not identified and inefficient practices are not eliminated.

The Institute was designed, therefore, to provide an intensive exposure to evaluation models and some important new evaluation techniques for persons employed in key administrative, supervisory, consultant or instructional roles in science education. More specifically it was anticipated that the Institute would contribute to the following objectives.

1. Provide a small but effective group of individuals capable of making critical evaluations of science programs in local school districts.

2. Provide a basis for further dissemination of evaluation techniques through follow-up workshops and inservice education at the local level.

3. Provide materials and insights helpful in planning future national Institutes to upgrade evaluation of science education programs.

4. Identify potential leaders in the use of evaluation procedures who could staff further institutes and inservice programs at the local level.

5. Stimulate a more intensive and comprehensive approach to evaluation problems and further work in the field.
Method

In order to achieve the objectives of the Institute, it was decided to invite between 100 and 120 participants who were intensively involved with the problems of science education either as supervisors of science education in the public schools or college level trainers of science teachers. Individuals were selected from all levels of education, elementary through college.

Following approval of the project, an intensive planning session was held with the Director, senior instructors, an NSTA representative, and one additional Institute staff member in attendance. Senior instructors and other instructional staff members were drawn from the Evaluation Center at Ohio State University and from Project EPIC located at the University of Arizona. Specific plans were developed and a detailed program was formulated.

Following the planning session, application blanks and an explanatory letter were sent to members of the Association for the Education of Teachers of Science, the National Science Supervisors, and to selected individuals known to be heavily involved in science education programs. In addition, the NSTA made a separate mailing to supervisors and consultants in science education maintained on the NSTA Registry. In total, approximately 10,000 letters were sent. Because of the short time between the approval of the proposal and the dates for the Institute, the time between mailing the invitation letters and the Institute was short. (Between two and three weeks). In spite of the time limitation, 173 applications were received. (It should be borne in mind that attendance was entirely at the expense of the individual or of his employer.) Of these, 107 were invited to attend. Copies of the application blank, explanatory letter, acceptance letter, letter of regret for those who could not be accommodated as well as the program mailed to prospective participants are included as Appendix A. Seventy-seven participants were involved in the Institute, although a few were absent at either the beginning or the end of the Institute. Individuals who accepted but who did not attend the Institute are indicated by the red circle around their identifying number in the roster of those invited in Appendix B. In addition to the regular Institute participants, several observers were present part of the time. These represented the NSTA, the NSF and the U. S. Office of Education. One NSF participant was present for all sessions. A breakdown showing geographical representation and levels of professional responsibility is provided in Appendix B-7.

In planning the Institute, it was evident that a program designed to sensitize participants to evaluation procedures and techniques should itself be a reasonable model with respect to the
evaluation process. Accordingly, considerable thought was given to the problem. It was decided to use a Semantic-Differential scale in pre- and post-response situations in an attempt to determine if significant attitude shifts occurred during the Institute. In addition, participant daily reaction sheets were used and these were collected and thoroughly reviewed by the Institute staff at the end of each day. Finally, a document, "Institute Evaluation" was developed and administered at the end of the Institute. Copies of the Semantic-Differential Scale, the participant daily reaction sheets and the final evaluation instrument are included as Appendix C.

Some of the instructional materials which were used, much of it specifically developed for the Institute, are included as Appendix D. In addition, packets of materials, too bulky to be included as a part of this report, were prepared and distributed by the Project EPIC staff. One complete set of the materials is included with this report.

Results

The Institute was held in Crabtree Auditorium. The program ran very nearly as it had been planned. Evaluations of the Institute were analyzed using the computer facilities of Project EPIC. For purposes of analysis, participants were separated into "teachers" and "supervisor" groups. The details of the analysis of the responses to the Semantic-Differential scale and to the Institute Evaluation instrument are shown in Appendix E.

Discussion

From an examination of the participant evaluations (Appendix Table E) it can be seen that the responses to the Institute were highly favorable. It should be noted that the items in the first section of the Institute Evaluation Instrument (Appendix C) were not all polarized in the same direction. Thus, in items such as 3, 28 and 41, "disagree" or "strongly disagree" responses constitute an endorsement for the Institute.

The day to day evaluations of the specific activities are shown in Appendix Table F. There is strong evidence that the participants thought the program was reasonably balanced with the majority of responses falling in the "about right" category. There is evidence that more time should have been allowed on the second day program which was essentially concerned with the
There was a feeling among some of the participants that the simulation was either unrealistic or a "bad example" of problems in evaluation of science programs. (This view was not shared by the Director who thought it might quite possibly be just too realistic.) There was an indication that more work in refinement of the simulation problem and more time for participants might have paid large dividends.

The daily evaluation forms were also helpful. From their analysis it became apparent that "evaluation" was being oriented too strictly to project assessment, particularly as these related to ESEA Title I and Title III activities. Comments on the evaluation sheets enabled the Institute staff to shift much more strongly in the direction of teacher, classroom and general program evaluation.

The analysis of the responses to the Semantic-Differential scale demonstrated a highly significant difference between the pre and post scores surpassing the .001 level of significance in the direction of a positive shift in attitude. The analysis of the responses and pertinent comments are included as Appendix E 3.

One participant tended to be highly critical and felt that the purpose of the Institute was misrepresented. He appeared to have expected specific answers to such questions as whether CBA or CHEMS should be installed in his school. In any case, he expected a detailed evaluation of many of the specific science curriculum studies which have been funded.

Conclusions

The Institute appears from available evidence to have been a highly successful operation. It is apparent from the extremely short response time allowed between the announcement letters and the deadline for applications that there is a felt need for assistance in evaluating science programs. There was evidence that the presentation of the CIPP evaluation model provided needed insights. Reactions of the participants seemed to indicate that, at present, context and input evaluation are likely to be particularly weak. More familiarity with process and product evaluation seemed evident. In any future Institute, it seems probable that the CIPP model and the simulation problem could and should be more closely related.

The success of this Institute clearly indicates that future efforts of this kind should be planned. It is suggested that Institutes operated in connection with selected NSTA regional conferences would be especially appropriate. Institutes should not necessarily be limited to such meetings, however.
Dear Colleagues in Science Education:

An unusual opportunity is being provided for key personnel in science education to participate in a four-day institute on the evaluation of science teaching programs. The institute on evaluation of science instruction will be held just prior to the NSTA Annual Convention in Washington, D. C. You are invited to apply as an institute participant. The institute is sponsored by NSTA under a grant from the U. S. Office of Education.

Presentations will be made by recognized authorities in evaluation. Participants will be provided with an opportunity to sharpen their insights into the evaluation process in a seminar setting. Objectives of the institute are:

1. Suggest ways of evaluating plans for educational improvement which include:
   a. Evaluation of a proposed strategy for improvement.
   b. Evaluation of procedures including provisions for feedback.
   c. Evaluation of outcomes of improvement programs.
2. Selection of appropriate evaluation techniques designed to provide information necessary for making decisions about educational programs, classroom practices and curriculum changes.
3. Development of ability to discriminate between well written and poorly written objectives given several sets of educational objectives of variable quality.
4. Describe interaction analysis as a useful evaluative tool.
5. Develop a well documented report of the project including a clear and concise evaluation of the institute.

Time is very short and an almost immediate response is necessary from those who desire to participate. Below are the "facts" relating to the institute. If you are interested, please return your application form by return airmail. In any case, applications must be received no later than March 13.

When: The Institute begins at 9:00 a.m., March 24 and ends March 27 at 4:30 p.m.

Where: All sessions of the Institute will be in Washington, D. C.

Deadline: Applications must be received by March 13. Please use airmail.

Fees: None. But participants must be supported by their employers or by themselves.
Staff: Dr. Blaine R. Worthen, Associate Director, Evaluation Center, The Ohio State University.

Mr. Michael D. Hock, Research Associate, Evaluation Center, The Ohio State University.

Dr. Robert L. Hammond, Director, Project EPIC, University of Arizona.

Staff Associates, Project EPIC, University of Arizona

Dr. Herbert A. Smith, Director of Teacher Education, Colorado State University.

Eligibles: Only 100 participants can be accommodated. Selection will be made from those applicants who are actively engaged as a supervisor or consultant for a local or state educational agency or who are employed by an institution of higher education and responsible for supervision of science teachers, teaching of science methods course and/or direction of research in science education.

Housing Accommodations: Arrangements have not been completed. However, NSTA will arrange for a block of rooms, probably at one of the Washington hotels, at the most favorable rate possible.

Sincerely yours,

Herbert A. Smith
Institute Director

203 Liberal Arts Building
Colorado State University
Fort Collins, Colorado 80521
Telephone: 303-491-5305
APPLICATION FOR ACCEPTANCE INTO THE NATIONAL NSTA INSTITUTE IN EVALUATION OF SCIENCE INSTRUCTION

Name: ____________________________________________

Address: Street__________________________________
          City__________________ State________ Zip_____

Employer: ________________________________ Present Job Title: ____________________________

Respond as appropriate in columns A, B, C, and D.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Classification:</td>
<td>Responsibility as to:</td>
<td></td>
<td>Full-time</td>
</tr>
<tr>
<td>Teacher</td>
<td>Grades taught:</td>
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</tr>
<tr>
<td>Administrator</td>
<td>Level:</td>
<td></td>
<td>Part-time</td>
</tr>
<tr>
<td>Supervisor</td>
<td>Level:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Level:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Educational Background

Bachelors Degree

Institution: ____________________________

Date: ____________________________

Major: ____________________________

Minor: ____________________________

Graduate Study

Institution(s): ____________________________

Degrees, if any: ____________________________

Major: ____________________________

Professional Affiliations

What contribution would you hope the NSTA Institute would make in helping you fulfill better your present responsibilities?

If accepted, do you want housing accommodations made for you?  □ yes □ no

(Participants will be provided with information as to the housing of the Institute as soon as possible. This will probably be in a local hotel and the most favorable rates it is possible to obtain will be negotiated.)

Best address to use in corresponding with you:

Telephone number: (Include area code)

Please note - Return application by airmail to: Dr. Herbert A. Smith

203 Liberal Arts Building

Colorado State University

Fort Collins, Colorado 80521

Telephone: 303-491-5305

A-3
Dear Participant:

I am happy to inform you that you have been accepted as a participant in the National NSTA Institute in Evaluation of Science Education. A schedule of the program is included for your information.

The Institute will be held in Crabtree Auditorium in the NEA Building located at 1201 Sixteenth Street, N.W. If you have requested housing reservations, they are being made for you at the Burlington Hotel. If you indicated on your application that you wanted reservations made for you, please fill out the slip stapled to this letter and mail to the hotel at once. The rates are $11 for single and $15 for double rooms. If you desire a double room, you should so state when you mail the attached form indicating the time of your arrival. Please note that it is your responsibility to notify the Burlington Hotel of your arrival time.

As a reminder, participants should fully understand that attendance at the Institute is either at their expense or at the expense of their employer. No funds to defray any part of the cost of attendance are available through the Institute itself.

We are looking forward to a stimulating and productive Institute and anticipate being able to greet you there.

Sincerely yours,

Herbert A. Smith
Institute Director
Dear Colleague in Science Education:

The response to the invitation to apply for the NSTA Evaluation Institute exceeded both expectations and the capacity to accommodate all who submitted applications. Consequently, it is with considerable regret that your application cannot be honored. If the Institute is successful, it may be possible in the future to sponsor similar conferences in connection with NSTA regional meetings. Your name and application form will be retained as evidence of your interest and desire to participate in an Institute devoted to problems of evaluation and forwarded to the NSTA central office.

Thank you for so promptly submitting your application. As you can probably easily conceive, the problem of selecting 100 participants from all those who applied was not easy. Selection had to be done quickly and with the exercise of a comparatively high degree of subjective judgment. To the charge of subjectivity, the Director pleads guilty and begs your indulgence.

Sincerely yours,

Herbert A. Smith
Institute Director
March 24

9:00 - 9:30 a.m. Opening Session
   Greetings and Announcements
   Introduction of Staff

9:30 - 10:15 a.m. "A Perspective for Evaluation of Science Education"
   Dr. Herbert A. Smith

10:15 - 10:30 a.m. Coffee Break

10:30 - 12:00 a.m. Evaluation as the Base for Educational Improvement

12:00 - 1:30 p.m. Lunch

1:30 - 3:00 p.m. CIPP Evaluation for Decision-Making

3:00 - 3:15 p.m. Coffee Break

3:15 - 4:30 p.m. Designing Evaluation Designs

March 25

9:00 - 10:30 a.m. Techniques for Gathering Evaluation Information

10:30 - 10:45 a.m. Coffee Break

   Simulated Evaluation Design Problem in Science Education
   (remainder of the day)

10:45 - 12:00 a.m. Focusing the Evaluation

12:00 - 1:30 p.m. Lunch

1:30 - 3:00 p.m. Collecting, Organizing, and Analyzing Information

3:00 - 3:15 p.m. Coffee Break

3:15 - 4:30 p.m. Administering, Reporting, and Interpreting Evaluation

March 26

9:00 - 10:00 a.m. Introduction to the EPIC Evaluation Concept,
   Model and Structure
   Dr. Robert L. Hammond

10:00 - 10:30 a.m. Introduction to the Writing of Behavioral Objectives
   in Science
   Dr. Wayne Roberson

10:30 - 10:45 a.m. Coffee Break
   A-6
10:45 - 12:00 a.m.  Small Group: Objective Writing Session  
Richard Powell, Drs. Terry Cornell, Wayne Roberson, Robert Kraner, and Robert Armstrong

12:00 - 1:30 p.m.  Lunch

1:30 - 3:00 p.m.  Small Group: Critique of Teacher-Developed Behavioral Objectives in Science, with Discussion

3:00 - 3:15 p.m.  Coffee Break

3:15 - 4:00 p.m.  Small Group: Individual Participant Objective Writing

4:00 - 4:30 p.m.  Small Group: Critique of Participant Objectives

March 27

9:00 - 9:30 a.m.  Introduction of Observational Systems for Teacher Self-Appraisal  
Drs. Terry Cornell and Wayne Roberson

Characteristics of Observation Systems:
  a. Common Communication
  b. System for Tallying Behavior
  c. Procedures for Analyzing Behavior
  d. Skill Development
  e. Evaluation (comparison of pre-active phase of teaching with interactive phase.)

