This volume is the last of four sets of materials produced for training science supervisors in educational technology. It describes the contents and use of kits designed to help supervisors analyze their jobs in five basic supervisory areas: budget; equipment, supplies, and materials; optimum learning systems; provision of services to science teachers; and reports. The necessity to relate these functions to improved student learning is emphasized. A bibliography is appended. Examples of management systems developed by science supervisors, samples of charts, and a copy of the criterion assessments used as follow-up activities are included as appendices to the report. (AL)
Set IV consists of a Management Kit. The original version was conceived and developed by
Priscilla B. Ranchoff
George H. Ziener

Information and details on science supervisor functions came from
Edward W. Buochke
Mary B. Harbock
Charlotte H. Parnell

Specific structure, packaging and editing were done by
Clarice Leslie
Anna Mae Patterson
George H. Ziener

Manuscript Coordinator: Dorothy B. Lutz
INTRODUCTION

The purpose of this kit is to help you analyze your job as it now exists. As a result of many work sessions, science supervisors developed this manipulative format to articulate and visualize management responsibilities.

Five basic science supervisory areas are included:

- Budget
- Equipment, Supplies, & Materials
- Optimum Learning System
- Provision of Services to Science Teachers
- Reports

These five areas do not include all activities of a science supervisor, but they do represent the most important management functions (goals) of supervisors as determined by supervisors themselves.

Emphatically, each of these functions must result in improved student learning. Otherwise, as often happens with the pressures of daily activity, these functions become ends in themselves. In utilizing this kit these functions may be visually represented as the spokes in a wheel all leading to optimum student learning.
In using this kit, you will prepare flow chart of activities and events (checkpoints) in the five supervisory areas. The materials in this kit are to assist in a visual analysis of your management responsibilities. Included are instructions to make that analysis as effective as possible.

Don't start to play until you can devote at least two uninterrupted hours to the task. You will need a large table and an audio tape recorder with enough tape for 60 minutes of recording.

When you are ready to start, turn the page and follow the instructions carefully.
INSTRUCTIONS FOR UNIT I

This first unit will provide directions and materials for a flow chart of your activities in any one of the five management goals. In addition, the resulting chart will provide a linear time sequence of activities which will form the basis for Unit II activities. If this activity is carried out with others in the same room, it would be better to prepare your own chart before comparing activities with others. The purpose is to prepare a chart of your own activities that will form a basis for future analysis and revision. Before changing, it is necessary to have a starting point: a basis for change.

Note: If you are in a group, spread out; unit I requires room.
Initial Activity

1. Open the Management Kit. Enclosed you will find all of the items noted in the "List of Supplies." (Appendix A)

2. From the five triangles (terminal goals) select the one you want to start with and put it at the far right end of the table. Put the other triangles back in the Management Kit.

3. Pick up the printed squares (checkpoints) and select any of these which you consider relevant to the process of reaching the selected terminal objective.

4. Put the balance of the checkpoints (squares) back into the Management kit.

5. Keep the blank squares out and put them in an easy-to-reach place.

6. Return all additional materials to the Management Kit.
Operation

Spread out all selected checkpoints (squares) on top of the table. Now, arrange them in sequential order leading to your goal (triangle). (e.g., which comes first, mailing the letter or typing it?) You may find it easier to start with the goal at the far right and work backwards. If you find any gaps (missing checkpoints) use the blank squares to make your own. Since this unit involves your own activities do not hesitate to add any checkpoints you feel are necessary.

The arrangement of checkpoints does not have to be linear (except in time) Create any pattern best suited for your situation. For example, the pattern might look something like this:

Here are some guidelines to help you.

1. Each checkpoint has a beginning and an ending.
2. The activities involved in reaching each checkpoint will be considered later.

When all the checkpoints have been arranged in a pattern leading toward the goal, turn the page.
Take the toothpicks out of the Management Kit. These are the activity connectors. Use them to show the activities leading from checkpoint to checkpoint toward the goal.

Here is one example of a finished product.

When your pattern is complete, select the colored pen that matches the colored paper on which the goal is printed. Now give each checkpoint card a position number (see above), moving across the table from left to right. Insert the position number beside the appropriate goal number which is already printed on the checkpoint card. For example, on the checkpoint card "Inventory" (at the right), the position number "8" was written beside the appropriate goal number (number "1" which stands for the goal "Reports").
Take the following items from the Management Kit:

1. The sheet of paper (8.5" X 14") of the same color as the triangle on which the goal is printed.
2. The black pen.
3. The square template.
4. The yellow lined pad.

Using these supplies, copy onto the colored paper the pattern you have developed. Follow these descriptive guidelines:

Description of Checkpoints Networks.

A. Composed of Events (checkpoints) and Activities.

1. The squares represent the Checkpoints.
2. The lines represent the Activities.
   a) Solid line ——— an activity.
   b) Dotted line ——— a dummy activity; no time required from event to event.

For example, any event which really forms a part of something else: replacement parts (events) are necessary to an inventory (event) but once you have listed them they are a part of the inventory. No specific activity is required for this.
B. Ground Rules.

1. An event can occur only once in a network.
   a) Event has a beginning.
   b) Event has an end.
   c) Activity runs from the beginning to the end.

2. There can be no return to an event in the network once it has ended.

Use the template to draw the lines represented by the toothpicks. Be sure to identify each of the squares on your drawing with both its position number and capital letter (at top). Use the yellow lined pad to list the numbered checkpoints in your pattern.

When the drawing is complete, get a tape recorder and explain the chart you have developed. Some find it helpful to have another person listen to the explanation; others prefer to do it in solitude. * Take your choice and, when finished, take a break.

* If you do not have a tape recorder write out the briefing as if it were a memo explaining your chart to another science person.
INSTRUCTIONS FOR UNIT II

After you have copied your flow chart and completed the verbal description, you are ready to assign times to your activities. Solid lines on your chart represent elapsed time.

Each activity requires some amount of time for completion.

The estimated time required is written on the line; e.g., one week equals 1.0 (a five-day week), one day equals 0.2.

One word of caution at this point, your chart need not have a standard time scale:

At this point feel free to change any lines from dotted to solid or vice versa.
Your flow chart now shows the events, activities, and time estimates for one terminal management goal. You have two options at this point: repeat Unit I and II for the other four terminal management goals, or continue to Unit III.

