DOCUMENT RESUME

ED 197 213 CE 027 897

AUTHOR Rice, Eric: And Others

TITLE Access to Vocational Education. A Planning System for Local Secondary and Post-Secondary Program and Facility Accessibility. Step 3: Generating Strategies.

INSTITUTION Barrier Free Environments, Inc., Raleigh, N.C.: System Sciences, Inc., Chapel Hill, N.C.
SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, D.C.
PUB DATE [80]
CONTRACT 300-78-0592
NOTE 43p.: Photographs and green headings will not reproduce well. For related documents see CE 027 894-901.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Accessibility (for Disabled): *Access to Education: *Educational Planning: Equal Education: Evaluation Methods: *Group Dynamics: Guidelines: *Needs Assessment: Postsecondary Education: Programed Instructional Materials: Secondary Education: Systems Approach: *Vocational Education
IDENTIFIERS Brainstorming: Charrettes: Nominal Group Technique: Synectics

ABSTRACT

This guidebook focuses on the third of five steps included in a planning system for improving local secondary and postsecondary program and facilities accessibility: generating strategies. The guidebook is comprised of four sections, each describing a specific technique for generating strategies. Techniques presented are (1) nominal group technique, (2) brainstorming, (3) synectics, and (4) charrette. Within each section, specific self-instructional activities for group leaders using that technique are given. In addition, examples of especific settings where each technique might be most effective are given. (LRA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

E3

Access to Vocational Education

A Planning System for Local Secondary and Post-Secondary Program and Facility Accessibility

ED197213

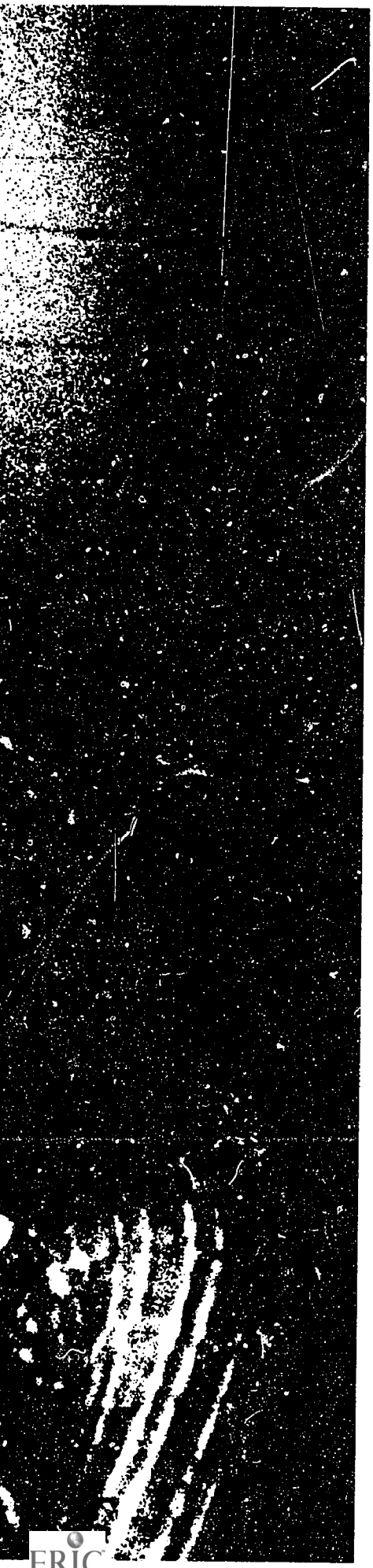
Generating Strategies

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Step 3: Generating Strategies

Suggested Techniques for Removing Barriers



Introduction

The third step in the Planning System uses group decision-making and planning procedures to develop alternative strategies or solutions for removing each major identified barrier. As you will recall, a strategy or solution is a course of action undertaken to meet specified goals or objectives. Group decision-making and planning procedures have been suggested in this step because the use of such procedures increases the number and validity of ideas generated, stimulates support for and commitment to the program design, and helps to satisfy Federal compliance requirements.

How to Use This Booklet

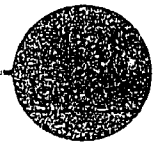
Before opening this booklet generating strategies, you have recorded on the Planning Record the names of the two procedures you believe to be most useful in your setting for generating strategies. In this booklet, you will find self-instructional descriptions of each procedure suggested for use in Step 3. Please turn to the sections corresponding to the procedures you noted on the Planning Record and read the material. Note that the materials assume you will be directing the planning exercise. If you have given responsibility for this step to someone else, this booklet should be studied by that person. After you have completed the reading, you must consider again your choice of procedures and make a final decision about which technique you will use.

Nominal Group Technique

The Nominal Group Technique was developed by Andre Delbecq and his colleagues over a ten-year period; its purpose is to increase the effectiveness of group idea generation for program planning. It has been used successfully in industry, government, health and education organizations. Delbecq's technique minimizes the limitations of "natural" interacting groups which had been found less than adequate for generating ideas and setting priorities.

The Nominal Group Technique (NGT) has been designed specifically to assure equal participation of all persons involved in the planning process so that the dialogue is not dominated by a few assertive individuals. For this reason, NGT is an appropriate technique to use when people with diverse backgrounds and different degrees of responsibility need to make decisions or solve problems. In fact, the NGT has been found helpful to school administrators when they must involve professional staff, support personnel, and parent groups in program planning (Paul, Turnbull and Cruickshank, 1977).