9:30 - 10:30 a.m.  Observational System for Coding Teacher Objectives, Methods, and Expressions Utilizing Video Tapes and Computer Analysis--Dr. E. Wayne Roberson

10:30 - 10:45 a.m.  Coffee Break

10:45 - 12:00 a.m.  Flander's Interaction Analysis, Description of Coding Process, Emphasizing Use of Matrices and Feedback--Dr. Terry Cornell

12:00 - 1:30 p.m.  Lunch

1:30 - 3:00 p.m.  Small Group Session: Resource People Available to Discuss Morning Presentations and Their Utilization in the Evaluation Process

3:00 - 3:15 p.m.  Coffee Break

3:15 - 3:45 p.m.  Response to Institute by Selected Participants

3:45 - 4:15 p.m.  Evaluation of Institute (Individual written responses)

4:15 - 4:30 p.m.  Closing Remarks and Adjournment
Anderson, Harold M.  
Professor of Education  
University of Colorado  
377 Ord  
Boulder, Colorado 80302

Bachus, Ralph E.  
Science Supervisor  
Boulder Valley School District  
2550 Linden Avenue  
Boulder, Colorado 80302

Balassone, James M.  
Coordinator of Science  
Great Neck Public Schools  
866 Middle Neck Road  
Great Neck, New York 11024

Bedelle, Adrienne G.  
Science Consultant  
City School System of New Rochelle  
Stephenson Boulevard  
New Rochelle, New York 10801

Binger, Robert D.  
Science Consultant  
Florida State Department of Educ.  
1601 Raa Avenue  
Tallahassee, Florida 32303

Bleecker, Anthony L. Jr.  
Dean of Science Instruction  
Pennsbury School District  
25 Crown Terrace  
Morrsville, Pennsylvania 19067

Bloom, Harold W.  
Supervisor of Science  
Board of Education of Anne Arundel Co.  
1602 Ebbotts Place  
Crofton, Maryland 21113

Bolles, William H.  
Science Education Adviser  
Department of Public Instruction  
Box 911  
Harrisburg, Pennsylvania 17126

Bonney, Catherine Y.  
Science Supervisor  
Newark Special School District  
83 East Main Street  
Newark, Delaware 19711

Brawley, Joanna  
Elementary Science Consultant  
Ferguson-Florissant School District  
815 January Avenue  
Ferguson, Missouri 63135

Buell, Robert R.  
Professor of Science Education  
University of Toledo  
Toledo, Ohio 43606

Burke, Richard J.  
Science Supervisor  
Greenhills-Forest Park Board of Ed.  
72 Drummond Street  
Cincinnati, Ohio 45218

Carter, Joseph  
Science Consultant/Science Teacher  
Anaheim Union High School District  
1047 Buckeyewood  
Orange, California 92667

Chimento, Russell L.  
Program Specialist, Science  
Sacramento City Unified School Dist.  
6654 13th Street  
Sacramento, California 95831

Corbusier, Edith  
Director of Education  
Cleveland Heights-University Heights  
Board of Education  
2155 Miramar Boulevard  
Cleveland Heights, Ohio 44121

Cunningham, John  
Director of Curriculum  
Mansfield Board of Education  
R199 Pulver List Road  
Mansfield, Ohio 44905

D'Ambrosio, Nicholas  
Assistant Professor of Science  
Paterson State College  
26 Dixon Place  
Wayne, New Jersey 07470

DeSeyn, Donna E.  
Science Consultant and Director  
Earth-Space Science Education Ctr.  
9 Fifth Avenue  
Fairport, New York 14450
9. Eastman, Thomas W.
   Director of Science
   Needham Public Schools
   58 Hawthorne Avenue
   Needham, Massachusetts 02192

20. Gentry, Adrian N.
    Coordinator of Instruction
    Director, ESEA Title III
    Science Project
    County Superintendent of Schools
    Box 868
    Riverside, California 92502

10. Eide, Edwin
    Science Chairman and Teacher
    Fenton High School, Bensenville, Ill.
    930 Elm Street
    St. Charles, Illinois 60174

21. Gibson, Carolyn A.
    Coordinator of Science
    University of Pittsburgh
    High School Science Research Program
    Box 187
    Pittsburgh, Pennsylvania 15237

1. Fails, Donald J.
   Science Supervisor
   Gateway Schools
   386 Kenney Avenue
   Pitcairn, Pennsylvania 15140

22. Given, Thomas D.
    Coordinator of Science
    Birmingham Public Schools
    632 Ardmoor
    Birmingham, Michigan 48010

2. Farmer, Walter A.
   Chairman, Science Education Dept.
   State University of New York, Albany
   R. D. Box 152
   East Berne, New York 12059

23. Haney, Richard E.
    Associate Professor of Science
    University of Wisconsin, Milwaukee
    4321 N. 42 Street
    Milwaukee, Wisconsin 53216

3. Flannery, Edward J.
   Coordinator of Science
   Council Bluffs Community Schools
   23 Arnold Avenue
   Council Bluffs, Iowa 51501

24. Harbison, Fay
    Director, ESEA Space Science
    Learning Program, Federal Project
    Administrator
    Newport-Mesa Unified School District
    543 Tustin Avenue
    Newport Beach, California 92660

4. Ford, Eleanor M.
   Associate Professor of Physics
   Fairmont State College
   453 Callen Avenue
   Morgantown, West Virginia 26505

5. Hanson, Claude A.
   Science Supervisor
   Boise Public Schools
   3417 Kelly Way
   Boise, Idaho 83704

5. Fox, Gene T.
   Science & Mathematics Supervisor
   Prince William County School Board
   5313 Garner Street
   Springfield, Virginia 22151

6. Fors, George
   Science & Mathematics Consultant
   Department of Public Instruction
   Bismarck, North Dakota 58501

6. Hazelton, Ralph
   Science Coordinator
   Dover Special School District
   134 Reese Street
   Dover, Delaware 19901
6. Heath, Elbert C.
Science Coordinator
Consolidated School District #2
R. R. #1
Oak Grove, Missouri 64075

7. Hudgins, William Kent
Science Consultant
PACE Education Center
Wood County Schools
2109 42nd Street
Parkersburg, West Virginia 26101

8. Hunt, Agnes
Science Supervisor
Birmingham Board of Education
2015 7th Avenue North
Birmingham, Alabama 35203

9. Jachimowicz, T. J.
Curriculum Development Specialist
Department of Public Instruction
166 North Clay Street
Manheim, Pennsylvania 17545

10. Jenkins, Jack L.
Secondary Science Chairman
Utica Community Schools
53076 Ruann Drive
Utica, Michigan 48087

11. Jones, Frances D.
Science Consultant
Alabama Department of Education
2919 N. Colonial Drive
Montgomery, Alabama 36111

12. Jones, Thomas D.
Science Coordinator
Maine-Endwell Central School District
633 Lacey Drive
Endwell, New York 13760

13. Keegan, Mary E.
Science Consultant
Winnetka Public Schools
111 Spruce Street
Winnetka, Illinois 60093

14. Kellogg, Maurice G.
Associate Professor of Science Educ.
Western Illinois University
287 Jana Road
Macomb, Illinois 61455

45. Kilburn, Robert E.
Science Coordinator
Newton Public Schools
46 Marked Tree Road
Needham, Massachusetts 02192

46. King, Marjorie M.
Science Consultant
Jefferson Parish School Board
519 Huey P. Long Avenue
Gretna, Louisiana 70053

47. Kirkbride, Robert D.
District Science Representative
Napa Valley Unified School District
1106 Larkin Way
Napa, California 94558

48. Kleinman, Gladys S.
Associate Professor
Hunter College
11 Dundee Road
Kendall Park, New Jersey 08824

49. Knighton, Walter
Science Consultant
West Chester School District
15 Green Bank Avenue
West Chester, Pennsylvania 19380

50. Knipling, Phoebe H.
Secondary Science Supervisor
Arlington County School Board
2623 N. Military Road
Arlington, Virginia 22207

51. Kolupski, Agnes
Science Coordinator
Vestal Central Schools
Vestal, New York 13850

52. Kriebs, Jean
Assistant Professor
Temple University
1676 Susquehanna Street
Rydal, Pennsylvania 19046

53. Labahn, William F.
Science Coordinator
District 59, Elk Grove, Illinois
1706 W. Algonquin Road
Arlington Heights, Illinois 60005
54. Lancaster, David N.
Science and Mathematics Consultant
San Carlos Elementary School District
826 Chestnut Street
San Carlos, California 94070

55. Lawrence, Otis O.
Science Consultant
Oklahoma City Public Schools
310 N. E. 61st Street
Oklahoma City, Oklahoma 73105

56. Lockard, J. David
Associate Professor of Science Educ.
Director, Science Teaching Center
University of Maryland
5905 33rd Avenue
Hyattsville, Maryland 20782

57. Lujan, Henry M.
Secondary Science Supervisor
District #11
Colorado Springs Public Schools
239 Elmwood Drive
Colorado Springs, Colorado 80907

58. Maben, Jerrold William
Associate Professor of Education
Director, Science Education Center
The University of Akron
Akron, Ohio 44304

59. MacDonald, Mary Hope
Professor of Chemistry
Loyola University
355 Lowerline
New Orleans, Louisiana 70118

60. Maddron, Dallas W.
Science Supervisor
Orange County Public Schools
2014 Strathaven Road
Winter Park, Florida 32789

61. Magat, Phyllis L.
Coordinator of Mathematics & Science
Alfred I. DuPont School District
112 S. Spring Valley Road
Wilmington, Delaware 19807

62. Matthews, Ann E.
Science Specialist Coordinator
Lincoln Public Schools and Liberty Council (ESEA Title III)
80 Parker Street
S. Acton, Massachusetts 01720

63. Metzger, Melvin A.
Math-Science Supervisor
Cecil County Board of Education
Booth Street Center
Elkton, Maryland 21921

64. Mills, Lester C.
Associate Professor of Education
Ohio University
2 Orchard Lane
Athens, Ohio 45701

65. Monteith, Vernon B.
Science Coordinator
Cherry Creek School District
1156 South Kendall Court
Denver, Colorado 80226

66. Moretti, Victor
District Science Chairman
Edison Twp Public Schools
39 Poplar Street
Fords, New Jersey 08863

67. Nelson, Dale D.
Coordinator of Science
East Side Union High School Dist.
15879 Highland Drive
San Jose, California 95127

68. O'Neill, Raymond A.
Elementary Supervisor
Arlington County Public Schools
4751 N. 25th Street
Arlington, Virginia 22207

69. Palmer, Carroll
Chairman, Science Curricula
Committee of School District
Chairman, Science Department
Morgantown High School
Monongalia County School District
405 Forest Avenue
Morgantown, West Virginia 26505

70. Palmer, Elra M.
Supervisor
Baltimore City Schools
2521 N. Charles Street
Baltimore, Maryland 21218

71. Pancella, John R.
Science Supervisor
Montgomery County Public Schools
850 N. Washington Street
Rockville, Maryland 20850
72. Pappas, Richard J.
Elementary Science Coordinator
Bethlehem Area School District
1330 Church Street
Bethlehem, Pennsylvania 18015

73. Parker, Grady P.
Director of Science and Mathematics Education and Programs
Texas A & M University
Box 251 Faculty Exchange
College Station, Texas 77843

74. Perkes, Victor A.
Lecturer & Supervisor in Science Ed.
University of California, Davis
507 Alvarado Avenue
Davis, California 95616

75. Petersen, Edward J.
Principal
Wasco Union School District
1785 Sunset
Wasco, California 93280

76. Pickens, John
Science and Mathematics Supervisor
Pasadena Independent School District
3010 Bayshore Drive
Pasadena, Texas 77502

77. Pratt, Leonard Harris
Science Instructor and Director, Science for the School
Council High School District 13
Box 51
Council, Idaho 83612

78. Procyk, Ida Margaret
Supervisor of Elementary City Schools
Uniontown Area Schools
59 Wilmac Street
Uniontown, Pennsylvania 15401

79. Ramsey, David L.
Science Education Consultant
State Department of Education
2310 Mission Road
Tallahassee, Florida 32304

80. Richardson, Sally K.
Asst. Director, Title III Astronomy & Related Space Sciences Planning Grt.
Kanawha County Board of Education
408 Beech Avenue
Charleston, West Virginia 25302

81. Rituper, Stephen Jr.
Curriculum Coordinator Director
Bethlehem Area School District
USOE Title III "KITS" for Science
1330 Church Street
Bethlehem, Pennsylvania 18015

82. Robison, Delber G.
Science Director
140 Ridgecrest Drive
Maryland Heights, Missouri 63017

83. Rueck, Elizabeth M.
Chairman and Science Coordinator
Barrington Consolidated High School
Route 1, Box 286
Wauconda, Illinois 60084

84. Ruiz, Maria A.
Director, Science Program
Department of Education
Guadiana 1596 El Cerezal
Rio Piedras, Puerto Rico 00926

85. Schlenker, George C.
Supervisor of Science
Montclair Public Schools
501 Quinton Avenue
Kenilworth, New Jersey 07033

86. Shutts, J. Hervey
Consultant in Science
Minneapolis Public Schools
807 NE Broadway
Minneapolis, Minnesota 55413

87. Simonian, George
Coordinator of Science
Chelmsford Public Schools
6 Overlook Drive
Chelmsford, Massachusetts 01824

88. Smith, Eric J.
Head of Science Department
Muleshoe Independent School Dist.
407 W. 17th C
Muleshoe, Texas 79347

89. Smith, Richard A.
Professor, Natural Science Dept.
San Jose State College
San Jose, California 95114
<table>
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<tr>
<th>#</th>
<th>Name</th>
<th>Title</th>
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<td>90</td>
<td>Spencer, Marvin G.</td>
<td>Science Supervisor</td>
<td>Board of Education of Frederick County, 115 East Church Street, Frederick, Maryland 21701</td>
</tr>
<tr>
<td>91</td>
<td>Strong, Virginia B.</td>
<td>Staff Developer</td>
<td>Education Development Center, 55 Chapel Street, Newton, Massachusetts 02160</td>
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<tr>
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<td>Thompson, Glenn M.</td>
<td>Science Coordinator</td>
<td>Addison-Rutland Supervisory Union, 23 Second Street, Fair Haven, Vermont 05743</td>
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<td>Tucker, Katharine</td>
<td>Science Coordinator</td>
<td>Penfield Central Schools, 3 Highland Drive, Penfield, New York 14526</td>
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<td>Tuzzolino, Frank J.</td>
<td>Coordinator of Science</td>
<td>Williamsville Central School, 131 Carmel Road, Buffalo, New York 14214</td>
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<td>95</td>
<td>Vivian, V. Eugene</td>
<td>Chairman Science Department</td>
<td>Glassboro State College, Glassboro, New Jersey 08028</td>
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<td>Voelker, Alan M.</td>
<td>Assistant Professor of Science Education</td>
<td>Ohio State University, 252 Arps Hall, 1945 North High Street, Columbus, Ohio 43210</td>
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<tr>
<td>97</td>
<td>Wagner, Earle B.</td>
<td>County Supervisor of Science</td>
<td>Board of Education, Harford County, P. O. Box 144, Bel Air, Maryland 21014</td>
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<tr>
<td>98</td>
<td>Wagner, Howard I., Jr.</td>
<td>Science Education Consultant</td>
<td>State Department of Education, RFD #3, Concord, New Hampshire 03301</td>
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<tr>
<td>99</td>
<td>Wailes, James R.</td>
<td>Professor of Science Education Chairman, Division of Elem. Educ.</td>
<td>University of Colorado, 415 South 44th Street, Boulder, Colorado 80302</td>
</tr>
<tr>
<td>100</td>
<td>Wallus, Peter P.</td>
<td>Coordinator, Secondary Education</td>
<td>Kalamazoo Public Schools, 1220 Howard Street, Kalamazoo, Michigan 49001</td>
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<tr>
<td>101</td>
<td>Washbourne, George W.</td>
<td>Director of Science</td>
<td>Kingston Consolidated School Dist., Box 94 RD 1, Kingston, New York 12401</td>
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<tr>
<td>102</td>
<td>Waterfield, John W.</td>
<td>Director of Instruction</td>
<td>Accomac County School Board, Accomac, Virginia 23301</td>
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<tr>
<td>103</td>
<td>Westfall, Jonathan</td>
<td>Director, Academic Year Institute</td>
<td>Professor of Botany, University of Georgia, 160 Terrell Drive, Athens, Georgia 30601</td>
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<tr>
<td>104</td>
<td>Wilhelmi, Lyle</td>
<td>District Science Coordinator</td>
<td>School District 4 Lane County, Rt. 4, Box 807, Eugene, Oregon 97405</td>
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<td>105</td>
<td>Zarik, I. A.</td>
<td>Science Supervisor</td>
<td>Long Branch School District, Long Branch, New Jersey 07740</td>
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<tr>
<td>106</td>
<td>Zoller, Alfred H.</td>
<td>Science Chairman, Junior High Schools</td>
<td>Smithtown Central School District, 161 Southern Boulevard, Nesconset, New York 11767</td>
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<tr>
<td>107</td>
<td>Zurhellen, Joan G.</td>
<td>Secondary Science Supervisor</td>
<td>Shelby County Board of Education, 1978 Nellie Road, Memphis, Tennessee 38116</td>
</tr>
</tbody>
</table>
OCCUPATIONAL CLASSIFICATION OF PARTICIPANTS

Professor, Colleges and Universities 20
Directors of Curriculum 6
Supervisors and Coordinators, School Districts, K-12 33
Supervisors and Coordinators, School Districts, 7-8-9 3
Supervisors and Coordinators, School Districts, Elementary 10
Supervisors and Coordinators, School Districts, Secondary 22
Science Chairmen, High School 5
State Department of Education Consultants 7
High School Principal 1

GEOGRAPHICAL DISTRIBUTION OF PARTICIPANTS

Alabama 2  New Hampshire 1
California 10  New Jersey 6
Colorado 5  New York 10
Delaware 3  North Dakota 1
Florida 3  Ohio 7
Georgia 2  Oklahoma 1
Idaho 2  Oregon 1
Illinois 5  Pennsylvania 10
Iowa 1  Puerto Rico 1
Louisiana 2  Tennessee 1
Maryland 7  Texas 3
Massachusetts 5  Vermont 1
Michigan 3  Virginia 4
Minnesota 1  West Virginia 4
Missouri 3  Wisconsin 2

29 states and Puerto Rico

Applications Received 173
Participants Accepted 107
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<th>bad</th>
<th>valuable</th>
<th>meaningless</th>
<th>short</th>
<th>tasty</th>
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PARTICIPANT DAILY REACTION SHEET

Session Date ______________________

A. Your questions (about content, facilities, etc.)

B. Your comments (on content, presentation, instruction, facilities, etc.)

C. Your suggestions (regarding content, instruction, arrangements, etc.)
Below are a number of statements concerning objectives and certain teacher self-approach techniques. You are to indicate how much you agree or disagree with each of the statements by encircling the letter representing one of the following expressions.