The choice is yours.
INSTRUCTIONS FOR UNIT III

At this point, you have completed at least one of the flow charts leading to a terminal management goal. All of the work up to now is yours and should reflect your real world activities.

In this unit you will have an opportunity to interact with other points of view. The unit may be taken either alone or with other science supervisors.

Remember - your chart represents your real world activities - it is not intended to be a textbook model. As a result, no two charts will have more than a general resemblance. This does not make one chart right and another wrong.

Be prepared to seek new areas of activity and new approaches to similar areas. But also, identify your own strengths.

The result of this interaction activity will be a strengthening of your own flow chart.

If you are working alone on Unit III, skip the steps under group activity and proceed to individual activity.
Group Activity

1. Keep the group small; three people maximum.

2. Pick the one terminal management goal for which everyone in the group has developed a flow chart (Unit I).

3. Spread out the charts and give one another the tape recorded or written briefing prepared to describe the chart (Unit I).

4. Question, defend, and discuss each chart in turn, making notes about some of the major differences in the charts. Take as much time as you wish.

5. Make any changes you wish in your original flow chart. Do these with a different colored pen.

6. You may not continue as a group or separate. In either case, continue with the following steps under individual activity.
Individual Activity

1. Pick one terminal management goal for which you have done a flow chart.

2. From the kit select the brown envelope labeled with the terminal management goal you selected. This envelope contains a conglomerate flow chart incorporating charts from other supervisors.

3. Spread your chart near the chart from the envelope.

4. This chart does not have a prepared audio tape or written briefing similar to yours. Prepare a briefing for it using a tape recorder or write it on the yellow pad.

5. Identify the major differences in arrangement of activities and checkpoints between your chart and the other chart (through comparing charts and briefings).

6. Make any changes you wish in your own original flow chart. You might wish to draw a new flow chart incorporating these changes.

Remember changes must be realistic. The resulting chart is yours, not a theoretical model.
If you have flow charts for the remaining terminal management goals, repeat Unit III using these charts. If not, go back to Units I and II and complete your remaining charts.

When you have completed Units I, II, and III for all five goals, go on to Unit IV.
INSTRUCTIONS FOR UNIT IV

Unit IV may be taken in a small group or individually. The purpose of this unit is to identify critical checkpoint areas. Once these areas have been identified they can be expanded in depth and weak points strengthened. Again, as in all other units, all of the activities must meet your needs. A critical checkpoint is one which is critical to your flow chart. A weak area is where you have identified the need for reinforcement.

1. In Unit I you placed the location of the checkpoint in a flow chart next to the number of the terminal management goal. Go through the checkpoints and sort them into piles according to the number of flow charts in which the checkpoint appears. (You should have six piles, 0 - 5.)

   B

   INVENTORY

   1. 8 2. 6 3. 34
   4. 4 5. 17

2. For the moment, take only the last two piles (e.g., 4 and 5). These checkpoints are of continuing importance since they appear in almost every flow chart.
3. Using the attached sheets as models, break down the checkpoints in detail.

(Example, what goes into the monthly staff meeting? What is involved in organizing a journal club?)

4. Only you can identify areas of weakness in your activity. The attached sheets and the bibliography following are intended as general aids and information. They were developed through using the kit with a number of science supervisors at all levels. Areas that appeared consistently have been emphasized.

From this point on you are on your own. If you have any comments or suggestions, let us know. We would appreciate copies of your revised flow charts and briefings, along with any other material you care to add.
SAMPLE CHECKPOINT BREAKDOWNS

CHECKPOINT CA

1. Presentations to Community Groups.
   1.1 Involve Attendees.
      1.1.1 Pre and Post Test.
      1.1.2 Demonstration - ice example.
      1.1.3 Shocking statements - heat example.
   1.2 Utilization of Media (equipment) desired in school by you in presentation
      1.2.1 Getting loan of equipment from supply house.
   1.3 Student Demonstration.

CHECKPOINT AU

1. Professional Development.
   1.1 Membership in Teacher Organizations, Unions, etc..
   1.2 Encourage staff participation in N.E.A., particularly N.S.T.A..
   1.3 Release time and/or monetary contributions for graduate study.
   1.4 In-service workshops, institutes, conventions, meetings, exhibits.
   1.5 Professional library and resource materials.
SAMPLE CHECKPOINT BREAKDOWNS

CHECKPOINT AC

1. Staff Meetings.
   1.1 To develop plans for science competition.
   1.2 To develop plans for Parents Day.
   1.3 To plan remedial action for weakest areas of student learning.
   1.4 To consider complaints received from parents or PTA.
   1.5 To consider requests from administration.
   1.6 To review public relations feedback.
   1.7 To discuss and evaluate validated learning systems and mediated materials.

CHECKPOINT BO

1. Journal Clubs.
   1.1 To prepare recruitment material.
   1.2 To list the scientific journals to be used.
   1.3 To establish schedule of monthly meetings.
   1.4 To select articles to be reviewed at the first meeting and to assign these to "reviewers".
   1.5 To record or collect written reviews and compile them for memographed "Digest".
   1.6 To distribute "Digest" to all science teachers, to NSTA, and to administration.
SAMPLE CHECKPOINT BREAKDOWNS

CHECKPOINT AQ

1. Conferences and Counseling Sessions With Science Teachers.
   1.1 To discuss individual's strengths and weaknesses.
   1.2 To consider physical and mental health of the individual.
   1.3 To listen carefully to, make note of, and follow-up on suggestions and complaints of each.
   1.4 To assist the teacher in finding best approaches to problem solving.
APPENDIX A
LIST OF SUPPLIES

Five (5) colored triangles.
(Each triangle is printed with one terminal management goal and a number identifying that objective.)

Ninety-One (91) white squares.
(Each square is printed with a checkpoint, numbers 1, 2, 3, 4, 5, goals, and a capital letter.)

Twenty (20) blank white squares.

Five (5) colored felt tip pens.
(Pink, yellow, green, blue, orange.)

One (1) bundle wooden toothpicks.

One (1) square template.

Ten (10) sheets 8½" X 14" paper.
(Blank, two sheets in each color: pink, yellow, green, blue, orange.)

Three (3) blank sheets 20" X 30" newsprint.