Strongly Disagree (SD); Disagree (D); Neither Agree nor Disagree (N); Agree (A); Strongly Agree (SA)

1. I now have a better idea of what evaluation is "all about" than I had before this institute. SD D N A SA

2. Evaluation plays a critical role in educational improvement. SD D N A SA

3. The evaluation concepts and techniques presented in this institute have little relevance to evaluation problems I am likely to face in the future. SD D N A SA

4. Looking at types of decisions (planning, programming, implementing, and consequential) is a useful way to begin to focus on the type of evaluation information which is needed. SD D N A SA

5. I feel that I could identify types of decisions which need to be made in most science programs with which I might work. SD D N A SA

6. The CIPP (context, input, process, and product) evaluation model is a useful way to view evaluation of science programs. SD D N A SA

7. Sorting the "lists of decisions" (on day 1 of the institute) into types was a useful technique to illustrate differences among decision types. SD D N A SA

8. It is important to do context and input evaluation before deciding on a program or plan of action. SD D N A SA
9. In general, I feel that I would know how to conduct context evaluation in planning a science program.

10. In general, I feel that I would know how to conduct input evaluation in selecting from among alternative programs, etc.

11. In general, I feel that I would know how to conduct process evaluation in monitoring program activities.

12. In general, I feel that I would know how to conduct product evaluation in relating outcomes to objectives.

13. The structure for developing evaluation designs is useful in attempting to design an evaluation for a science program.

14. I feel I could use the structure for developing evaluation designs to design an evaluation which met minimal evaluative criteria.

15. Many of the techniques identified on the second day of the institute (e.g., interviews, unobtrusive measures, achievement tests, etc.) are relevant for evaluation in science programs.

16. I believe that I personally could use most of the techniques if they seemed relevant.

17. I believe I understand when the varying techniques might be appropriate.

18. The simulated evaluation design problem was useful in giving me a feel for how one might go about designing an evaluation.

19. The feedback in the simulation was helpful to me in understanding the design process.

20. The theory behind Roberson's Self-Appraisal System is good, but is unrealistic in real life.

21. Developing objectives makes me feel more confident.

22. I feel a sense of insecurity when attempting to learn a code.

23. Learning a code makes me feel as though I'm lost in a jungle of numbers and can't find my way out.

24. Objective writing is something which I enjoy doing.

25. I become confused and unable to think clearly when learning to code.
26. I feel that Flander's Interaction Analysis is not adequately designed to provide useful evaluation information.
27. When I hear the word objective, I have a feeling of dislike.
28. Coding a teacher's behavior does not serve a useful purpose.
29. The development of program or educational objectives is a necessary procedure.
30. Objective writing is too complicated to learn in a one-day workshop.
31. Flander's Interaction Analysis is good in theory, but is unrealistic in real life.
32. Beginning teachers are too inexperienced to write objectives.
33. I feel coding is very useful.
34. I feel a positive reaction toward the ideas presented at the conference.
35. I become frustrated when I think about writing objectives.
36. I approach writing objectives with a feeling of hesitation resulting from a fear of not being skilled in writing objectives.
37. I feel at ease when learning to code.
38. Roberson's Self-Appraisal System is adequately designed to provide useful evaluation information.
39. Developing good program objectives and instructional objectives will facilitate the improvement of teaching procedures.
40. The objectives of this institute were not the same as my objectives.
41. I could have learned as much by reading a book.
42. The instructors really knew their subject.
43. The daily schedules were too fixed.
44. There was too much lecture and too little interaction.
45. I think I would be under a terrible strain when coding teachers.
46. Objective writing is very important to me.
The major topics which were presented in this institute are listed below. Would you please respond to each topic by checking whether you think the time spent on it was too much, too little, or about right.

**FIRST DAY**

1. A perspective for evaluation of science education (Smith)
2. Evaluation as the base for educational improvement (Worthen-Hock)
3. CIPP evaluation for decision-making (Worthen-Hock)
4. Designing evaluation designs (Worthen-Hock)

**SECOND DAY**

1. Techniques for gathering evaluation information (Worthen)
2. Simulation: Designing context evaluation (Worthen-Hock)
3. Simulation: Designing input evaluation (Worthen-Hock)
4. Simulation: Designing process evaluation (Worthen-Hock)
5. Simulation: Designing product evaluation (Worthen-Hock)

During the institute, the time spent on this topic was:

(check one)

- Too Much
- About Right
- Too Little

C-6
### THIRD DAY

1. **EPIC evaluation model**  
   (Hammond)

2. **Writing and critiqueing behavioral objectives**  
   (Arizona team)

### FOURTH DAY

1. **General observational systems for teacher self-appraisal**  
   (Cornell-Roberson)

2. **Coding teacher behavior:**  
   Video tape and computer analysis (Roberson)

3. **Coding teacher behavior:**  
   Flander's interaction analysis (Cornell)

4. **Evaluation of institute (what you're now doing)**  
   (Smith)

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<th>Too Much/About Right/Too Little</th>
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Total time spent in the institute was:

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<tr>
<th></th>
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A PERSPECTIVE FOR EVALUATION OF SCIENCE EDUCATION

Herbert A. Smith
Director of Teacher Education
Colorado State University

It is certainly a pleasure to welcome a group of science educators to a conference on the evaluation of science instruction. The fact that the response to the invitation to the Institute was as substantial as it was on the very short notice provided is an index of the current interest and the felt needs which exist for a more adequate and effective approach to the problems of evaluation. The objectives of this meeting were spelled out in some detail in the invitation which went to you along with the announcement of the Institute. However, I think it can be simply stated that the real purpose of the Institute is to determine how science instruction can be improved and how it can be made to have the highest degree of relevancy for all students who are enrolled in the elementary and secondary schools. Evaluation is a key element in any such improvement. The concept guiding this Institute is that evaluation covers a total system: students, teachers, supervisors and administrators, administrative organization, facilities—in short, all those things that impinge directly or indirectly upon the climate for learning.

During the Institute we will have some highly qualified experts in the area of evaluation who will work with you in a variety of situations. We believe that the concepts and materials which they present will prove to be highly beneficial. But in
fairness to them, I think I should state that they do not represent themselves as science educators, rather they are evaluators. Consequently, there are some things that they cannot do. There are specific questions related to science education that they are not qualified, and cannot be expected to be qualified, to answer. Many of these questions are philosophical in nature and require certain value judgments which fall more specifically within the province of science educators. To illustrate, they cannot tell us what we ought to be doing in science education. During their presentation they will raise questions, I presume, which will be pertinent to the decision-making process which is involved in curriculum and program development, but ultimately these decisions are the responsibility of science educators and administrators. To put it another way I would not anticipate that they will answer for us "Where should we be going, and why?" As I understand their role, they expect to be able to tell us "how to go there" more effectively. They will help us identify our possible failures along the way and perhaps help us realize when we can reasonably be said to have arrived at our destination. I hope they will have something to say about the relativistic character of educational objectives.

Essentially, my role in this Institute is to serve an administrative and coordinating function. However, I should like to step aside from these assignments for a few minutes to speak as a science educator and to exercise a director's prerogative by commenting upon the current scene in science
education. There is a substantial basis for believing that a conference devoted to the subject of the evaluation of science education is critically imperative at the present time. In the next few minutes I hope to be able to raise some questions and issues which seem rather vital to science education.

Education has been characterized in recent years by an immense amount of activity and science education has exhibited its full share. But as I have observed the passing scene, our educational establishment often seems like a ship without a rudder or compass but which is, nevertheless, cruising with all engines set at full steam ahead. It reminds me of the legendary Texan who dashed into the Dallas airport and demanded a ticket from the first airline ticket clerk that he encountered. She said, "Well sir, will you tell me where you want a ticket to?" and he said, "Listen, lady, it doesn't make any difference, I've got business everywhere."

It is high time that our fundamental purposes for science instruction receive an intensive and critical examination. I seem to detect no unified consensus as to the direction in which we should head. It is obvious that we need vision as well as skills, wisdom as well as knowledge, and humanity as well as competence, and that our educational system has a major responsibility for seeing that such aspirations are attained. Too often we see a strange hiatus between the existence of knowledge and the logical implications which knowledge has for action. We have intellectual accomplishments not coupled in any way with productive behavior.
and personal or social responsibility. Such intellectual sterility may reflect a lack of any real commitment and be a reflection to a large degree of our failure to answer in a convincing manner, "Where are we going?"

Vast sums of money have been spent in developing curriculum materials without any very consistent guide as to what ends will be served by the materials produced. Great masses of materials have been produced in recent years and most of them have reflected an "elitist philosophy." The emphasis has definitely been on subject matter content. The educational axiom that content should be selected in terms of the needs of people has been too cavalierly abandoned. Students often complain bitterly today about the lack of relevance of much of their education for their lives and for the real world. I have said in print elsewhere that I am convinced that materials produced by the large scale curriculum projects which have been so generously funded are largely irrelevant for more than half of the students in our schools. And I think that that statement is probably far too conservative. It may be closer to being irrelevant for 80-85% of our students. I hope that our evaluators will have something to tell us about the kind of standards and expectations which might be related to children and adolescents. What is a "criterion of reasonableness" for educational attainment which should be applied in an educational setting? There are substantial evidences today that too many children are being pushed too far, too fast, and too hard.

D-4
It is clearly no secret to many of you that science courses, and most especially physical science courses, do not enjoy high popularity with either high school or college students. Part of this unpopularity may well be related to the question of grading and evaluation. It has always been a mystery to me as to why students usually expect to receive lower grades in science and in mathematics than in other subjects. Often, their expectations are completely fulfilled. One strongly suspects that a certain amount of academic snobbery is the culprit and many science teachers, both in secondary schools and colleges, seem to think that their function is to flunk students rather than to teach them. Avoiding science classes except for the minimum required for graduation may be evidence of good judgment on the part of many gifted students who really cannot risk a "C" or "D" grade if they wish to contend for scholarships or other awards or win entrance into a name university. This statement in itself, of course, may be indicative of some of the serious ailments in our educational system. No large campus or school is likely to be free of the pompous pedant who loudly proclaims that "Nobody gets an A in my class!" The tragedy of this situation is that the clown expects to be rewarded because of the high standards he maintains. One might maintain that either his standards are unreasonable, or he is a poor teacher, or both.

The signs of alienation of youth need no lengthy elaboration here. They are all about us. The statistics on any number of indices are available which show the heavy impact of failures.
in schools and in homes; the failures of teachers and parents to meet the basic needs of youth. To list but a few indices would include the present adolescent suicide rate, the incidence of mental illnesses, various psychosomatic afflictions, juvenile crime rates, dropouts, "hippyism," teenage drug addiction and teenage prostitution. Nor are the alienated restricted to minorities, the poor, or the socially and culturally disadvantaged. Suburbia and the "upper-uppers" are also well represented. Youth is in rebellion and the lack of relevancy of their education to their perceived needs and interests is plainly evident.

One always hesitates to deride the current emphasis on subject matter for when he does he is so often interpreted as saying that subject matter is unimportant. Obviously, what is really needed is more and not less subject matter but it affords us little benefit if, in trying to teach the subject matter, we "successfully" alienate the great mass of adolescents. The real issue is to teach functional subject matter in such a way that students recognize and accept its validity and utility. One of the reasons why we have been relatively unsuccessful in reaching many students is to be found in the fact that most of the new programs have been almost exclusively concerned with the cognitive aspect of education and especially with abstract concepts. The affective domain of attitudes, appreciations, hopes, and aspirations have too often been ignored. In fact, often its existence seems not even to have been recognized.
The young do not bring the same motivations to the classroom that scientists bring to their laboratories and yet it would appear that the scientists in their enthusiasm have often projected themselves and their own motivations and interests into many of the materials which they have produced. They have forgotten that the views they hold and the satisfactions they now seek are quite unlike those that they possessed when they were 12, 14 and 16 year old youngsters. The past, particularly of successful men, is often viewed through the rosiest of tinted lenses and selective memory and nostalgia recreate a scene bearing little resemblance to reality which once existed.

The affective domain cannot be ignored for two very substantial reasons. In the first place, it is in the affective domain that we find the driving forces which innervate and direct the energies of youth. Second, it is in the affective domain that we find those qualities which make men, men, rather than animals. For the great mass of human beings, science will always be important in terms of its meaning for human life and society and for only a very few will it be a source of intellectual delight and adventure. Consequently, science cannot be taught in a vacuum apart from its social, political and economic derivatives. Considering the vast forces which the scientists have unleashed it is certainly in the interests of all that those destined to be scientists, and who are now enrolled in our elementary and secondary school classes, should be imbued with
a compassion for humanity, with a concern for larger problems, and a perspective of the place of science in the world including some awareness of its potential for good or evil.

I am sure that in this Institute you are going to hear something about "behavioral objectives." It is certainly pertinent that you should, for the aim of all education is surely to both change behavior and provide the potential for future changes in behavior. Yet, I have to smile when I hear the new gospel preached and listen to the new cliches which extol the ultimate virtues of "behavioral objectives." We find in Ecclesiastes 1:10:

Is there anything whereof it may be said, see this is new? it hath been already of old time, which was before us.

Nearly a century ago Charles Sanders Pierce was learnedly and profoundly debating on "operational theory of meaning" with William James and others, holding that the meaning of a concept was essentially incorporated in a set of operations (behaviors). If one accepts Pierce's thinking it is surely not a long step to the contention that educational objectives can have no meaning except in terms of behaviors. In essence, to speak of behavioral objectives is a tautology. I recall in my own classes of 20 and more years ago of asking students how the class had changed their behavior and disturbing them by the assertion that my course and all the other courses they had taken were worthless to the extent that they had not changed behavior or created a potential for changed behavior in future situational contexts.
But I do not particularly intend to detract from the current emphasis on the "behavior" aspect of educational objectives. Perhaps such emphasis is long overdue. However, I do not think we can identify all those behaviors which are likely to be pertinent. We again run the risk of miring in a swamp which Ernest Bayles calls "specific objectivism." It is really a question of the generality of objectives which is involved. Just how detailed does one become in listing the desired behavior outcomes?

With the present emphasis on behavior there is danger that we will get bogged down with behavioral minutia and lose sight of those broader behavioral objectives which are the real goals of education. It is by no means certain that competence in small behavior units will necessarily add up to those broader behavior patterns which determine the basic life patterns which lead to a good and productive life. Hopefully, a part of our Institute program will bring a degree of realism and practicality to our attempts to assess our progress in the modification of behavior and that it will bridge a dangerous gap by helping us steer between the shoals of behavioral minutia and the reefs of over-extended and meaningless generality.