One (1) black felt tip pen.

One (1) lined yellow pad.
APPENDIX B

LIST OF "CHECKPOINT" SQUARES

A  CLERICAL SUPPORT
B  INVENTORY
C  DISTRIBUTION TO TEACHERS
D  PROCUREMENT OF BIDS
E  IDENTIFICATION OF UNMET NEEDS
F  REPAIRS AND REPLACEMENTS
G  DETERMINATION OF NEEDS
H  RESEARCH REVIEW
I  BUDGET
J  INVOLVEMENT OF FACULTY
K  COMPARISON OF NEEDS TO BUDGET
L  ASSIGNMENT OF PRIORITIES
M  RECEIVING INSTRUCTIONS
N  REQUESTS FOR ASSISTANCE
O  ADMINISTRATIVE BRIEFING
P  MAINTENANCE
Q  ORDERING
R  DISCUSSION OF BUDGET
S  MEMORANDA & LETTERS
T  COMPETITIVE TEAM IN STATE CASH AWARDS USED FOR EQUIPMENT
U  PERUSING CATALOGS
V  VISITS TO SCIENCE CLASSROOMS
W  TALKING TO SALESemen
X  VISITING OTHER DISTRICTS (OR STATES)
Y  "SHARING" LIMITED EQUIPMENT
Z  CHECKING DELIVERIES
AA VISITING EXHIBITS
AB EVALUATION OF STUDENT LEARNING (QUANTITATIVE & QUALITATIVE)
AC STAFF MEETINGS
AD TESTING & VALIDATION
AE STATISTICAL SUMMARIES
AF TELEPHONE CONFERENCES
AG SUGGESTIONS FROM ADMINISTRATORS
AH BASIC LEARNING PROGRAM DEVELOPMENT
AI REQUESTS FROM ADMINISTRATORS
AJ HUMAN REPAIR & MAINTENANCE
AK DAILY DIARY
AL PROGRESS REPORT
AM EXPLANATION OF WRITTEN REPORTS
AN ORIENTATION OF NEW FACULTY
AO PREPARATION FOR VOCATIONAL TRAINING
AP IN-SERVICE TRAINING
AQ CONFERENCES OR COUNSELING SESSIONS
AR ACTION RESEARCH
AS PLANNING FUTURE PROGRAMS
AT JOB ASSIGNMENTS
AU PROFESSIONAL DEVELOPMENT
AV STAFF EVALUATION
AW ANECDOTAL RECORDS
AX COMMITTEE ASSIGNMENTS
AY JOB VACANCIES
AZ ORAL INTERVIEWS
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<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<td>INTERIM REPORTS</td>
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<tr>
<td>BB</td>
<td>ANNUAL REPORT</td>
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<tr>
<td>BC</td>
<td>CONVENTIONS, INSTITUTES &amp; WORKSHOPS</td>
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<td>BD</td>
<td>TEACHER DESIRES</td>
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<td>BE</td>
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<td>BH</td>
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<td>BI</td>
<td>UNSATISFACTORY OR QUESTIONABLE EVALUATION OF STUDENT LEARNING</td>
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<tr>
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<td>SUGGESTIONS OF FACULTY MEMBERS</td>
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<td>BO</td>
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<td>BQ</td>
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<td>INVOLVEMENT OF PARENTS</td>
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<td>BS</td>
<td>SUGGESTIONS OF STUDENTS</td>
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<tr>
<td>BT</td>
<td>SUGGESTIONS OF PARENTS</td>
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<tr>
<td>BU</td>
<td>DETERMINATION OF WHAT WE WANT STUDENTS TO LEARN</td>
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<td>BV</td>
<td>INVOLVEMENT OF STUDENTS</td>
</tr>
<tr>
<td>BW</td>
<td>NO APPLICATION OF APPROVED &amp; VALIDATED SYSTEM OR MEDIATED MATERIALS</td>
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<tr>
<td>BX</td>
<td>BEST PRACTICES NEWS LETTER</td>
</tr>
<tr>
<td>BY</td>
<td>CONTINUING EDUCATION</td>
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<tr>
<td>BZ</td>
<td>SUGGESTIONS OF COMMUNITY</td>
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</tbody>
</table>
CA  PRESENTATIONS TO COMMUNITY GROUPS
CB  EQUIPMENT, MATERIAL, & SUPPLIES
CC  PERSONNEL REPORTS
CD  STAFF SELECTION
CE  TEACHER AIDES
CF  STAFF COMMUNICATIONS
CG  APPLICATION OF VALIDATED LEARNING SYSTEMS & MEDIATED MATERIALS
CH  REMEDIAL PLANS
CI  EQUIPMENT SPACE
CJ  PROFESSIONAL ASSOCIATIONS & JOURNALS
CK  EQUIPMENT UTILIZATION
CL  PROPOSAL PREPARATION
CM  VALIDATION OF NEW LEARNING MATERIAL
APPENDIX C

BIBLIOGRAPHY

Use of Systems Approach for Management Activity


Provision of Services to Science Teachers (especially related to goal two)


Provision of Services to Science Teachers Continued


Budget and Reports (especially related to goals one and three)


Equipment, Supplies, and Materials (especially related to goal five)


An annual directory, produced by the trade association of audiovisual hardware manufacturers, includes pictures and specifications of the equipment.


The most comprehensive directory of hardware and software manufacturers/producers/distributors. Includes listings of media organizations, periodicals, film libraries, educational radio and television stations.


Lists free films, filmstrips, tapes, transcriptions, and other printed material.


Index to 16mm Educational Films, second edition. New York City: R. R. Bowker Company, 1969. ($38.50)

Contains 35,000 entries for commercially available 16mm films. More than 10,000 entries in the natural and physical sciences.

Index to 8mm Educational Film Loops, first edition. New York City: R. R. Bowker Company, 1969. ($16.00)

Approximately 10,000 entries for commercially available 8mm film loops.

Index to 35mm Educational Filmstrips, second edition. New York City: R. R. Bowker Company, 1969. ($34.00)

Some 25,000 entries.
Equipment, Supplies, and Materials Continued


Some 15,000 entries.

APPENDIX D

MODEL SYSTEMS DEVELOPED BY SCIENCE SUPERVISORS FOR USE IN UNIT III
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<th>Capitol Letter of Management Game</th>
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<td>Begin Report</td>
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<td>2.</td>
<td>Clerical Support</td>
<td>AK</td>
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<td>3.</td>
<td>Daily Diary</td>
<td>AW</td>
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<tr>
<td>4.</td>
<td>Anecdotal Records</td>
<td>BN</td>
</tr>
<tr>
<td>5.</td>
<td>Begin: Staff Contributions</td>
<td>AC</td>
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<tr>
<td>6.</td>
<td>Staff Meetings</td>
<td>BO</td>
</tr>
<tr>
<td>7.</td>
<td>Journal Club Meetings</td>
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<td>8.</td>
<td>Correspondence</td>
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<tr>
<td>9.</td>
<td>Staff &amp; Student Evaluation</td>
<td>AB, AV</td>
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<td>10.</td>
<td>Personnel Reports</td>
<td>CC</td>
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<tr>
<td>11.</td>
<td>Budget</td>
<td>I</td>
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<td>12.</td>
<td>Equipment, Supplies &amp; Materials</td>
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<td>13.</td>
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<td>14.</td>
<td>Suggestions of Community</td>
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<td>15.</td>
<td>End: Staff Contribution</td>
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<td>16.</td>
<td>Statistical Summaries</td>
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<td>17.</td>
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<td>18.</td>
<td>Progress Report</td>
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<td>19.</td>
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<td>20.</td>
<td>End: Reports</td>
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REPORTS

ROUTINE REPORTS
- STATISTICAL SUMMARIES
- PROGRESS REPORTS
  - INTERIM REPORTS
- ANNUAL REPORT
  - PERSONNEL
  - EQUIPMENT, SUPPLIES & MATERIALS
  - BUDGET
  - QUANTITY & QUALITY OF STUDENT LEARNING

SPECIAL REPORTS

REPORTS TO COMMUNITY GROUPS
- STUDENT & STAFF INVOLVEMENT
- SCIENCE NEWSLETTERS
- LIVE ASSESSMENT OF GROUPS

PICTORIAL WORK BREAKDOWN STRUCTURE
for the Management of REPORTS
### MODEL 2: PROVISION OF SERVICES TO SCIENCE TEACHERS

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<th>Model Sequential Order</th>
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</thead>
<tbody>
<tr>
<td>1. Begin: Services to Science Teachers</td>
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<td>AK</td>
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<tr>
<td>2. Daily Diary</td>
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<td>3. Anecdotal Records</td>
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<td>CF</td>
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<tr>
<td>4. Begin: Regular Communication with Staff</td>
<td></td>
<td>AC</td>
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<td>5. Begin: Monthly Staff Meeting</td>
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<td>6. Plan for Science Competition</td>
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<td>7. Parents Day Plans</td>
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<td>BG</td>
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<td>11. Public Relations Feedback</td>
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<td>12. Application of Validated Learning Systems &amp; Mediated Material</td>
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<tr>
<td>13. End: Monthly Staff Meetings</td>
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<td>BO</td>
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<td>14. Begin: Journal Clubs</td>
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<td>15-20. Research Review</td>
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<td>21. End: Regular Communication with Staff</td>
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<td>AJ</td>
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<td>22. Begin: Individual Conferences &amp; Counseling Sessions</td>
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<td>23. Discussion of Individual's Strengths &amp; Weaknesses</td>
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<td>24. Consideration of Physical &amp; Mental Health of Individual</td>
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<td>Memoranda &amp; Letters</td>
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<td>Telephone Conferences</td>
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<tr>
<td>29.</td>
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<tr>
<td>30.</td>
<td>End: Services to Science Teachers</td>
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</tbody>
</table>
PROVISION OF SERVICES TO SCIENCE TEACHERS
SERVICES TO SCIENCE TEACHERS

COUNSELING & GUIDANCE
- TELEPHONE
- FACE-TO-FACE
- CORRESPONDENCE

PROFESSIONAL DEVELOPMENT
- FORMAL EDUCATION
- SCIENCE STAFF MEETINGS
- COMMITTEE ASSIGNMENTS
- IN-SERVICE TRAINING (WORK SHOPS, JOURNAL CLUBS, ETC.)

IN卷VOLMENT IN COMMUNITY
- SABBATICAL LEAVE
- HEALTH LEAVE
- EVALUATION
- ASSIGNMENTS

PERSONNEL PLANNING
- PROFESSIONAL
- NON-PROFESSIONAL
- CLERICAL
- TEACHERS' AIDES

ATTENDANCE AT PROFESSIONAL MEETINGS, ETC.

PICTORIAL WORK BREAKDOWN STRUCTURE
for the Management of PERSONNEL, "SERVICES TO SCIENCE TEACHERS"
MODEL 3: BUDGET

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<th>Model Sequential Order</th>
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<tbody>
<tr>
<td>1.</td>
<td>Begin: Budget</td>
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</tr>
<tr>
<td>2.</td>
<td>Begin: Staff</td>
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</tr>
<tr>
<td>3.</td>
<td>Begin: Regular Staff Available</td>
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</tr>
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<td>4.</td>
<td>Staff on Health Leave</td>
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<td>5.</td>
<td>Staff on Sabbatical Leave</td>
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<td>6.</td>
<td>Total Staff on Leave</td>
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<td>7.</td>
<td>Staff Retirement</td>
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<td>8.</td>
<td>Staff Transfer to Other School</td>
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<tr>
<td>9.</td>
<td>End: Regular Staff Available</td>
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</tr>
<tr>
<td>10.</td>
<td>Applications</td>
<td>BK</td>
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<tr>
<td>11.</td>
<td>Teacher Aides</td>
<td>CD</td>
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<td>12.</td>
<td>Clerical Support</td>
<td>A</td>
</tr>
<tr>
<td>13.</td>
<td>Potential Staff Evaluation</td>
<td>AV</td>
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<td>14.</td>
<td>Possible Job Assignments</td>
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<td>15.</td>
<td>Job Vacancies</td>
<td>AY</td>
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<td>16.</td>
<td>Staff Selection</td>
<td>CE</td>
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<td>18.</td>
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<td>19.</td>
<td>End: EMS</td>
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<td>20.</td>
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<td>22.</td>
<td>Guidance (Conference or Counseling Sessions)</td>
<td>AQ</td>
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<td>23.</td>
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<td>24.</td>
<td>Begin: Continuing Education</td>
<td>BY</td>
</tr>
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<td>25.</td>
<td>Committee Assignments</td>
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<td>26.</td>
<td>Action Research</td>
<td>AR</td>
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<tr>
<td>27.</td>
<td>End: Continuing Education</td>
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<td>28.</td>
<td>In-Service Training</td>
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<td>29.</td>
<td>End: Professional Development</td>
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<tr>
<td>30.</td>
<td>End: Reports</td>
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<td>31.</td>
<td>End: Budgetary Allocations</td>
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<tr>
<td>32.</td>
<td>Optimum Learning System (Management Goal 4)</td>
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PICTORIAL WORK BREAKDOWN STRUCTURE
for the Management of BUDGET
# MODEL 4: OPTIMUM LEARNING SYSTEM