I suspect that there will be aspects of the science education program in which evaluation is sorely needed which will not be touched upon in any adequate way in this Institute. For years, I have felt that there is an inadequate definition of the role
of the science supervisor. The wide variety of titles and responsibilities assigned is a reflection of this fact. The relationships between system supervisors and building principals, the hierarchy of administrative controls, the processes of planning and budgeting, the informal infra-structure of the system and many other factors have a direct and sometimes deadly influence on the science instructional program. Important as they are, it seems probable that we will not enter into these areas in any depth. I mention these here only to insure that they are not overlooked or thought to be unimportant.

Problems of evaluation are among the most complex in all of education. Consequently, we should not be so presumptuous as to expect this Institute to answer all the questions which might legitimately be raised. Perhaps our functions will have been well served if we are able to increase your sensitivity to problems of evaluation, provide you with some enlarged insights and the opportunity to interact among yourselves, demonstrate some special techniques and stimulate you to think seriously about evaluation as it relates specifically to problems within the context of your own system responsibilities. We expect it to be a working conference and we hope it will be a productive one.
EVALUATION = The Process of providing information
to aid in decision-making.

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LACKS IN EDUCATIONAL EVALUATION

1. Lack of adequate definition of and validated theoretical bases for evaluation.
2. Lack of knowledge about educational decision processes and information requirements.
3. Lack of appropriate evaluation designs.
4. Lack of appropriate evaluation instruments, tools, and techniques.
5. Lack of integrated mechanisms for organizing, processing, and reporting evaluation information.

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EVALUATION FOR DECISION-MAKING

THESIS: A major purpose of evaluation is to provide information for making decisions.

RATIONALE:

1. Quality education demands continuing efforts to improve education;
2. Educational improvement requires an appropriate balance of enlightened persistence and change;
3. Obtaining and maintaining this delicate balance requires sound decision-making;
4. Sound decision-making depends upon an appropriate supply of evaluative information.

D-11
COMPARISON OF EXPERIMENTAL AND EVALUATION STRATEGIES

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<td><strong>POSE</strong></td>
<td>To test research hypotheses</td>
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<tr>
<td><strong>OBJECTS</strong></td>
<td>To facilitate the continual improvement of a program</td>
</tr>
<tr>
<td>Units to be measured are randomly assigned to treatment and control conditions</td>
<td>Subjects are assigned to a program based upon their needs and the purpose of the program rather than the requirements of the data collection and analysis designs</td>
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<tr>
<td><strong>TREATMENTS</strong></td>
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<tr>
<td>Treatment and control conditions are held constant throughout the experiment</td>
<td>Evaluation aims to stimulate improvement in on-going programs</td>
</tr>
<tr>
<td><strong>INSTRUMENTATION</strong></td>
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<tr>
<td>Instruments are administered after a specified period of time—usually a year or sometimes pre and post to the experiment</td>
<td>Instruments are administered to conform with information requirements of decision-makers throughout the program's existence</td>
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<tr>
<td><strong>BACK</strong></td>
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<tr>
<td>Avoided during the experiment so as to avoid contamination</td>
<td>An essential means for stimulating change</td>
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<tr>
<td><strong>ERIA</strong></td>
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<tr>
<td>Information should be: valid, and reliable</td>
<td>Information should be: valid, reliable, timely, credible, and pervasive</td>
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</table>

DECISION-MAKING IN EDUCATIONAL IMPROVEMENT

**PROBLEM:** To evaluate for decision-making, the relevant decisions must be known.

**POSTULATE:** Decisions in educational improvement activities may be classified as:

- **Planning** (focusing needed improvement activities)
- **Programming** (specifying procedure, personnel, facilities, budget, and time requirements for implementing planned activities)
- **Implementing** (directing programmed activities)
- **Recycling** (terminating, continuing, evolving, or drastically modifying activities)
DEVELOPING EVALUATION DESIGNS

The logical structure of evaluation design is the same for all types of evaluation, whether context, input, process or product evaluation. The parts, briefly, are as follows:

A. **Focusing the Evaluation**
   1. Identify the major level(s) of decision-making to be served, e.g., local, state, or national.
   2. For each level of decision-making, project the decision situations to be served and describe each one in terms of its locus, focus, criticality, timing, and composition of alternatives.
   3. Define criteria for each decision situation by specifying variables for measurement and standards for use in the judgment of alternatives.
   4. Define policies within which the evaluation must operate.

B. **Collection of Information**
   1. Specify the source of the information to be collected.
   2. Specify the instruments and methods for collecting the needed information.
   3. Specify the sampling procedure to be employed.
   4. Specify the conditions and schedule for information collection.

C. **Organization of Information**
   1. Provide a format for the information which is to be collected.
   2. Designate a means for coding, organizing, storing, and retrieving information.

D. **Analysis of Information**
   1. Select the analytical procedures to be employed.
   2. Designate a means for performing the analysis.

E. **Reporting of Information**
   1. Define the audiences for the evaluation reports.
   2. Specify means for providing information to the audiences.
   3. Specify the format for evaluation reports and/or reporting sessions.
   4. Schedule the reporting of information.

F. **Administration of the Evaluation**
   1. Summarize the evaluation schedule.
   2. Define staff and resource requirements and plans for meeting these requirements.
   3. Specify means for meeting policy requirements for conduct of the evaluation.
   4. Evaluate the potential of the evaluation design for providing information which is valid, reliable, credible, timely, and pervasive.
   5. Specify and schedule means for periodic updating of the evaluation design.
   6. Provide a budget for the total evaluation program.

D-13
KINDS OF EVALUATION FOR DECISION-MAKING

PROPOSITION: Each class of decisions in educational improvement activities requires a relevant kind of evaluation.

**Context evaluation** is for planning decisions and provides information about "what needs to be done?"

**Input evaluation** is for programing decisions and provides information about "what can be done?"

**Process evaluation** is for implementing decisions and provides information about "what is being done?"

**Product evaluation** is for recycling decisions and provides information about "what has been done?"
## THE CIPP EVALUATION MODEL

<table>
<thead>
<tr>
<th>RELATION TO DECISION-MAKING: THE CHANGE PROCESS</th>
<th>OBJECTIVE</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context Evaluation</strong></td>
<td>For deciding upon the setting to be served, the goals associated with meeting needs and the objectives associated with solving problems, i.e., for planning needed changes.</td>
<td>To define the operation context, to identify and assess needs in the context, and to identify and delineate problems underlying the needs.</td>
</tr>
<tr>
<td><strong>Input Evaluation</strong></td>
<td>For selecting sources of support, solution strategies, and procedural designs, i.e., for programming change activities.</td>
<td>To identify and assess system capabilities, available input strategies, and designs for implementing the strategies.</td>
</tr>
<tr>
<td><strong>Process Evaluation</strong></td>
<td>For implementing and refining the program design and procedure, i.e., for effecting process control.</td>
<td>To identify or predict, in process, defects in the procedural design or its implementation, and to maintain a record of procedural events and activities.</td>
</tr>
<tr>
<td><strong>Product Evaluation</strong></td>
<td>For deciding to continue, terminate, modify or refocus a change activity, and for linking the activity to other major phases of the change process, i.e., for evolving change activities.</td>
<td>To relate outcome information to objectives and to context, input, and process information.</td>
</tr>
</tbody>
</table>

By describing individually and in relevant perspectives the major subsystems of the context; by comparing actual and intended inputs and outputs of the subsystems; and by analyzing possible causes of discrepancies between actualities and intentions.

By describing and analyzing available human and material resources, solution strategies, and procedural designs for relevance, feasibility and economy in the course of action to be taken.

By monitoring the activity's potential procedural barriers and remaining alert to unanticipated ones.

By defining operationally and measuring criteria associated with the objectives, by comparing those measurements with predetermined standards or comparative cases, and by interpreting the outcomes in terms of recorded input and process information.

D. L. Stufflebeam
Indicators of Status or Change in Cognitive and Affective Behaviors of Students in Terms of Standardized Measures and Scales

Standardized achievement and ability tests, the scores on which allow inferences to be made regarding the extent to which cognitive objectives concerned with knowledge, comprehension, understandings, skills, and applications have been attained.

Standardized self inventories designed to yield measures of adjustment, appreciations, attitudes, interests, and temperament from which inferences can be formulated concerning the possession of psychological traits (such as defensiveness, rigidity, aggressiveness, cooperativeness, hostility, and anxiety).

Standardized rating scales and check lists for judging the quality of products in visual arts, crafts, shop activities, penmanship, creative writing, exhibits for competitive events, cooking, typing, letter writing, fashion design, and other activities.

Standardized tests of psychomotor skills and physical fitness.

Indicators of Status or Change in Cognitive and Affective Behaviors of Students by Informal or Semiformal Teacher-made Instruments or Devices

Incomplete sentence technique: categorization of types of responses, enumeration of their frequencies, or ratings of their psychological appropriateness relative to specific criteria.

Interviews: frequencies and measurable levels of responses to formal and informal questions raised in a face-to-face interrogation.

Peer nominations: frequencies of selection or of assignment to leadership roles for which the sociogram technique may be particularly suitable.

Questionnaires: frequencies of responses to items in an objective format and numbers of responses to categorized dimensions developed from the content analysis of responses to open-ended questions.

Self-concept perceptions: measures of current status and indices of congruence between real self and ideal self—often determined from use of the semantic differential or Q-sort techniques.

Self-evaluation measures: student's own reports on his perceived or desired level of achievement, on his perceptions of his personal and social adjustment, and on his future academic and vocational plans.
Teacher-devised projective devices such as casting characters in the class play, role playing, and picture interpretation based on an informal scoring model that usually embodies the determination of frequencies of the occurrence of specific behaviors, or ratings of their intensity or quality.

Teacher-made achievement tests (objective and essay), the scores on which allow inferences regarding the extent to which specific instructional objectives have been attained.

Teacher-made rating scales and check lists for observation of classroom behaviors: performance levels of speech, music, and art, manifestation of creative endeavors, personal and social adjustment, physical well being.

Teacher-modified forms (preferably with consultant aid) of the semantic differential scale.

III. Indicators of Status or Change in Student Behaviors Other than Those Measured by Tests, Inventories, and Observation Scales in Relation to the Task of Evaluating Objectives of School Programs

Absences: full-day, half-day, part-day, and other selective indices pertaining to frequency and duration of lack of attendance.

Anecdotal records: critical incidents noted including frequencies of behaviors judged to be highly undesirable or highly deserving of commendation.

Appointments: frequencies with which they are kept or broken.

Articles and stories: numbers and types published in school newspapers, magazines, journals or proceedings of student organizations.

Assignments: numbers and types completed with some sort of quality rating or mark attached.

Attendance: frequency and duration when attendance is required or considered optional (as in club meetings, special events, or off-campus activities).

Autobiographical data: behaviors reported that could be classified and subsequently assigned judgmental values concerning their appropriateness relative to specific objectives concerned with human development.

Awards, citations, honors, and related indicators of distinctive or creative performance: frequency of occurrence of judgments of merit in terms of scaled values.

Books: numbers checked out of library, numbers renewed, numbers reported read when reading is required or when voluntary.
Case histories: critical incidents and other passages reflecting quantifiable categories of behavior.

Changes in program or in teacher as requested by student: frequency of occurrence.

Choices expressed or carried out: vocational, avocational, and educational (especially in relation to their judged appropriateness to known physical, intellectual, emotional, social, aesthetic, interest, and other factors).

Citations: commendatory in both formal and informal media of communication such as in the newspaper, television, school assembly, classroom, bulletin board, or elsewhere (see Awards).

"Contacts": frequency or duration of direct or indirect communications between persons observed and one or more significant others with specific reference to increase or decrease in frequency or to duration relative to selected time intervals.

Disciplinary actions taken: frequency and type.

Dropouts: numbers of students leaving school before completion of program of studies.

Elected positions: numbers and types held in class, student body, or out-of-school social groups.

Extracurricular activities: frequency or duration of participation in observable behaviors amenable to classification such as taking part in athletic events, charity drives, cultural activities, and numerous service-related avocational endeavors.

Grade placement: the success or lack of success in being promoted or retained; number of times accelerated or skipped.

Grade point average: including numbers of recommended units of course work in academic as well as in non-college preparatory programs.

Grouping: frequency and/or duration of moves from one instructional group to another within a given class grade.

Homework assignments: punctuality of completion, quantifiable judgments of quality such as class marks.

Leisure activities: numbers and types of; times spent in; awards and prizes received in participation.

Library card: possessed or not possessed; renewed or not renewed.
Load: numbers of units or courses carried by students.

Peer group participation: frequency and duration of activity in what are judged to be socially acceptable and socially undesirable behaviors.

Performance: awards, citations received; extra credit assignments and associated points earned; numbers of books or other learning materials taken out of the library; products exhibited at competitive events.

Recommendations: numbers of and judged levels of favorableness.

Recidivism by students: incidents (presence or absence or frequency of occurrence) of a given student’s returning to a probationary status, to a detention facility, or to observable behavior patterns judged to be socially undesirable (intoxicated state, dope addiction, hostile acts including arrests, sexual deviation).

Referrals: by teacher to counselor, psychologist, or administrator for disciplinary action, for special aid in overcoming learning difficulties, for behavior disorders, for health defects or for part-time employment activities.

Referrals: by student himself (presence, absence, or frequency).

Service points: numbers earned.

Skills: demonstration of new or increased competencies such as those found in physical education, crafts, homemaking, and the arts that are not measured in a highly valid fashion by available tests and scales.

Social mobility: numbers of times student has moved from one neighborhood to another and/or frequency which parents have changed jobs.

Tape recordings: critical incidents contained and other analyzable events amenable to classification and enumeration.

Tardiness: frequency of.

Transiency: incidents of.

Transfers: numbers of students entering school from another school (horizontal move).

Withdrawal: numbers of students withdrawing from school or from a special program (see Dropouts).

IV. Indicators of Status or Change in Cognitive and Affective Behaviors of Teachers and Other School Personnel in Relation to the Evaluation of School Programs.
Articles: frequency and types of articles and written documents prepared by teachers for publication or distribution.

Attendance: frequency of, at professional meetings or at in-service training programs, institutes, summer schools, colleges and universities (for advanced training) from which inferences can be drawn regarding the professional person's desire to improve his competence.

Elective offices: numbers and types of appointments held in professional and social organizations.

Grade point average: earned in postgraduate courses.

Load carried by teacher: teacher-pupil or counselor-pupil ratio.

Mail: frequency of positive and negative statements in written correspondence about teachers, counselors, administrators, and other personnel.

Memberships including elective positions held in professional and community organizations: frequency and duration of association.

Model congruence index: determination of how well the actions of professional personnel in a program approximate certain operationally-stated judgmental criteria concerning the qualities of a meritorious program.

Moonlighting: frequency of outside jobs and time spent in these activities by teachers or other school personnel.

Nominations by peers, students, administrators or parents for outstanding service and/or professional competencies: frequency of.

Rating scales and check lists (e.g., graphic rating scales or the semantic differential) of operationally-stated dimensions of teachers' behaviors in the classroom or of administrators' behaviors in the school setting from which observers may formulate inferences regarding changes of behavior that reflect what are judged to be desirable gains in professional competence, skills, attitudes, adjustment, interests, and work efficiency; the perceptions of various members of the total school community (parents, teachers, administrators, counselors, students, and classified employees) of the behaviors of other members may also be obtained and compared.

Records and reporting procedures practiced by administrators, counselors and teachers: judgments of adequacy by outside consultants.

Termination: frequency of voluntary or involuntary resignation or dismissals of school personnel.
Transfers: frequency of requests of teachers to move from one school to another.

V. Indicators of Community Behaviors in Relation to the Evaluation of School Programs

Alumni participation: numbers of visitations, extent of involvement in PTA activities, amount of support of a tangible (financial) or a service nature to a continuing school program or activity.

Attendance at special school events, at meetings of the board of education, or at other group activities by parents: frequency of.

Conferences of parent-teacher, parent-counselor, parent-administrator sought by parents: frequency of request.

Conferences of the same type sought and initiated by school personnel: frequency of requests and record of appointments kept by parents.

Interview responses amenable to classification and quantification.

Letters (mail): frequency of requests for information, materials, and servicing.

Letters: frequency of praiseworthy or critical comments about school programs and services and about the personnel participating in them.

Participant analysis of alumni: determination of locale of graduates, occupation, affiliation with particular institutions, or outside agencies.

Parental response to letters and report cards upon written or oral request by school personnel: frequency of compliance by parents.

Telephone calls from parents, alumni, and from personnel in communications media (e.g., newspaper reporters): frequency, duration, and quantifiable judgments about statements monitored from telephone conversations.

Transportation requests: frequency of.
<table>
<thead>
<tr>
<th>PROGRAM: IN-SERVICE, PART A</th>
<th>SUB-OBJECTIVES</th>
<th>CRITERIA</th>
<th>INFORMATION NEEDED/SOURCE</th>
<th>INSTRUMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TO PRESENT FIVE TRAINING COURSES WHICH UTILIZE THE FIVE LEVELS OF CURRICULUM MATERIALS BEING DEVELOPED</td>
<td>CONTENT VALIDITY OF TRAINING COURSE (RELATED TO LEVELS OF CURRICULUM MATERIALS)</td>
<td>CONTENT REPORT</td>
<td>CONSULTANT OPINION OF CONSULTANT REGARDING CONTENT OF CURRICULUM MATERIALS</td>
<td>CONSULTANT REPORT</td>
</tr>
<tr>
<td>2. TO FAMILIARIZE TEACHERS WITH THE CURRICULUM MATERIALS IN SPACE-RELATED SCIENCE</td>
<td>MINIMUM USE OF ONE DEMONSTRATION FOR EACH UNIT AT THE INQUIRY APPROACH WITH THESE CURRICULUM MATERIALS</td>
<td>MINIMUM USE OF ONE DEMONSTRATION FOR EACH UNIT AT THE INQUIRY APPROACH WITH THESE CURRICULUM MATERIALS</td>
<td>RECORDING OF INSTRUCTION</td>
<td>AUDIO TAPE RECORDER</td>
</tr>
<tr>
<td>3. TO DEMONSTRATE THE USE OF THE INQUIRY APPROACH WITH THESE CURRICULUM MATERIALS</td>
<td>ABILITY TO DEAL WITH HYPOTHETICAL SITUATIONS BY USING RESOURCES; OBTAINING KNOWLEDGE, AND MATERIALS</td>
<td>ABILITY TO DEAL WITH HYPOTHETICAL SITUATIONS BY USING RESOURCES; OBTAINING KNOWLEDGE, AND MATERIALS</td>
<td>RECOGNITION OF INSTRUCTION</td>
<td>AUDIO TAPE RECORDING</td>
</tr>
<tr>
<td>4. TO FAMILIARIZE TEACHERS WITH AVAILABLE SERVICES, EQUIPMENT, MATERIALS, AND EQUIPMENT WHICH MIGHT BE USED IN THE SPACE-RELATED SCIENCE PROGRAM</td>
<td>POSITIVE CHANGE IN TEACHER ATTITUDE; TEACHER USE OF CURRICULUM MATERIALS (75% OF TEACHERS TEACH 1/2 OF THE CONCEPTS IN MATERIALS DURING YEAR)</td>
<td>POSITIVE CHANGE IN TEACHER ATTITUDE; TEACHER USE OF CURRICULUM MATERIALS (75% OF TEACHERS TEACH 1/2 OF THE CONCEPTS IN MATERIALS DURING YEAR)</td>
<td>RECOGNITION OF INSTRUCTION</td>
<td>SEMANTIC DIFFERENTIAL OBSERVATION SCHEDULE</td>
</tr>
<tr>
<td>5. TO GENERATE TEACHER INTEREST AND ENTHUSIASM IN THE ADOPTION OF THESE CURRICULUM MATERIALS</td>
<td>TEACHER ATTITUDE OF INDIVIDUAL TEACHERS IN THE ADOPTION OF THESE CURRICULUM MATERIALS</td>
<td>TEACHER ATTITUDE OF INDIVIDUAL TEACHERS IN THE ADOPTION OF THESE CURRICULUM MATERIALS</td>
<td>RECOGNITION OF INSTRUCTION</td>
<td>SEMANTIC DIFFERENTIAL OBSERVATION SCHEDULE</td>
</tr>
<tr>
<td>ADMINISTRATION</td>
<td>ANALYZING INFORMATION</td>
<td>REPORT FORM/AUDIENCE</td>
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<tr>
<td>1. HIRE CONSULTANT, SCHEDULE REPORT</td>
<td>CONTENT ANALYSIS, FREQUENCY COUNTS, PROPORTIONAL ANALYSIS--HUMAN ANALYSIS (CONCEPTUAL) AND/OR COMPUTATION</td>
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<tr>
<td>REPORT DEADLINE</td>
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<tr>
<td>SCHEDULE AND CONDUCT INTERVIEWS</td>
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<tr>
<td>2. SET UP ROLL CARD</td>
<td>FREQUENCY COUNT BY INDIVIDUALS REPEATING SESSIONS--HUMAN COMPUTATION CONTENT ANALYSIS--HUMAN ANALYSIS (CONCEPTUAL)</td>
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<tr>
<td>CHECK TELEPHONE INTERVIEW AND RECORD</td>
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<tr>
<td>3. SET UP RECORDER, PRINT CODING</td>
<td>TRANSCRIPTION: CODE TEACHER VERBAL PRESENTATION FOR INQUIRY BEHAVIOR--CODER</td>
<td></td>
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<tr>
<td>FORMS, SET REPORT DEADLINE</td>
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<td>4. SCHEDULE AND ADMINISTER</td>
<td>CORRECT-INCORRECT SOLUTIONS (DIFFERENCE SCORE)--HUMAN COMPUTATION SCORE FOR ACCURACY</td>
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<tr>
<td>INSTRUMENTS TO TEACHERS</td>
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<tr>
<td>5. SCHEDULE PRE- AND POST-</td>
<td>ANALYSIS OF GAIN SCORES--COMPUTER PROGRAM</td>
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<tr>
<td>TEST AND ADMINISTER PROVIDE OBSERVER</td>
<td>FREQUENCY COUNTS OF USE BY TEACHERS--OBSERVERS</td>
<td></td>
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<tr>
<td>PROVIDE OBSERVER, PRINT CODING FORMS</td>
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<td>SET REPORT DEADLINE</td>
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</tbody>
</table>
SELECTED REFERENCES IN EVALUATION


Caldwell, Michael S. "Input Evaluation and Educational Planning." The Ohio State University Evaluation Center, January 15, 1968.

Hock, Michael D. "Evaluation in the Columbus Public Schools, Title I Program." The Ohio State University Evaluation Center, 1967.


D-25
In July of 1967, you accepted a position as a secondary-school science supervisor. During your first week on the job, you discovered that the district Curriculum Study Committee on Goals for the Sciences had formulated a new set of educational goals. The superintendent of schools asked each science supervisor to analyze existing curricula within his area of responsibility and to design, implement, and evaluate pilot curricula. Based on the results, recommendations were to be made concerning possible system-wide adoption of these curricula.

You decided to focus initially on the biology curriculum. During the course of the year, you found that the following decisions had to be made in order to fulfill your charge:

1. Does the superintendent really want curricula to conform to the prescribed "Goals for the Sciences"? (i.e., what are the goals he really wants to attain?)
2. Does the selected set of goals really address itself to problems and needs in your system?
3. What are the goals of the present biology curriculum?
4. How much divergence is there between the "new goals" and the present goals of the biology curriculum?
5. What should the objectives of the biology curriculum be?
6. Can we attain all of these objectives?
7. How can we attain the objectives we have selected?
8. What portions of the present biology curriculum are relevant?
9. What alternative curriculum approaches might be used?
10. What are the benefits and costs of each alternative?
11. What criteria should we use in selecting from among the alternatives?
12. Which alternative biology curriculum is best suited to our needs?
13. Does operation of the selected curriculum create unforeseen procedural problems?
14. Are the teachers able to teach the biology curriculum which is implemented?
15. Does the selected biology curriculum yield the desired result -- i.e., does it attain the stated objectives?

The above decisions are listed in the sequence in which they had to be made. Group these decisions into the four categories of decisions (planning, programing, implementing, and consequential) by drawing heavy lines at appropriate points to separate the decisions in the list into four groups. Label each group according to type of decision.
You have recently been hired to aid the science supervisor, who unsuccessfully attempted to develop and evaluate a pilot curriculum in biology. Together you successfully culminated that task.

In view of the difficulty in accomplishing the prior task, you and the supervisor have attempted to anticipate the decisions which must be made as you engage in similar analysis of the physics program. Through communication with administrators and instructional staff, you have identified and compiled a list of decisions for which evaluative information is needed. This list follows:

1. What is the effect of participating teacher attitude on the new program?

2. What means are available which will likely reduce the cost of material development for the curriculum?

3. What similar types of new programs have other school systems attempted to implement?

4. What level of academic achievement would we have expected in physics?

5. Has student perception of the laboratory instructor affected new program operation?

6. How might the sessions in the curriculum best be presented sequentially?

7. Who among the students might most profitably be focused upon in this new program?

8. To what degree does the proposed program appear likely to be administratively feasible for physics teachers to operate?

9. What alternative interpretations exist for explaining the low level of understanding of physics concepts before we begin any new programs?

10. How will the proposed curriculum likely benefit students not enrolled in it?

11. What type of attitude toward the "discovery" method should students manifest?

12. Are students enrolled in the new program given the allotted individual counseling time by faculty members?

13. What are the benefits of the program—what objectives have been attained?

14. What is the current status of the problem which motivated our creating this new physics program?
15. What aspects of the in-service program for teachers of physics ought to be continued during the next year?

The decisions listed above are not listed in sequence -- i.e., they are not listed in the order in which they must occur for efficient program development. As before, your task is to categorize each decision by type (planning, programing, implementing, and consequential). Label each decision.

Because of your background in evaluation, you recognize that there is a direct relationship between the type of decision to be made and the type of evaluation (context, input, process, and product) needed to aid the decision-maker.
The enclosed is the first of several sets of simulated materials which will be given to you as part of a simulated evaluation design problem in science education. This simulation is based in part on an actual ESEA Title III science project. However, much of the simulation material is totally fictitious. Many of the events portrayed herein never actually occurred. Names are fictitious, and many roles and behaviors are complete fabrications. In short, while an attempt has been made to lend an air of reality to the simulation by basing it on a real program, gross liberties have been taken in order to protect anonymity and to enhance the utility of the simulation.

The following agencies have kindly allowed the use of their "letterheads" to simulate correspondence related to the simulated project:

It should be stressed that all correspondence printed on these letterheads for this institute is simulated and bears no direct relation to any actual correspondence from any of these agencies.
As of now, you are E. Val Laytor, new Evaluation Specialist. You have just arrived at your office for the first time, having only recently left your former position as a science supervisor in a neighboring district.

The materials attached here were left on your desk by Dr. Judd Mentle, former incumbent in this position. Unfortunately, you were unable to have a personal conference with him before he left for his new job. We suggest that you study carefully the materials which he left for you. You may need or want other specific kinds of information. If so, ask your secretary, Miss Rhea Sorse, and she can tell you whether or not such information is available. [The simulation instructors will play the role of Miss Sorse -- address any information requests to them.]
June 25, 1967

MEMO:

TO: Dr. E. Val Laytor

FROM: Dr. Judd Mentle

RE: Attached materials

I regret that I have to leave before you arrive to replace me. I had hoped to be able to introduce you personally to some of the problems you will face as you assume the position of evaluation specialist. You'll arrive at a critical time. The district has been under fire from several sources, particularly from a vocal citizens' group that feels we are "behind the times."

This spring, the board of education asked Superintendent McBride to organize a curriculum study committee to see if the district might analyze the report on "Regional Educational Goals for the 1980's" prepared by AEL (Appalachia Educational Laboratory, Inc.). A committee (they've given themselves the fancy title of "Goals Task Force") was formed and is working on recommendations now. If my guess is correct, they will have us changing everything in the system. If that happens, you'll probably wish you'd stayed in Huntington!

Supt. McBride was very strong with me on one point. Maybe you won't relate to him in the same way, but he made it clear to me that he was the decision-maker and my role was only to provide him with the information he asked for.

If you get in trouble, rely on Miss Sorse. She is the best secretary I ever had. And she really knows the school system. I've had her collect some background information I thought you might find useful. The first piece is a section out of an unsuccessful Title I proposal we submitted. It will give you a quick idea of what the system is like. The rest of this stuff is self-explanatory.

Good luck to you.

D-31

BAC 1.1
The Community Setting

There are striking and extreme contrasts which are apparent in the educational and cultural needs of the citizens. At one end of the spectrum are the professional and technical personnel who make up thirteen per cent of the work force. These citizens desire for themselves and their families the highest quality in educational and cultural opportunities. They participate in and support the efforts of many community organizations. (However, a Museum, Scouts, Campfire Girls, and kindred groups are the only community-supported organizations that offer enrichment programs to the community as a whole.) On the other end of this spectrum are communities so remote that their peoples can spend whole lifetimes without ever leaving. These citizens have few, if any, desires for education or culture. The local one or two room school often represented the only culture and education they knew. Since it has been necessary to close all but a few of these schools through a program of consolidation, many communities have no cultural or educational influence remaining in their community lives.
average of $483. Such a low expenditure cannot allow the inclusion of needed enrichment programs and activities for either the culturally deprived or highly gifted students, both of which are found within the school system.

An estimated 6% of the four and five year old children in the county participate in public school kindergarten or pre-school programs conducted with ESEA Title I and Operation Headstart funds.

The elementary classroom teacher to pupils ratio is 29:1. The secondary ratio is 22:1.

The elementary professional staff to pupils ratio is 25:1. The secondary ratio is 19:2.

The total enrollment in the school system over the past five years is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963-64</td>
<td>60,010</td>
</tr>
<tr>
<td>1964-65</td>
<td>59,709</td>
</tr>
<tr>
<td>1965-66</td>
<td>59,664</td>
</tr>
<tr>
<td>1966-67</td>
<td>58,768</td>
</tr>
<tr>
<td>projected 1967-68</td>
<td>57,559</td>
</tr>
</tbody>
</table>

These figures show a decreasing enrollment pattern which reflects to some extent the 7% state population loss noted in the 1960 census. No other major changes in enrollment have occurred.

School facilities are not seriously overcrowded, and the current $31,900,000.00 building program, to be completed in 1971, will further improve school facilities. None of the 156 schools have been declared unsafe.

Is presently supporting the public schools at the maximum tax rate allowed by the State Constitution. The County is fully bonded (including a $22,900,000 bond issue voted in 1965 for capital improvements and a supplementary bond issue of $9,000,000 which was approved December 16, 1967) and the citizens have voted a 100% excess levy. The monies derived from the
excess levy are primarily used for instructional materials and to pay higher teachers' salaries. But salaries are still well below the national average.

The only avenue remaining to increase local support of the public schools is through increased property evaluation. The present evaluation of real and personal property is at approximately 50% of true and actual value, which is the amount required by State law. Recently a group of influential citizens representing industry, business and the general public met to discuss the need for more adequate school financing. They voted to take the necessary steps to cause property evaluation in the county to be raised over the next two to five years.