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<th>Capital Letter of Management Game</th>
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</thead>
<tbody>
<tr>
<td>1. Begin: Development of Optimum Learning System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Begin: Evaluation of Present System</td>
<td>AB</td>
<td></td>
</tr>
<tr>
<td>3. Per Cent of College Prep Students into College</td>
<td>BL</td>
<td></td>
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<tr>
<td>4. Per Cent of Students into Technical Training</td>
<td>AO</td>
<td></td>
</tr>
<tr>
<td>5. Per Cent of Students into Work Force</td>
<td>BM</td>
<td></td>
</tr>
<tr>
<td>6. End: Evaluation of Present System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Begin: Evaluation of Staff</td>
<td>AV</td>
<td></td>
</tr>
<tr>
<td>8. Begin: Course Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Begin: Class Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Begin: Analysis of Major Parts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Begin: Course A</td>
<td></td>
<td></td>
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<tr>
<td>12. Begin: Course B</td>
<td></td>
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<td>13. Begin: Course C</td>
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<td>14. Begin: Course D</td>
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<td>15. Begin: Course E</td>
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<tr>
<td>16. Begin: Course F</td>
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<td>17. List of Major Parts</td>
<td></td>
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<tr>
<td>18. Traditional Staff Evaluation</td>
<td>AV</td>
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<tr>
<td>19. Traditional Evaluation of Each Part</td>
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<td>20. Staff Involvement</td>
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<td>Model Sequential Order</td>
<td>Model Checkpoint</td>
<td>Capital Letter of Management Game</td>
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<td>21</td>
<td>Audio Visual Remedial Action</td>
<td>CH</td>
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<td>22.</td>
<td>Criterion Assessment for Each Part</td>
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<td>23.</td>
<td>Application of Criterion Assessment to On-Going Courses</td>
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<td>24.</td>
<td>Comparison of Traditional Evaluation with Criterion Assessment Results</td>
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<td>25.</td>
<td>Equipment, Materials &amp; Supplies</td>
<td>GB</td>
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<tr>
<td>26.</td>
<td>Begin: Preparation of Learning Modules</td>
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<tr>
<td>27.</td>
<td>Validation of Learning Modules</td>
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<td>28.</td>
<td>Mediation</td>
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<td>29.</td>
<td>Validation of Mediated Materials</td>
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<td>30.</td>
<td>Continuous Evaluation</td>
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<td>31.</td>
<td>Introduction of New Learning Modules</td>
<td>CG</td>
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<td>32.</td>
<td>Evaluation &amp; Comparison with Previous Evaluation</td>
<td>CM</td>
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<td>33.</td>
<td>Learning System Development</td>
<td>AH</td>
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<td>34.</td>
<td>Application of New Learning System</td>
<td>BP</td>
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<td>35.</td>
<td>Modification or Improvement of New Learning System</td>
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<td>36.</td>
<td>Optimum Feasible Learning System</td>
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PICTORIAL WORK BREAKDOWN STRUCTURE for the Management of OPTIMUM LEARNING SYSTEM DEVELOPMENT
**MODEL 5: EQUIPMENT, SUPPLIES & MATERIALS**

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<th>Capital Letter of Management Game</th>
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<tr>
<td>1.</td>
<td>Q. &amp; Q. Student Learning</td>
<td>AB</td>
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<tr>
<td>2.</td>
<td>Determination of Needs</td>
<td>G</td>
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<td>3.</td>
<td>Begin: Knowledge of ESM</td>
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<tr>
<td>4.</td>
<td>Visiting Exhibits</td>
<td>AA</td>
</tr>
<tr>
<td>5.</td>
<td>Talking to Salesmen</td>
<td>W</td>
</tr>
<tr>
<td>6.</td>
<td>Visiting Other Districts (or States)</td>
<td>X</td>
</tr>
<tr>
<td>7.</td>
<td>Suggestions of Faculty Members</td>
<td>BN</td>
</tr>
<tr>
<td>8.</td>
<td>Perusing Catalogues</td>
<td>U</td>
</tr>
<tr>
<td>9.</td>
<td>Professional Organizations &amp; Journals</td>
<td>CI</td>
</tr>
<tr>
<td>10.</td>
<td>End: Knowledge of ESM</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Begin: Budgetary Allocations</td>
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<tr>
<td>12.</td>
<td>Available Storage Space</td>
<td>CJ</td>
</tr>
<tr>
<td>13.</td>
<td>Available Utilization Space</td>
<td>CK</td>
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<td>14.</td>
<td>Available Utilities</td>
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<td>15.</td>
<td>End: Budgetary Allocations</td>
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<td>16.</td>
<td>Standards</td>
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<td>17.</td>
<td>Proposals</td>
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<td>18.</td>
<td>Orders</td>
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<td>19.</td>
<td>Deliveries</td>
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<td>Maintenance Schedule</td>
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<td>21.</td>
<td>Replacement Parts</td>
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<td>22.</td>
<td>Inventories</td>
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<td>23.</td>
<td>Distribution &amp; Reporting Procedures</td>
<td>C</td>
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<td>24.</td>
<td>Staff Orientation</td>
<td>M</td>
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</tbody>
</table>
PICTORIAL WORK BREAKDOWN STRUCTURE
for the Management of
EQUIPMENT, SUPPLIES, & MATERIALS