The county qualifies for assistance under the federally affected areas legislation. At present, no monies have been received, but full application for them is being made during the coming fiscal year.
MARCH 1 -- The noted physicist Dr. Charles Isaiah, Director of the Educational Studies Center of the University of Chicago, will speak today on "Technology, Space, and the Man of the Next Century" before a group of local educators. Dr. Isaiah is an outspoken advocate of redirecting and remaking the academic curriculum in today's secondary schools. Mr. Moore of the Board of Education invited Dr. Isaiah after hearing his comments on the report "Regional Educational Goals for the 1980's." Mr. Moore stated he "hoped Dr. Isaiah would give our local schools the direction which can come only from an expert involved in both an academic area and the field of education in general."
The February 16, 1967 meeting of the Board of Education was held in the basement of the Administration building from 7 to 10 o'clock; all members were present. Mr. Gidney began the meeting by a call for tabling the agenda in order to permit open discussion of the report "Regional Educational Goals for the 1980's," prepared by the Appalachia Educational Laboratory. It was Mr. Gidney's belief that community reaction to the report's contents and spirit had been so deep and widespread that Board discussion was warranted. The motion passed.

Chairman Moore stated he was certain that all present recognized the opportunities for action in the future which were implicit in the report. He noted that the local reaction to the report would, in his opinion, be most valuable if undertaken in the spirit which surrounded the passage of the federal Elementary and Secondary Education Act of 1965 (especially as expressed in Title III).

Mrs. Merriman observed that she had received many "creative suggestions" from close friends among the membership of the PTA; she believed that many of these ideas (especially concerning cultural enrichment in the Art Museum or the use of honors programs) might be fruitfully investigated by the Board or the school administration.

Mr. Wallbrown differed with Mrs. Merriman, noting that "many of the Board's constituents" were less articulate than members of the PTA but had problems perhaps more severe and wants just as strongly perceived as did students with whom Mrs. Merriman was acquainted. Several teachers in the audience stated that they believed remedying shortcomings in the existing program (notably by "updating" the academic program at the secondary level) would be a more profitable undertaking than "trying to solve the problems of students who are not born yet."

James Wagner suggested that the Board solicit recommendations from the administration and the community concerning steps which might be taken to respond to the challenges implicit in the Goals report. Chairman Moore put the suggestion in the form of a motion and the motion passed unanimously. He directed the secretary to circulate the minutes of this meeting to interested parties as a solicitation.

Respectfully submitted,

Janet Baker, Secretary
Dear SR. Layter,

It was a pleasure to chat with you at our faculty luncheon yesterday. I'm pleased to have you aboard.

I'm attaching some items which have crossed my desk recently. They all relate in one way or another to the work of the Goals Task Force. As you know, I'll have to move on that one before long. Could you help me by sifting through this stuff and helping me identify decisions I will have to make and information sources that I can use in acting on the task force recommendations, when they are finally made.

I'm particularly concerned about the relationship of AET's "Regional Goals for the 1980s" to the unique needs and problems of our system. Could you get your rough ideas to me sometime next week?

Thanks,

Phillip McBride
May 20, 1967

To the Members of the Board of Education

Amidst all the concern for planning for the 1980's, the school district must not overlook the wise use of available resources during present days. The importance of integrating existing programs is equally as great as the importance of coordinating the development of new programs. For these reasons, we believe it is crucial to report to the Board on the operation of the program in the Planetarium.

There presently is little or no relation between use of the Planetarium by school personnel and students, and activities in the classroom prior to or after visits to the Planetarium. Yet the Planetarium appears to be viewed by school personnel as a valuable resource. There has been constant growth in the use of the facility, and a corresponding growth in the level of experience available to the visiting student.

Prior to November, 1962, the facilities of The Children's Museum were housed in three rooms. One of these rooms held a Spitz Model A-1 planetarium projector and canvas dome where public lectures were given once a week and school lectures by appointment. This Planetarium was operated by volunteers under the supervision of a semi-professional museum director.

During 1962, a move to larger quarters enabled the Museum's Board of Directors to plan for a larger, better-equipped Planetarium. A capital fund drive was conducted and the sum of $35,000 was raised. A Spitz Model A-3-P projector, 20 foot perforated aluminum dome, reclined seating for sixty persons, and basic auxiliary equipment were purchased and installed. A small exhibit area adjoining the Planetarium was furnished with astronomical displays. The program was placed under the direction of a Museum Board member with amateur experience in the field, assisted by volunteer lecturers.
To the Members of the Board of Education

May 20, 1967

In 1964 the Museum Board asked the Schools to provide a teacher to serve as director of the Planetarium. Superintendent McBride expressed interest in coordinating a planetarium instruction with the regular school curriculum. However, funds were not available at that time nor in the foreseeable future to provide a teacher-director. Subsequently, the Museum employed a part-time, non-professional curator to supervise the Planetarium's operation and develop a specific program of lectures with the assistance of the science supervisors. One presentation for the primary grades has been completed to date, as well as an outline of the subjects to be covered by presentations for the higher grade levels.

Adjacent counties frequently send students to Planetarium. During 1965-66, there were approximately 1,500 student visitors from adjacent counties attending in class groups. In addition, class groups from more remote counties amounted to about 1,450 student visitors. Little has been done, however, to integrate the use of the Planetarium into the curriculum of the schools. A trip to the Planetarium is viewed as a field trip--an enriching, but not a teaching, experience. How can the schools plan profitably for the 1980's when the attitude of school personnel is to so wastefully misuse existing resources? We are willing to work with the school system, and especially its science supervisors, in creating an integrated program for Planetarium use; indeed, the availability of ESEA Title III funds makes such a proposal practically an expense-free risk. Would it not be more rational to work toward the educational goals of the 1960's, before worrying about the 1980's?

Sincerely yours,

George DeSicullos
Janice Schmidt
Henrietta Strickland

Board of Directors

Task 1.1
MEMORANDUM

TO: The Board of Education

RE: Solicitation of Reaction to "Regional Educational Goals For The 1980's"

June 9, 1967

In spite of the fact that is a major industrial complex and that average local family incomes are among the nation's highest, cultural deprivation, provincialism, and poverty are widespread. There are extreme contrasts evident among students, families, and communities in the valley region. While industrial wages (a major part of the region's economic base) in the region rank fourth highest in the country, and per capita income is ranked high by comparison to the national average, twenty-one per cent of the region's families subsist on incomes of less than $3,000. There is no room among this latter group for the purchase of cultural or educational opportunities; all that is available to them are opportunities presented by the public school system, other government agencies, or private welfare agencies or charities. Most certainly you must not forget the youth of these families as you look at the "average" student of

Gertrude Henry, Chairman

Sandra Raley

Erwin McAuly

Wilfred Sanders

Charles Bloom

Youth Committee, Inc.
Dr. Philip McBride, Supt.

Dear Phil:

Just a short note to give you a rundown on the meeting we had over lunch today. Al Herbst had just seen the Regional Goals report, and was really excited by possibilities he saw in it for action by the school district. What would you say to running a "Science and the World of Work" program through the grades using work-oriented science materials, and having an adult education program in conjunction with that program which we would run in the assembly centers of our plants. You could relate simple and complex principles in biology, chemistry, and physics to illustrate the operating technology of industry in the area, and use our equipment, facilities, and other resources to complement your science program. It seems to me, as it did to Al, that a curriculum like this would really meet the changing needs of kids in our region for an understanding and appreciation of both science and technology.

A program like this would work into the program changes which you are undertaking (I understand), and also could advance the level of skill which our employees (both present and future) bring to the job. Of course, we'd be glad to work over coffee with you and your staff on this, and give some thought to providing books and perhaps some additional money for the program. I told Al, "This is the kind of thinking that can make this region great!"

Sincerely yours,

D. Chambers

Task 1.3 D-41
Supt. McBride:

I'm sure you've seen this. It makes more sense to me than some of the other suggestions I've heard. Let me know what you intend to do--or has the 803 Task Force recommendation come out yet? I'm a bit worried about our financial ability to be very responsive to any expensive programs.

Dennis O'Harrow
June 17, 1967

MEMO:

TO:        Members of the Central Administration and the Science Department Faculty

FROM:      Ray Boroff and Peggy Bresnen, Science Study Committee Co-Chairmen

RE:        Suggestions for an Integrated Science Program to Meet the Needs of District Students

Considerable interest has been aroused by the report "Regional Educational Goals for the 1980's." The report has identified changes in the population and economic characteristics of the region likely to occur by 1990, and discussed implications of such changes for education and the impact of education on these characteristics. What stands out most clearly to us is a theme, recurring in the report, of the probable misuse of human and material resources in the region. Persons young and old will be underemployed, undereducated, and unprepared to meet the changing stresses of the coming years. The countryside will be more and more polluted. Workplaces will often be marginal economic undertakings, little understood and likely to be perpetuated in the region, greatly affecting an unsuspecting population.

In a time of change, in a region where the quality of human and material resources is frighteningly low, it seems that the most flexible and effective response to new needs that our system can make is to produce healthy and adaptable people. Young and old need proper nutrition, proper dental hygiene, reasonable personal health habits, and positive personal mental health, to be ready to adapt. In addition, a knowledge of the capability of people to adapt and their biological and physical environment is a necessary requisite for making successful and lasting adaptations. Finally, a knowledge of processes which make the human system and the ecological system operate as they do is a necessary requisite for operating successful adaptation, both personal and social.
It is our belief that an integrated science program can meet the most pressing need of our region in the coming years—the need to know and understand the process and product of adaptation. Biological constructs, physics concepts, principles of chemistry and the earth sciences can all be used to instruct the student and give him understanding, and can all be related to the student's person, his life style, and the environment in which he lives. It is our belief that the science faculty ought to move forward to propose and plan a science curriculum which will help our students adapt, and which will have meaning for them. A unique opportunity for meeting the real needs of our students lies within reach. What is your reaction? Will you work with us on such a program?
Contents of
Student Cumulative Record
Folder

1. Student Name, Address, Telephone, Parents' Names
2. Birthdate, Sex
3. Parents' Occupation, Education (years completed)
4. Brothers and Sisters Presently Enrolled in System
5. Grade Average in Subjects by Year, and Teacher
6. IQ Scores (California Test of Mental Maturity)--grades 6, 10
7. Standardized Achievement Test Scores
   Stanford Achievement Battery grades 3, 6, 9, 11
   Sequential Tests of Educational Progress grades 3, 6, 9, 11
   Tests of General Educational Development (graduating senior, 1966 only; subtests in grammar, literature, mathematics, social studies, natural sciences)
8. Attitude toward various academic subjects (on locally-constructed semantic differential instrument)--grades 7, 10, 12 in 1966 only
9. Individual test results and referral records of the school psychologist
10. Health record and referral records of the school nurse
11. Attendance (days per semester) for each year
12. Vocational Interest Checklist--grade 9 only

INFO 1

D-45
1. Throughout standardized testing is done in grades three, six, nine and eleven, as a part of the State-County Testing Program.

2. In grades three and six the Stanford Achievement Battery is used and in grades nine and eleven the Sequential Tests of Educational Progress are used.

3. According to the most recent test data the number of students making exceptionally high and exceptionally low scores in science is as follows:

<table>
<thead>
<tr>
<th>GRADE</th>
<th>NUMBER OF STUDENTS SCORING ABOVE THE 90th PERCENTILE (NATIONAL NORMS)</th>
<th>NUMBER OF STUDENTS SCORING BELOW THE 10th PERCENTILE (NATIONAL NORMS)</th>
<th>NUMBER OF STUDENTS TESTED IN EACH GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>623</td>
<td>573</td>
<td>5096</td>
</tr>
<tr>
<td>6</td>
<td>619</td>
<td>775</td>
<td>4838</td>
</tr>
<tr>
<td>9</td>
<td>584</td>
<td>307</td>
<td>4891</td>
</tr>
<tr>
<td>11</td>
<td>371</td>
<td>292</td>
<td>4169</td>
</tr>
</tbody>
</table>

INFO 1.
Dear Dr. Laytor:

I'm again being inundated with requests--by well-meaning people, I'm sure--for meetings with persons who have the solution to problems here in the district. A great number of people have been motivated to react to the Regional Goa's report. I'd like to react to people's suggestions and requests with as much consistency as I can, and I'd like to have you do some work to aid me in achieving this consistency. From the materials I've given to you over the past days, would you pull together a set of possible objectives for district action which relate to needs and problems you've perceived. Of course, I'll want information on the degree to which any objectives you suggest are presently being attained. Could you, then, give me a list of likely sources of information for this task, (i.e.-information to see if we've already attained them) relative to each objective you identify?

I'll check with you Friday on your progress.

Yours truly,

Phillip McBride
Superintendent

Task 2.0
August 1, 1967

Dear Val:

Your activities as an evaluator for this past month have been extremely helpful to me. Now I'd like you to give me your critical judgment on a job I must complete. The Goals Task Force has completed a report on objectives which they feel meet the most pressing need of the district. The objectives deal with a space-related science and planetarium program (I've attached their report).

I need you to help me make a program proposal out of these ideas, for the consideration of the School Board. The Board has decided the Task Force's ideas are good, and several Board members are pressing me to produce a Title III proposal based on the attached objectives. I'd like to make a feasible, as well as a relevant, program—lately everyone seems concerned about all the abortive attempts at change we've seen in the past. What I'd like you to do is select or screen from among the attached materials the most feasible objectives for the total program.

Thanks!

McB.

Task 3.0
Young people today are maturing in a world where the sum total of knowledge will double in one decade. This "explosion of knowledge" is recognized as a force affecting each of our lives in the last half of the 20th century. It is also recognized that a major focus of this knowledge explosion is space-related science, and that new concepts and technological developments in this area not only extend the limits of our environment, but also effect changes in its very nature. Thus we are living in the Space Age and must seek to understand what implications it has for us as individuals and as members of the community. There are economic, sociological, and political considerations; a new philosophical orientation is needed; even the art forms of our day reflect Space Age influence; to say nothing of the vast array of scientific and technological advances that both improve and complicate our lives. There are few areas of thought in either the sciences or the humanities which have not felt the impact of the Space Age. All of which poses a basic problem for the educational systems of our nation. They must provide young people with the knowledge and attitudes that will enable them to mature adequately and become effective citizens in this age of Space and space-related science.

A curriculum in astronomy and space science was written in the summer of 1966 for grades K through 6. It presently is being tested in thirteen classrooms in the county. During the summer of 1967, it should be evaluated and revised for expansion to other parts of the system. Curriculum writing in space-related science is scheduled for the secondary level during the summer of 1967. The limited funds available for both of these endeavors, however, does not allow for assistance by specialists in space-related science curriculum. The curriculum places little or no formal emphasis on the interrelatedness of space science to other science and non-science subject areas. Practically speaking, such emphasis has been a matter of individual teacher preference and ability.

An example of this lack of interrelatedness is the poor use of existing facilities. For example, during the past two years, ninety-four of the 122 elementary schools and seventeen of the thirty-four secondary schools have brought an average of four classes to visit the planetarium of The Museum. This indicates not only teacher interest in
providing further learning opportunities in the space-related science, but also some 888 hours of teaching time devoted to these opportunities. There is, however, only minimal coordination of the planetarium lecture content with the classroom curriculum, and the effectiveness of the visit depends solely on the ingenuity of the individual teacher to prepare his students for their learning experience and to reinforce it through follow-up classroom activities. In addition, the planetarium is staffed by amateur volunteers whose abilities vary tremendously.

County thus has a need and an opportunity to replace current deficiencies in the area of space-related science with a systematically structured program emphasizing not only the subject area, but also its relationship to other areas of instruction. The program, as proposed, deals with the needs for teacher in-service training in content and methods, curriculum development, and instructional materials; and stresses the involvement of students in the experiences of science.

**Objectives to Meet the Local Need**

The objectives of the pilot operation of the Space-related Science Project, we believe, ought to be the following:

A. To develop, during the summer of 1967, space-related science curriculum materials for grades K through 9 and to use these materials, during the 1967-68 school year, in a pilot program involving approximately ten per cent of the school population. The materials will emphasize the interrelatedness of Space Science to other subject areas and the involvement of students in the experiences of Science.

B. To coordinate the use of The Museum Planetarium with the space-related science curriculum materials and to improve its capabilities as an educational resource for the schools and the community.

C. To provide teacher in-service training in space-related science content and science teaching methods and materials through (1) a schedule of in-service courses for pilot teachers, and (2) Space-related Science Specialists whose responsibilities include giving maximum individual assistance to the pilot teachers.

D. To increase the learning opportunities in space-related science through the use of supplementary student activities which extend and enrich the curriculum.

E. To increase the availability of space-related science resource materials and equipment to pilot students and teachers.
F. To disseminate information about space-related science and the Project which encourages positive attitudes on the part of (1) principals, teachers, and other school personnel, (2) students and their parents, and (3) the community at large.

G. To maintain an awareness of new knowledge in space-related science and recently developed educational practices that may be of use in the ongoing Project.

H. To produce sample television programs in space-related science in cooperation with the area educational television broadcasting facility.

I. To gather data and to plan for the step-wise expansion of Project services and facilities.

J. To incorporate a continuing program of evaluation designed to assess the degree to which the above objectives are attained and to provide information necessary to the maintenance of Project effectiveness.

Task 3.1
Aug. 4

Dear Dr. Layton:

Here are some estimates I've prepared in response to your phone request for my guesses about costs of the Title III project. I've looked at the proposal draft the Task Force prepared, and have worked out estimates for salaries, materials, equipment, etc. I doubt you can do the project for much less than I've listed.

Supt. McBride used these estimates in preparing an estimated (tentative) budget which he sent to the State Coordinator of Title III programs -- probably as a trial balloon.

If there is any other information I can give you, feel free to give me a call.

Dennis O'Harrow

Dr., my full address is Finance Officer, Business

D-52
## PROPOSED BUDGET

### A. Administration

- **Salaries (Project and Planetarium Director)**: $27,000
- **Materials**: $1,500
- **Travel**: $1,000

**Total**: $29,500

### B. Instruction

- **Salaries**: $48,500
  - Science Specialists (3) @ $11,000
  - Evaluation Specialist @ $11,500
  - Secretary @ $4,000
- **Materials**: $7,000
- **Travel**: $7,000
- **Consultants**: $4,000
- **Stipends for materials development**: $23,000
- **ETU Programming**: $1,000
- **Dissemination**: $1,000

**Total**: $91,500

### C. Planetarium Instruction

- **Salaries**: $13,000
- **Travel**: $1,500
- **Consultants**: $500

**Total**: $15,000

### D. Plant Operation (Planetarium)

- **Total**: $1,500

### E. Pupil Transportation

- **Total**: $3,000

### F. Equipment

- **Office**: $3,000
- **Planetarium**: $3,000
- **Truck**: $3,000

**Total**: $9,000

### G. Fixed Costs (Benefits)

- **Total**: $8,000

**Total**: $157,500

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Task 3.2  
D-53
August 9, 1967

Dr. Phillip McBride,
Superintendent

Dear Dr. McBride:

Regarding the possibility of funding your proposed Title III program in astronomy and space-related science, I am concerned about the tentative budget you submitted. I have talked to your finance officer, Mr. Dennis O'Harrow, and informed him that the estimated cost of the first year of the pilot program -- $158,000 -- is considerably higher than we customarily fund such programs. I suggested he seriously investigate the possibility of reducing the budget by approximately one-half, especially in view of the likely Federal cuts in domestic spending during the next fiscal year. I look forward to talking with you further as your project develops.

Cordially,

Will Ketchem, Auditor
Office of Coordinator of Federal Programs

Task 3.3
MEMORANDUM

Dr. Layton —

Here's the stuff out of the proposal that relates to the Jack Force notions about what jobs each person on the project will do. I think you're right — they'll have to plan on working a 15-hour day!

Rhea

TASK 3.4

D-55
Likely Tasks of Personnel

The Project Director will be responsible for the overall supervision and administration of Project activities; coordinate the curriculum writing conference; instruct in-service teacher training courses; coordinate study and evaluation programs and direct revisions and changes in Project operations; coordinate planning efforts and implement new procedures which are developed; supervise dissemination of information; prepare budget and exercise its control; supervise proper maintenance of records and preparation of reports and proposals; maintain liaison with government agencies (including state and federal Departments of Education); develop areas of cooperation between Project and other educational agencies and institutions; supervise development of educational television programming; supervise acquisition of Project library with accurate and up-to-date materials on space-related science information and science education practices.

The Planetarium Specialist will be responsible for the operation and maintenance of the planetarium facility; coordinate planetarium scheduling; assist Space-related Science Specialists in preparation of planetarium lessons for pilot operations; write and produce public planetarium programs; install and maintain auxiliary planetarium equipment; design and build new auxiliary equipment, as required; present or supervise the presentation of all public programs; disseminate information on planetarium programs to general public and to scheduled school groups; maintain accurate, timely knowledge of space-related science developments for incorporation in public programming; advise on public program and planetarium facility expansion; supervise acquisition of and maintain planetarium equipment, library of films, slides, auxiliaries, sound tapes, and other visual effects; prepare planetarium operating budget and supervise its expenditure; keep accurate records of planetarium use, operative checks and maintenance performed; assist in acquiring data on audience reaction to public programs.

The Space-related Science Specialists will be responsible for conducting in-service teacher training; provide maximum individual assistance to pilot classroom teachers in subject content, methods, and materials use; encourage and assist with supplementary student activities; arrange for and direct large group activities such as "Star Parties" and family programs; present three-part planetarium lessons (including pre-visit orientation and post-visit reinforcement); counsel and advise teachers in matters of scheduling and evaluation; disseminate Project information to pilot schools; assist in development of educational television programming; maintain accurate, timely knowledge of space-related science content and developments in science education; advise on expansion of program and educational planning; keep accurate records of Project activities as re-
quired by evaluation procedures; implement revisions in materials and procedures resulting from Project evaluation.

The Evaluator will be responsible for carrying out all the evaluation tasks of the Project; work with Project staff to explain evaluation techniques and outline record-keeping requirements; design and produce, schedule and administer evaluation instruments; observe and confer with a valid sample of pilot school personnel; supervise the processing and analysis of all data collected; make weekly reports to Project Director and monthly reports to planning groups and The Children's Museum on evaluation results; prepare year-end evaluation report for Project staff, Board of Education, state and federal Departments of Education.

Task 3.4
September 5, 1967

Dr. E. Val Laytor,
Evaluation Specialist
Central Administration Building

Dear Val:

I don't know if you are in a position to do anything about it, but I'm going to complain to you anyway. I hope I'm not misusing our friendship.

I called McBride as soon as I heard about your district's decision to put all their eggs into that misbegotten Title III planetarium project. I told him that I couldn't conceive of a focus much less related to what we see as real needs in this area. But I guess he isn't going to listen.

Val, I'm really disturbed. We spent a lot of time and research on our report on "regional goals for the 1980's." We identified many problems that are crucial in Appalachia--and Charleston is no exception. We have hundreds of kids who can't read their names, and you guys decide to teach them about the stars! I just don't understand the logic. Can't you get to McBride and talk some sense to him? If I can help you convince him, let me know.

Sincerely,

Wayne Newton
Research Director

Task 3.5

D-58
MEMORANDUM

To: Phil McBuild

Late yesterday afternoon I got a call from Ray Stroff, one of the Chairman of the Science Study Committee. He said the secondary school science people are really upset about science specialists coming to work with them in the Planetarium program. They feel the teachers are better qualified to give the specialists. In some cases they’ll hold off during the program in grades 6-12. Better get busy, we’ll lose them at contract time.

C. More

PS- What about a K-7 program?
August 12, 1967

Dear Val:

Thanks for doing such a thorough job of scrutinizing the proposed objectives for the Title III space-related science program. The over-all objectives the Board decided upon are attached.

The one objective I'm really concerned about is the one regarding in-service education. I'd like you to help me look at how we might best attain this objective. Would you set some criteria for selecting among alternative programs? Then, use your creativity and the criteria to generate alternative ways to attain the in-service education objective. Can you give me the criteria and a list of alternative programs (just one or two sentences describing the program, and a notation of the criteria which you expect the program to meet) by next Wednesday?

Thanks,

Mc B.

Phillip McBride
Superintendent

PM:jt
Task 4.0
Objectives

The objectives of the first year pilot operation of the Space-related Science Project are:

A. To develop, during the summer of 1967, space-related science curriculum materials for grades K through 9 and to use these materials, during the 1967-68 school year, in a pilot program involving approximately ten percent of the school population. The materials will emphasize the interrelatedness of Space Science to other subject areas* and the involvement of students in the experiences of Science.

B. To coordinate the use of The Children's Museum Planetarium with the space-related science curriculum materials and to improve its capabilities as an educational resource for the schools and the community.

C. To provide teacher in-service training in space-related science content and science teaching methods and materials through (1) a schedule of in-service courses for pilot teachers, and (2) Space-related Science Specialists whose responsibilities include giving assistance to the pilot teachers.

D. To increase pilot teacher knowledge of the availability of space-related science resource materials and equipment.

E. To disseminate information about space-related science and the Project which encourages positive attitudes on the part of (1) principals, teachers, and other school personnel, and (2) students and their parents.

F. To maintain awareness of new knowledge in space-related science and recently developed educational practices that may be of use in the ongoing Project.

G. To gather data and to plan for the step-wise expansion of Project services and facilities.

H. To incorporate a continuing program of evaluation designed to assess the degree to which the above objectives are attained and to provide information necessary to the maintenance of Project effectiveness.

* See attached "Space-Related Science" diagram.
SPACE-RELATED SCIENCE
EMBRACES MANY DISCIPLINES

- General Science
- Biology
- Chemistry
- Physiology
- Earth Science
- Physics

- History
- Literature
- Social Sciences
- Civics
- Sociology

The Sciences
Scientific Predictions

The Humanities
Communicating Explanations

Methods of Science
Astronomy: Physics of Light and Motion

Mathematics
- Arithmetic
- General Mathematics
- Algebra I, II, College
- Geometry, Plane, Solid
- Trigonometry
- Analytic Geometry
- Calculus
- Statistics

Descriptions in Numerical Terms
Communication Arts
- Reading
- Writing
- Speech
- Art
- Graphics

D-62
Ear Colleague in Evaluation:

have recently been looking at the problems of educational planning and the assessment of alternative strategies for attaining goals which educators deem desirable. It seems to be true throughout education that there is little systematic comparison of ways to attain the objectives which local schools, whole districts, or larger systems state are of concern to them.

I believe that some ideas I have been working with might provide a framework within which the assessment of inputs might be viewed. The following are criteria which I have found help me evaluate alternatives; the criteria are vague, and may be used together or separately, with varying degrees of importance attached to them, but they help me appear more rational when reasonableness is needed.

CRITERIA FOR EVALUATING ALTERNATIVE STRATEGIES FOR ATTAINING EDUCATIONAL OBJECTIVES:

- **Relevance**: determining the relevance of the proposed solution strategy to identified need areas;
- **Legality**: determining the legal status of the proposed solution relative to the context in which it is to be implemented;
- **Congruence**: determining the congruence of the solution with the value system(s) of the agency charged with implementation;
- **Legitimacy**: determining if the solution is within the purview of the agency charged with the implementation;
- **Compatibility**: determining the compatibility of the strategy with the value system(s) of the implementing agency and its staff;
- **Balance**: determining the impact of the solution on other components of the system of concern, and on the weights and interrelationships of the organization;
- **Practicability**: determining the practicability of the solution in terms of achieving its stated purposes (end products or outcomes);
- **Cost-effectiveness**: determining the relative desirability of the solution in comparison with other solutions, in terms of the ratio of necessary inputs (costs) and outputs (effectiveness).

My hope is you will use and revise them at will.

Sincerely,

Michael S. Caldwell
Associate Director
Dear Dr. Layton:

I've had the members of the Goals Task Force work over the objective that you and Supt. McBride were concerned about. To make what we intended more apparent, we have restated the objective and articulated a set of sub-objectives. Our thinking was that we would assume the objective was attained when we could see evidence that the sub-objectives had been attained. I hope these ideas give you some lever on the job of creating different ways of going about attaining our in-service education objectives.

Yours truly,

John Blaha, Chairman
Goals Task Force

Attachment

Task 4.2
Major and Minor Objectives of the In-Service Education Program: to provide teacher in-service training in space-related science content, methods, and materials (and to attain this objective through the following):

A) In-service courses for pilot program teachers (with sub-objectives being):

1) to present five training courses which utilize the five levels of curriculum materials being developed;
2) to familiarize teachers with the curriculum materials in space-related science;
3) to demonstrate the use of the inquiry approach with these curriculum materials;
4) to familiarize teachers with available services, materials, and equipment which might be used in the space-related science program;
5) to generate teacher interest and enthusiasm in the adoption of these curriculum materials.

B) Individual assistance provided by science specialists in the program (with sub-objectives being):

1) to answer teachers' subject matter inquiries;
2) to keep teachers informed of current developments in the subject-matter area of space-related science;
3) to provide resource equipment and materials on request;
4) to demonstrate inquiry teaching methods on request;
5) to engage in team teaching in space-related science on request;
6) to assist with small-group investigations on request.

Task 4.2

D-65
A period of several months' time has elapsed since you worked with designing alternative in-service education programs (in the previous simulation). During the past months the draft proposal was prepared in its final form and submitted, and a Title III grant received for establishing and operating a space-related science program. The objectives of the program are those with which you are familiar (and were listed in the previous simulation). The program is now well under way, having been started at the beginning of the school year. Your task is to monitor the operation of the program's activities and detect deviations from the manner in which the program was expected to operate. You have been monitoring potential barriers or sources of trouble which you predicted might impede program activities, as well as remaining alert to unanticipated barriers to program success. Periodically you have been sending reports to decision-makers responsible for the program. Then ---

Task 5.0

D-66
PROCESS EVALUATION REPORT NO. 14

Project: In-Service Education
Program: Space-Related Science, Title III
Date: November 20, 1967
Data Collection and Report Preparation: E. Val Laytor

SUBJECT: Attendance at In-service Education Meetings

Criterion:

Fluctuation in teacher attendance at in-service education meetings was one of the factors identified during project planning as a likely barrier to project success. It was believed that a serious drop in session attendance would make it unlikely that project objectives could be fully attained.

Findings and Interpretation

During the past four meetings, there has been a marked and consistent downward shift in attendance. The following figures illustrate this:

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Attendance</th>
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</thead>
<tbody>
<tr>
<td>1 (Oct. 27)</td>
<td>74</td>
</tr>
<tr>
<td>2 (Nov. 3)</td>
<td>63</td>
</tr>
<tr>
<td>3 (Nov. 10)</td>
<td>55</td>
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<tr>
<td>4 (Nov. 17)</td>
<td>46</td>
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</tbody>
</table>

Initially, 75 persons were expected at the sessions; it was anticipated that attendance would remain at that level. Thus, it appears unlikely that the desired level of teacher training will be achieved unless steps are taken to insure a high level of regular repeat attendance.

Data Collection Organization and Analysis:

Session attendance was taken by counting entrants to the in-service training sessions. The evaluator recorded the actual attendance figures on a roll card, and checked project files to determine expected enrollments. Analysis involved comparison of expected and observed attendance by meeting.
MEMO:

FROM: Sally Richardson

Dear Teacher:

I am happy to hear that you have agreed to be one of the pilot teachers in the Space-Related Science Project. As you know, we will hold a special in-service course to provide training in space-related science content, methods, and materials.

The course will be held in the multi-purpose room at Fairview Elementary School on West Seneca Avenue. The instructor will be Mr. Willard Leer, the new Director of the Space-Related Science Project.

A schedule of the sessions and topics appears below. Each session meets for one hour.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 27</td>
<td>Introduction to Space-related Science Curriculum Materials</td>
</tr>
<tr>
<td>November 3</td>
<td>Developing Student Investigations in Space-related Science</td>
</tr>
<tr>
<td>November 10</td>
<td>Techniques for Using Astronomical Equipment</td>
</tr>
<tr>
<td>November 17</td>
<td>Space-related Science and the Inquiry Approach</td>
</tr>
<tr>
<td>November 24</td>
<td>Space-related Science Curricula: Units 1-3</td>
</tr>
<tr>
<td>December 1</td>
<td>Space-related Science Curricula: Units 4-6</td>
</tr>
</tbody>
</table>
You've been so immersed in the many activities of an evaluator that you have completely overlooked beginning a job that you should have completed some time ago. You have not yet made a product evaluation design for either the program as a whole or any of its parts. This has been brought painfully to your attention by a reminder to you (in the hallway) from Supt. McBride, who observed he would soon be ready to "take a hard look at the in-service training program" to see if further programs ought to be conducted in the same way.