- Needs of Students
  - See Optimum Learning System

- Marketed Equipment, Supplies & Materials
  - Exhibits
  - Catalogs
  - Salesmen
  - Visits to Other Schools
  - Professional Meetings & Journals

- Budget Allocations
  - Available Storage Space
  - Available Utilization Space
  - Facilities Available in Each Area

- Maintenance & Utilization
  - Inventory of Items Delivered
  - Preventive Maintenance Schedule

- Purchasing
  - Preparation of Standards
  - Requests for Proposals or Bids
  - Preparation of Orders
    - Spare Parts
    - Special Supplies

- Distribution
  - Reporting Procedures

- Staff Orientation

- Evaluation of Effectiveness
APPENDIX E

PROJECT MATERIALS

△ TERMINAL GOALS

☐ CHECKPOINTS

TEMPLATE
1 REPORTS

2 Provision of Services to SCIENCE TEACHERS
<table>
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<th>III</th>
<th>IV</th>
<th>V</th>
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<td>ASSIGNMENT OF PRIORITIES</td>
<td>1. 2. 3. 4. 5.</td>
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<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>INVOLVEMENT OF FACULTY</td>
<td>COMPARISON OF NEEDS TO BUDGET</td>
<td>REQUESTS FOR ASSISTANCE</td>
<td>RECEIVING INSTRUCTIONS</td>
<td>ADMINISTRATIVE BRIEFING</td>
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<td>1. 2. 3. 4. 5.</td>
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DISCUSSION OF BUDGET
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VISITS TO SCIENCE CLASSROOMS
1. 2. 3. 4. 5.

MEMORANDA & LETTERS
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TALKING TO SALESMEN
1. 2. 3. 4. 5.

COMPETITIVE TEAM IN STATE CASH AWARDS USED FOR EQUIPMENT
1. 2. 3. 4. 5.

VISITING OTHER DISTRICTS (OR STATES)
1. 2. 3. 4. 5.

ORDERING
1. 2. 3. 4. 5.

PERUSING CATALOGS
1. 2. 3. 4. 5.

VISITS TO OTHER DISTRICTS (OR STATES)
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<td>Y</td>
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<td>CHECKING</td>
<td>VISITING</td>
<td>EVALUATION OF</td>
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<td>EQUIPMENT</td>
<td>DELIVERIES</td>
<td>EXHIBITS</td>
<td>STUDENT LEARNING</td>
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<td>MEETINGS</td>
<td>TESTING &amp; VALIDATION</td>
<td>STATISTICAL SUMMARIES</td>
<td>TELEPHONE CONFERENCES</td>
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</table>
PREPARATION FOR VOCATIONAL TRAINING
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4. 5.

IN-SERVICE TRAINING
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CONFERENCES OR COUNSELING SESSIONS
1. 2. 3.
4. 5.

PLANNING FUTURE PROGRAMS
1. 2. 3.
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JOB ASSIGNMENTS
1. 2. 3.
4. 5.

PROFESSIONAL DEVELOPMENT
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4. 5.

ACTION RESEARCH
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4. 5.

STAFF EVALUATION
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4. 5.
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<th>Section</th>
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<tbody>
<tr>
<td>BE</td>
<td>TEACHER ABILITIES</td>
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<td>GRADUATE STUDIES</td>
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<td>PUBLIC RELATIONS FEEDBACK</td>
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<td>BH</td>
<td>P.T.A. OR PARENT COMPLAINTS</td>
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<td>UNSATISFACTORY OR QUESTIONABLE EVALUATION OF STUDENT LEARNING</td>
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<td>TEACHING RESPONSIBILITIES</td>
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<tr>
<td>BK</td>
<td>APPLICATION EVALUATION</td>
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<tr>
<td>BL</td>
<td>GETTING KIDS INTO COLLEGE</td>
<td>1. 2. 3. 4. 5.</td>
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</tbody>
</table>
**BU**
DETERMINATION OF WHAT WE WANT STUDENTS TO LEARN
1. 2. 3. 4. 5.

**BV**
INVOLVEMENT OF STUDENTS
1. 2. 3. 4. 5.

**BW**
NO APPLICATION OF APPROVED & VALIDATED SYSTEM OR MEDIATED MATERIALS
1. 2. 3. 4. 5.

**BX**
BEST PRACTICES NEWS LETTER
1. 2. 3. 4. 5.

**BY**
CONTINUING EDUCATION
1. 2. 3. 4. 5.

**BZ**
SUGGESTIONS OF COMMUNITY
1. 2. 3. 4. 5.

**CA**
PRESENTATIONS TO COMMUNITY GROUPS
1. 2. 3. 4. 5.

**CB**
EQUIPMENT, MATERIAL, & SUPPLIES
1. 2. 3. 4. 5.
CK EQUIPMENT UTILIZATION
1. 2. 3.
4. 5.

CL PROPOSAL PREPARATION
1. 2. 3.
4. 5.

CM VALIDATION OF NEW LEARNING MATERIAL
1. 2. 3.
4. 5.

20 BLANK SQUARES
SQUARE TEMPLATE
These assessments have been developed as a self evaluative activity for supervisors. The questions are based on the model systems used in Unit III. They are presently designed as a follow-up activity after the kit has been completed. As such, they serve to provide a more open-ended conclusion. However, all supervisors who have gone through the kit during group validations have received them.
2. What clerical support do you have?
   2.1 None.
      2.1.1 Write longhand.
      2.1.2 Do my own typing.
   2.2 Typist available ____ hours per week.
   2.3 Stenographer available ____ hours per week.
   2.4 Other: (dictating machine, etc..) __________________________
                   __________________________

3. Do you keep a daily diary or some other type of daily record? ____.
   If you do, send us a copy of the entries for one week of school. If you don't, start keeping one and send us a
   copy of the entries made during the first week.

4. Do you maintain a file of anecdotal records? ____.
   Send us copies of one or two of them. If you don't, prepare one or two to send us.

6. Do you have regularly scheduled meeting with your science teachers as a group?
   6.1 How many attend?
   6.2 How frequent are the meetings?

   7.1 If "Yes":
      7.1.1 Do science major students attend in addition to the science teachers?
CRITERION ASSESSMENT — REPORTS

7. Continued.

7.1.3 What scientific journals are reviewed?

7.1.4 Are the reviews or excerpts published for distribution?
  7.1.4.1 If "Yes", how many copies? ____.
  7.1.4.2 If "No", do you plan to start?