You've decided to begin the task by developing a product evaluation design for five sub-objectives of the in-service program. Having constructed the attached worksheet, your job now is to fill in the worksheet.

Task 6.0
<table>
<thead>
<tr>
<th>Sub-objectives</th>
<th>Criteria (Acceptable Evidence)</th>
<th>Information Needed/Source</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To present five training courses which utilize the five levels of curriculum materials being developed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. To familiarize teachers with the curriculum materials in space-related science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. To demonstrate the use of the inquiry approach with these curriculum materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. To familiarize teachers with available services, materials, and equipment which might be used in the space-related science program</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. To generate teacher interest and enthusiasm in the adoption of these curriculum materials</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
January 16, 1968

Dr. E. Val Laytor
Central Administration Building

Dear Dr. Laytor:

To respond to your request for information about what evidence the members of the Board would accept as indicative that program objectives have been met, I discussed the matters you listed with my colleagues. For each of the sub-objectives in the in-service training program, we talked over some of the possible types of evidence you suggested, and after due deliberation we decided the following represents evidence we would be comfortable accepting from others and defending to the public:

**Objectives**

1. To present five training courses which utilize the five levels of curriculum materials being developed

2. To familiarize teachers with the curriculum materials in space-related science

3. To demonstrate the use of the inquiry approach with these curriculum materials

4. To familiarize teachers with available services, materials, and equipment which might be used in the space-related science program

**Acceptable Evidence**

- Content validity of the training course in relation to the level of curriculum materials discussed
- Instructor adherence to prescribed content
- 95% repeat attendance at sessions
- Coverage of the entire curriculum unit in the six hours of sessions
- Minimum of one use of method for each unit at each level of curriculum materials
- Ability to deal with hypothetical situations by obtaining relevant resources
- Expressed knowledge about services, materials, and equipment

D-71
Objectives

5. To generate teacher interest and enthusiasm in the adoption of these materials

Acceptable Evidence

Positive shift in teacher attitude
Teacher level of use or non-use of curriculum materials

If we may be of further help to you, please feel free to contact me. We look forward to reviewing your forthcoming reports concerning the impact of our district’s Title III educational programs on the needs of this area.

Sincerely yours,

[Signature]
Chairman,
County Board of Education

Task 6.2
January 18, 1968

Dr. E. Val Laytor
Central Administration Building

Dear Dr. Layton:

I understand you're planning an evaluation of the space-related science program to assess the extent to which we got the payoffs we hoped for. I know evaluation is a difficult job, and I want to help you in any way I can. I'd be glad to discuss with you what the program has done; I've been with the program since it was funded, and am familiar with all aspects of it. It seems that it would be easier on teachers and staff members in the program, as well as more productive for you, to use materials I have here in the office and reactions and perceptions I've gotten from working with people in the program. If you'd find it helpful, I'll be glad to stop by and work with you.

Yours truly,

Willard Leer, Director

Task No. 6.3

D-73
You have finally completed the product evaluation design. The last major task facing you is that of drawing up a master schedule for the collection of the information (administration of instruments, etc.). Start by drawing up a master schedule for the data collection in the portion of the design which you have just completed (the product evaluation of the first five sub-objectives of the in-service training program).

Task 7.0
January 28, 1967

Dr. E. Val Laytor
Central Administration Building

Dear Val:

I've just received your note requesting a series of interviews with project personnel in the Title III space-related science program. Feel free to begin your work any time; there is no problem in interviewing these people. Your request reminded me of the problem we had with Judd Mental's scheduling of evaluation activities, when he was here as your predecessor -- and because of those problems I ought to fill you in on some general guidelines for testing, etc., here in the district. The following guidelines are the outgrowth of discussions between myself and staff of the district:

a) Students may be tested only during the first two and last two weeks of the school year

b) Teachers may be used as information sources only under their own volition

c) Project personnel are required to provide evaluation information needed by the evaluator

d) All other personnel may serve as information sources only after the matter is approved by the central administration.

I think it would be best to use these guidelines in setting up any further work you do.

Yours truly,

Phillip McBride, Supt.

Task 7.1
SOME METHODS OF DATA COLLECTION

1. Objective tests
2. Essay tests
3. Projective methods
4. Rating scales, Check lists, Inventories
5. Semantic differential
6. Questionnaire
7. Interviews
8. Observation of behavior
9. Sociometry
10. Unobtrusive measures and content analysis
<table>
<thead>
<tr>
<th>PRIMARY USES</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Measure individual's aptitude, achievement, and intelligence</td>
<td>1. Greater objectivity in scoring</td>
<td>1. Problem of validity</td>
</tr>
<tr>
<td>2. Screen and select individuals</td>
<td>2. Speed of scoring</td>
<td>2. Standardized tests sometimes used institutions requiring specially constructed tests</td>
</tr>
<tr>
<td></td>
<td>3. Potentially higher reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Can be item analyzed for improvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Quantity of available standardized tests</td>
<td></td>
</tr>
<tr>
<td><strong>OBJECTIVE TESTS</strong></td>
<td><strong>ESSAY TESTS</strong></td>
<td></td>
</tr>
<tr>
<td>Measure student ability to think, organize, and apply knowledge</td>
<td>Allows students to synthesize their knowledge about a topic</td>
<td>1. Difficult to score objectively</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Sampling of topics is relatively limited</td>
</tr>
<tr>
<td><strong>PROJECTIVE METHODS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure individual's emotions, needs, motivations, attitudes, and values through projected behavior</td>
<td>1. Clinically insightful</td>
<td>1. Lack of objectivity in interpretation</td>
</tr>
<tr>
<td></td>
<td>2. Allows measurement of variables typically unavailable through other techniques</td>
<td>2. Uncertain reliability and validity</td>
</tr>
</tbody>
</table>
RATING SCALES, CHECK LISTS, INVENTORIES

<table>
<thead>
<tr>
<th>PRIMARY USES</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assess interests, vocational choices, personality</td>
<td>1. Easy to complete</td>
<td>1. Often interpreted too narrowly</td>
</tr>
<tr>
<td>2. Predict occupational success</td>
<td>2. Numerous items help increase reliability</td>
<td>2. Criteria for ratings are often unspecified</td>
</tr>
<tr>
<td>3. Measure system variables</td>
<td>3. Can be objectively scored</td>
<td>3. Often forces choices between unacceptable responses</td>
</tr>
</tbody>
</table>

EXAMPLE OF A RATING SCALE ITEM

Is this student shy or bold in social relationships?

<table>
<thead>
<tr>
<th>Painfully self-conscious</th>
<th>Timid</th>
<th>Self-conscious on occasions</th>
<th>Confident in himself</th>
<th>Bold, insensitive to social feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>
# PRIMARY USES

<table>
<thead>
<tr>
<th>SEMANTIC DIFFERENTIAL</th>
<th>QUESTIONNAIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRENGTHS</strong></td>
<td><strong>WEAKNESSES</strong></td>
</tr>
<tr>
<td>1. Adaptable to varying research demands</td>
<td>1. Frequent low percentage of returns</td>
</tr>
<tr>
<td>2. Quick and economical to administer and score</td>
<td>2. No assurance that the intended respondent understands the questions</td>
</tr>
</tbody>
</table>

- **INTERVIEWS**
  - 1. Explore new fields
  - 2. Validate other methods
  - 3. Probe responses in depth

- **QUESTIONNAIRES**
  - 1. Survey large groups
  - 2. Validate other methods
  - 3. Economical

- **WEAKNESSES**
  - Often tells more about the respondent than about the topic under consideration
  - Costly in time and personnel
  - Requiring skilled interviewers
  - Often difficult to summarize
  - Many biases possible, i.e., interviewer's, respondent's, situational
### PRIMARY USES

**OBSERVATIONS OF BEHAVIOR**

1. Describe actions through direct observation
2. Measure interactions between persons in a social setting

### STRENGTHS

**OBSERVATIONS OF BEHAVIOR**

1. Can be used in natural or experimental settings
2. Most direct measure of behavior

### WEAKNESSES

1. Observer's presence often causes an artificial situation
2. Hostility to being observed
3. Problem in deciding exactly what is to be observed
4. Inadequate sampling of observed events
5. Ambiguities in recording
6. Frequent observer unreliability

### SOCIOMETRY

1. Analyze data on choices, communication, and interaction patterns of people in groups
2. Classify individuals and groups according to influence, leadership, etc.

### STRENGTHS

1. Easy to analyze
2. Naturalistic method
3. Clinically insightful

### WEAKNESSES

Criteria used in making choices are often vague
<table>
<thead>
<tr>
<th>PRIMARY USES</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Validate more conventional measures</td>
<td>1. Nonreactive</td>
<td>1. Hidden measures are considered unethical by some</td>
</tr>
<tr>
<td>2. Develop insights</td>
<td>2. Non consciously biased</td>
<td>2. Doubtful validity when used alone</td>
</tr>
<tr>
<td>3. Suggest hypotheses</td>
<td>3. Often readily available</td>
<td></td>
</tr>
<tr>
<td>4. College data otherwise unobtainable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXAMPLES OF UNOBTRUSIVE MEASURES**

1. Physical wear on certain pages of books to measure amount of use
2. Police and Juvenile Court records
3. Census data
4. Number of marks on the school walls
5. School budgets
6. Student cumulative records
7. Bulletin board displays
8. Completed teacher application forms
9. Teacher transfer rates
10. Hidden microphones or observations
EXAMPLE OF INTERVIEW
OR QUESTIONNAIRE

1. In general, how would you rate the program of the health centers as a means of providing the necessary medical and dental care for low income students?

   ____ Very good, no problems
   ____ Good, some problems
   ____ Inadequate, many problems
   ____ Very poor, does more harm than good
   ____ Other, please specify

2. Have you been able to visit the health center that serves your school?

   ____ Yes  ____ No

   If yes, are the physical facilities adequate?

   ____ Yes  ____ No

   If no, what is needed?

3. What problems, if any, do your children have in getting to the health center?

   ____ Lack of transportation
   ____ Geographical location
   ____ Inability of parent to accompany child
   ____ Parental indifference
   ____ Poor home-school communications
   ____ Other, please specify

4. Have you been able to form a clear perception of your role in relation to the Health Centers Project?

   ____ Yes  ____ No

   If yes, please describe this role. (Functions and responsibilities)

D-82
EXAMPLE OF A
SOCIOMETRIC ITEM

Write the names of the three children in the class you would most like to have sit near you.

1. ____________________________________
2. ____________________________________
3. ____________________________________
EXAMPLE OF
CHECK LIST ITEMS

Please check those pieces of equipment which you frequently use in your science classes:

- Record player
- Tape recorder
- Filmstrip projector
- Overhead projector
- Film projector

EXAMPLE OF
INVENTORY ITEMS

1. Select from the three activities listed, the one that you would most like to perform:
   a. Design new styles for automobiles
   b. Conduct an advertising campaign for a particular make of car
   c. Sell automobiles

2. I would rather (choose only one):
   a. Burn my draft card
   b. Deprive a baby of food
   c. Steal money from a church
### INFORMATION NEEDS

**A. PSYCHOLOGICAL VARIABLES**
1. Intelligence
2. Aptitude
3. Achievement
4. Personality
5. Readiness
6. Sensory Motor
7. Vocational preference
8. Interest
9. Attitudes/Values
10. Motivation
11. Creativity

<table>
<thead>
<tr>
<th></th>
<th>Objective tests</th>
<th>Essay tests</th>
<th>Projective methods</th>
<th>Rating scales</th>
<th>Check lists</th>
<th>Inventories</th>
<th>Semantic differential</th>
<th>Questionnaires</th>
<th>Interviews</th>
<th>Observation of behavior</th>
<th>Scoliometry</th>
<th>Unobtrusive measures</th>
<th>Others</th>
</tr>
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<tbody>
<tr>
<td>Intelligence</td>
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<td>Aptitude</td>
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<td>Achievement</td>
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<td>Readiness</td>
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<td>Sensory Motor</td>
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<td>Vocational preference</td>
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<td>Attitudes/Values</td>
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</tbody>
</table>

**B. SYSTEMS VARIABLES**
1. Personnel
2. Finance
3. Facilities & materials
4. Communications
5. Structure
6. Influences
7. Content/systems output
8. Goals & objectives

- **Evaluation of Objectives in Context:**
  - Identifying and Assigning Priorities to Needs
  - Assess Problems Against Criteria
  - Translating Problems into Specific Objectives

- **Evaluation of Plans:**
  - Assessing Alternative Solutions
  - Identifying Appropriate Point of Entry in the Change Process
    - Research
    - Development
    - Diffusion
    - Adoption
  - Assessing Potential Barriers to Success

- **Evaluation of Process:**
  - Monitoring Important Variables
  - Relating Progress Data to Objectives
    - Detecting Deviation from Design
  - Facilitating Communication to Project Personnel

- **Evaluation of Outcome:**
  - Relating Outcomes
### APPENDIX TABLE 1

RESPONSES BY TEACHERS AND SUPERVISORS TO STATEMENTS ABOUT THE INSTITUTE

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Teachers SD D N A SA</th>
<th>Supervisors SD D N A SA</th>
<th>Total Group SD D N A SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6 4</td>
<td>2 2 9 3 3</td>
<td>1 3 5 2 2</td>
</tr>
<tr>
<td>2</td>
<td>2 8</td>
<td>1 8 4 4</td>
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<td>3</td>
<td>6 4 1</td>
<td>2 2 20 3 2</td>
<td>3 4 24 3 3</td>
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<td>1 8 2</td>
<td>1 2 2 7 22</td>
<td>2 2 35 24</td>
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<td>5</td>
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<td>1 3 3 43 3</td>
<td>1 4 4 50 4</td>
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<td>10 1</td>
<td>1 1 3 3 8 10</td>
<td>1 1 3 48 11</td>
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<td>9 4 0 12</td>
</tr>
<tr>
<td>8</td>
<td>1 5 5</td>
<td>2 5 25 20</td>
<td>2 6 30 25</td>
</tr>
<tr>
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SD = strongly disagree; D = disagree; etc.

E-1
## APPENDIX TABLE 2

### EVALUATIONS BY TEACHERS AND SUPERVISORS
OF SPECIFIC ACTIVITIES BY DAYS

<table>
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<th>Days</th>
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<td>Too</td>
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</table>
1. A numeric value of -2 to +2, pivoting on 0, was given to each response of the thirteen scored pairs of polar adjectives for both pre- and post-tests. (Six scales were inserted only for screening.)

Example: -2 Meaningless --- Meaningful +2
+2 Happy --- Sad -2

2. The numeric values of the thirteen ratings on each sheet were totaled, yielding a composite score in the range of -26 to +26.

3. The grand mean and standard deviations for both the pre- and post-tests were then computed.

<table>
<thead>
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<th>Pre-test</th>
<th>Post-test</th>
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<tr>
<td>$\bar{X} = 9.30$</td>
<td>$\bar{X} = 15.54$</td>
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<tr>
<td>$S_1^2 = 75.99$</td>
<td>$S_1^2 = 24.61$</td>
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<td>$N = 63$</td>
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4. The most proper statistical treatment would have been the correlated t-test; however, since the lack of identification on the tests made it impossible to match papers in the pre- and post-groups, the standard t-test was used.

5. The values in step 3 were substituted in the formula

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{N_1 S_1^2 + N_2 S_2^2}{N_1 + N_2 - 2} \left( \frac{1}{N_1} + \frac{1}{N_2} \right)}}$$

6. The $t$ value was computed to be 23.998 which reached the .001 level of significance, in favor of the post-tests.