7.2 Do you have any committees on which you or members of your staff participate?
  7.2.1 If "Yes", please list them:

7.3 Attach pertinent materials relating to these meetings, such as:
  7.3.1 Agenda.
  7.3.2 Minutes.
  7.3.3 Reports.
  7.3.4 Other.

8. Do you routinely communicate with your science teachers by telephone?
  8.1 About how much time each day?
  8.2 About how much time each week?
9. Give us an estimate of the amount of correspondence involved in your job.
   9.1 About ____ letters per week.

11. List type of materials included in your personnel files on science teachers.

12. Prepare a realistic budget for this unit on reports including the following items as a minimum:
   12.1 Clerical hours.
   12.2 Professional hours (you and your staff)
   12.3 Equipment, supplies, & materials:
       12.3.1 Typewriter(s).
       12.3.2 File cabinets.
       12.3.3 Postage.
       12.3.4 Telephone.
       12.3.5 Miscellaneous (Itemize)

15. Reports to Community through various methods.
   15.1 Send us copies of presentations you have made to community groups or prepare a presentation to be made to a community group.
       15.1.1 Describe the method(s) used to involve attendees.
   15.1.2 List equipment (including media) used.
15. Continued.

15.1.3 List and describe student involvement.

15.2 Did you ever use equipment desired for use in school in your presentations?
15.2.1 Did you borrow it from a dealer or a supply house?
15.2.2 Did you borrow it from another school?
15.2.3 If obtained otherwise, describe.

15.3 Do you have a community newsletter?

Presentations to Parents.

15.4 Do you have any planned presentations to parents such as:
15.4.1 Back to school nights?
15.4.2 Election Day visitations?
15.4.3 Others? (List and describe briefly)

15.4.4 Do you have a newsletter to parents?
If you do, attach a copy of the most recent one.

15.4.5 How is student learning reported to the parents?
CRITERION ASSESSMENT - REPORTS

15. Continued.

15.4.5.1 Report Cards.
15.4.5.2 Conferences.
15.4.5.3 Others. (List and describe)

17. How many statistical reports do you submit each school year? _____ (Describe and submit a copy of each)

18. Requests from Administration.

18.1 Do you have special presentation(s) for School Board and Administration? _____ Describe briefly.

18.2 Do your students participate in formal competition such as a state science league?

18.2.1 If they do, list and give standing and points received.

18.2.2 Are there competitive events available in which your students do not participate? _____ If so, please describe.
CRITERION ASSESSMENT - REPORTS

18. Continued.

18.2.3 Are there opportunities for students to participate in scientific programs sponsored by industry, etc.? If so, please describe.

18.3 Working with your staff, identify some unique needs of science which might be used in presentations. Prepare a list of these.

19. What reports are you required to keep by the state, district, county, or school? List these and indicate the approximate amount of time required for the presentation of each.
22. Guidance

22.1 Do you have a file on each of the science teachers under your supervision?

22.1.1 Check any of the following materials you maintain in these files:

- Basic personnel data
- Anecdotal records
- Traditional evaluation
- Teaching assignments
- Community activities
- Education

22.1.2 List other materials you include in these files.

22.2 Do you have regular counseling sessions or conferences with each of your science teachers?

22.2.1 If you do, how are these scheduled? (Describe in 25 words or less)
22.2.2 If you do not, would it be a good idea to try this?

23. Developmental Assignments

23.1 Do you take into consideration developmental opportunities for individual teachers when making assignments or do you select the one you believe can do the best job?

23.2 If you have a list of developmental assignments, send us a copy.

23.3 If you don't have such a list, prepare one.

24. Continuing Education

24.1 Is there some form of education assistance available to you and your science teachers for formal education? Describe.

24.2 Have you used committee assignments as a form of in-service training? Describe.

24.3 Are your science teachers involved in any action research at the present time?
24.4 Do you have a science journal club in operation?

24.4.1 If you do, answer the following questions:

24.4.1.1 Do any students participate?

24.4.1.2 What journals are covered?

24.4.1.3 How often does the club meet?

24.4.1.4 How many copies of the reviews are distributed?

24.4.2 Do you plan to start one?

29. Have you ever discussed the need for guidance and other developmental activities with your science teachers?
2. Budget

2.1 List names of those on regular staff this year in alphabetical order.

2.1.1 Using a green pencil or pen, put an "H" in front of those known to be on health leave, and an "S" in front of those on sabbatical leave.

2.1.2 Using a red pencil or pen, put an "R" in front of those being retired, and a "T" in front of those being transferred out of your area of supervision.

9. List the names of those available this year from last year's staff, in alphabetical order, add the salary of each in a column to the right.

10. Review and assess applicants for positions for the coming year.

13. To the list prepared in 9, add your evaluation of each, using A, B, and C subjectively.

14. List each science class to be taught this year, beginning with the most advanced classes.

14.1 Tentatively assign members of the regular staff to these classes.
CRITERION ASSESSMENT - BUDGET

14. Continued

14.1.1 Consider the use of teacher aides and/or clerical support to make it possible to increase class hours for the more able teacher(s).

14.1.2 Discuss this possibility with the teacher(s) involved.

14.2 Prepare a list of the number of teacher aides and/or clerks desired.

14.2.1 Write a justification for each position, using information obtained in 14.1.

14.2.2 Have the teacher(s) involved comment on and approve the justification(s).

15. Job Vacancies

15.1 Using information obtained in 14, prepare a list of job vacancies indicating salary for each in column to the right.

   Teachers.
   Teacher Aides.
   Clerks.

15.2 Prepare a list of job vacancies for teachers only, if no teacher aides or clerks are employed.

15.3 Compare the budget for 15.1 with the budget for 15.2.

15.4 Write a memorandum to your administrator with your recommendations for staffing next year, using the information from 14.2 and 15.3 as part of your justification.
CRITERION ASSESSMENT - BUDGET

16.1 When job vacancies have been firmly established
(approved by your administration) prepare a list of
staff members selected for next year: teachers,
teacher aides, clerks.

16.1.1 Check availability of those selected.
16.1.2 Complete employment procedures.

17. Make job assignments.

18. Record total budget for personnel salaries.

19. Record total budget for equipment, supplies & materials.

29. Record total budget for professional development.

30. Record total budget for reports.

31. Record total budget for optimum learning system development.

32. Total items 18, 19, 29, 30, and 31 for total budget.
CRITERION ASSESSMENT - OPTIMUM LEARNING SYSTEM

3.1 How many college preparatory students did you have last year?

3.2 How many of the above students were majoring in science?

3.3 Using the following chart, indicate how many of your students took science on the examinations and how many passed or failed?

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>TOTAL</th>
<th>PASSED</th>
<th>FAILED</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Entrance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Not Local)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.4 How many of your students desirous of being admitted to college were accepted?
   a. Successful? ____
   b. Unsuccessful ____

4.1 How many of your senior students aspired to enter technical training institutions?

4.2 How many of your senior students were accepted into technical training institutions?

5.1 How many of your graduates joined the work force after graduation? (Do not include temporary or summer employment)
   a. Total _______
   b. As Technicians _______
   c. Other Type Work _______
5.2 How many of your graduates were not able to find employment?

6.1 How many of your graduates successfully met their objectives?
   a. College Preparatory?
   b. Technical Training
   c. Employment
      Overall Average

8.1 List the names of your science teachers who taught any of the students who were unsuccessful in reaching their post-graduation goals under the following categories:
   a. College Preparatory
   b. Technical Training
   c. Employment

8.2 Prepare a list of all science classes taught under your supervision last year, including the number of students in each class and the name of the teacher.

8.3 Using the information compiled in 8.1, list your science teachers in order of seniority, the classes taught by each one, the number of students in each class, and add the average grade for each class. (The following format should be used)

<table>
<thead>
<tr>
<th>TEACHER</th>
<th>CLASS</th>
<th>NO. OF STUDENTS</th>
<th>AVERAGE GRADE</th>
</tr>
</thead>
</table>

2
19.1 Write a memorandum to be sent to each science teacher under your supervision requesting a student learning analysis for each major subdivision of each course. The subdivisions may be taken from course outlines, chapters or sections of a text, or - if necessary, material covered in each reporting period,

OR

Write an announcement stating that you will request this same information at the next science teacher's staff meeting.

19.2 Using the list prepared in 8.3 as a reference, add the major subdivisions of each class and the average grade for each subdivision. (Note how the grade was obtained in each class.)

20.1 Write a paragraph describing the degree of involvement of the science teachers in this evaluation process.

21.1 Prepare a list of the weakest subdivisions for each course and, working with the teacher(s) involved, plan immediate remedial action for these areas. Outline the plan. (Note: This doesn't mean the development of learning modules)

22.1 Working with the appropriate teacher(s), and using the courses' outline, prepare criterion test items that thoroughly describe the learning desired for students in each instance.

23.1 Apply criterion tests to the on-going classes being taught by traditional methods and record the results in the same format as the one you used in 19.2.
24.1 Prepare a tabular comparison of criterion test type of evaluation with the traditional type of evaluation on major course subdivisions.

26.1 Cooperatively with the teacher(s) begin to prepare learning modules for areas of weakness identified by the results of the criterion tests. Prepare a copy of each learning module developed.

27.1 Try out the learning module(s) on a small group of students, preferably those in need of remedial work, using the criterion test(s) for validation. List the results, item by item, on one of the criterion test forms.

27.2 If there are items in the learning module that are not providing the learning experiences required, modify them until the desired results are attained. Submit a copy of the original module along with the modified one, giving the criterion test results for each.

31.1 Outline your plans for incorporating the validated learning modules into the curriculum, and indicate the sequential order of development of other learning modules leading to a complete learning system in science.

33.1 Prepare a flowchart indicating the major events (circles) and the required activities (arrows) in order to complete a validated learning system for science.
CRITERION ASSESSMENT - OPTIMUM LEARNING SYSTEM

33.2 Over the arrows, estimate the time required for each activity, then compute the estimated date of completion of the system. (Use 0.2 for 1 day - 1.0 for 1 week, etc.)
CRITERION ASSESSMENT - EQUIPMENT, SUPPLIES, & MATERIALS

3.1 Start a 3" X 5" index file of equipment, supplies, & materials that it would be nice to have.

3.1.1 Prepare a memorandum to your science teachers asking them to provide feeder information into this file.

3.1.2 Prepare a sample 3" X 5" card, to be attached to your memorandum, showing the format in which you desire to have the information presented.

3.1.3 Be sure that information from the following activities gets into the file:
   4. Attending exhibits.
   5. Visits from salesmen.
   6. Visits to other schools.
   7. Activities of staff members.
   8. Perusal of catalogs.
   9. Professional organizations and journals.

12. Identify all storage space currently available for storage of equipment, supplies and materials.
   12.1 Describe area.
   12.2 Square footage.

13. Identify all space currently available for utilization of equipment, materials, and supplies.
   13.1 Indicate how this space is being used.
   13.2 Indicate how it might be used to better advantage.
CRITERION ASSESSMENT - EQUIPMENT, SUPPLIES, & MATERIALS

14. Add to 13 the utilities available in each area.

15. Compare the needs (identified in optimum learning system development) with the index file (3.1), and list the most desirable items.
   15.1 Using constraints described in 12, 13, and 14, cut the list down to those items that are feasible.
   15.2 Prepare a recommendation for the purchase of new equipment, supplies and materials with justification for each new major item.
   15.2.1 Indicate degree of staff involvement.
   15.2.2 Indicate method of staff involvement.

16. Prepare standards for new equipment, supplies, & materials. (Submit one to us)

17. Prepare requests to State Department of Education for proposals and/or requests for bids. (Submit one to us)

18. Prepare orders. (Submit copy to us)

19. Write a paragraph or two describing your system for recording such items as:
   19.1 Dates of deliveries.
   19.2 Checking of items delivered.

20. List all major pieces of equipment and your preventive maintenance schedule for each, including your inventory of spare parts.
21. Send us a copy of your inventories.

23. Describe your distribution and reporting procedures.
   23.1 Do students operate the equipment?
   23.2 Is any of the equipment mobile?

24. How do you orient members of your staff to new equipment and its uses?

25. Prepare a total budget for equipment, supplies, & materials referring to items 15, 20, 21, and 23.