Essentially, the NGT is a structured group meeting in which individuals are encouraged first to generate their own ideas or solutions to problems, without the pressure from other participants toward consensus. Then, through a process of alternate discussion and anonymous voting, a rank-ordered list of problems or solutions is obtained. The technique is applicable to a great variety of tasks in many different settings.



What is one major difference between Nominal Group Technique and other group methods you read about in the Guide?

a. ideas are prioritized or rank-ordered
b. participants do not discuss each other's ideas
c. uniqueness of ideas is emphasized
d. NGT requires the use of a computer
e. it costs absolutely nothing

Answer: a.

STRENGTHS AND LIMITATIONS OF THE NOMINAL GROUP TECHNIQUE

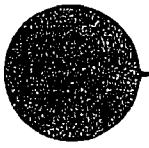
The Nominal Group Technique incorporates some advantages of interacting groups while minimizing most disadvantages. For example, one disadvantage of interacting groups is that natural leaders or verbal individuals dominate discussions, thereby discouraging new and innovative thinking about a topic. Interacting groups expend energy competing for "floor time" and discussion has a tendency to stray from the main topic. As a result, too often time is wasted and the decisions are sometimes made in haste, if made at all.

The structured steps of the NGT eliminate the problem mentioned above. The initial silent period encourages group members to generate ideas as well as to feel responsible for the group's success. The NGT also allows members to share personal concerns and potentially unpopular ideas while avoiding the sometimes "hidden agenda" of interacting groups. The discussion period following the "round robin" guarantees that meanings are clarified and ideas sharpened, as in interacting groups. The research of Delbecq and others indicates that nominal groups produce more creative and acceptable solutions than interacting groups (Dunnette, Campbell and Justad, 1963). When group members are varied in status, roles, views or opinions, NGT procedures reduce the amount of conflict and tension sometimes found in groups with varied backgrounds.

Although the Nominal Group Technique has many advantages, there are several aspects of the process which may limit its use under certain circumstances. First, the structured format demands a single-topic meeting since it is difficult to change topics in the middle of discussion. If after some discussion, it becomes apparent that more than one kind of problem or goal needs attention, then the NGT should not be employed. You should consider and eliminate this problem in your initial selection and phrasing of the questions and objectives of the meeting.

A second potential limitation of NGT is its structured format. Though the structure "protects" members from others' criticism of their ideas, it occasionally makes some participants feel manipulated and uncomfortable, as if the process has precedence over the participants. Genuinely creative ideas and the enriching development of ideas through in-depth group discussion may be sacrificed by the need to move on to the next step in the procedure.

The technique also lacks a certain degree of precision. The ideas offered during the first round of the NGT may not be precisely defined and may appear to overlap, when in fact their sponsors had different aspects of the problem in mind. There is limited opportunity in the procedure for major refinement of ideas. Also, very similar ideas are not always combined before being ranked. Voting without a thorough sorting of ideas into appropriate categories is erroneous and results in repetition in the final list.



The Nominal Group Technique produces a rank-ordered list of possible solutions to the presented problem. Is this a strength or limitation of the technique? Why? _____

_____

_____

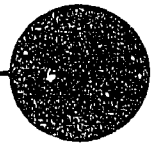
Answer:
Strength, because not all techniques result in a listing of priorities

WHEN SHOULD THE NGT BE USED?

The Nominal Group Technique is adaptable to a wide variety of settings and is well within the capacities of most potential participants. This method is appropriate when problem definition or idea-generating is desired. With it the following goals can be accomplished: (1) to identify various elements of a problem; (2) to identify elements of a solution; and (3) to establish a priority listing of these elements. It is particularly helpful when judgments of many individuals must be combined and a group decision made; it is very useful when a ranking of options is desired.

RESOURCES AND MATERIALS REQUIRED

The physical requirements for holding an NGT meeting are minimal. A room large enough to accommodate all participants comfortably at desks or at a table with chairs is necessary. All participants need paper, pens or pencils and several 3" x 5" notecards for recording ideas and voting. The person leading or directing the group needs a flip chart on an easel or a chalkboard which the entire group can see for recording ideas and votes. The leader also needs a felt-tip pen and a roll of masking tape for recording and displaying responses. These supplies are not difficult to obtain in most educational settings.



In which of the following situations would the Nominal Group Technique be an appropriate technique for an administrator to use? Please select more than one answer if more than one situation applies.

a. negotiating with a teachers' union
b. planning for competency testing
c. selecting textbooks for the next year
d. fixing the air conditioning system
e. choosing the site of an open classroom unit
f. eliminating bus routes to conserve gas

Answer: b, c, e.

How much would it cost to use the NGT to generate solutions for removing barriers in your educational unit? In general, the dollar expenditure would be minimal, because the materials are inexpensive and little time is required of the participants or the administrator as compared with other available methods. Good planning and careful definition of the group's objectives by the administrator or group leader will contribute to lower costs for this technique.

Let's see how much a nominal group session would cost your educational unit. Assuming the room, paper and pens were available free, estimate the following:

Participants	Cost of ½ day work (at most)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Leader	**Cost of 1½ days work**
_____	_____

Total Cost _____

At this point, does the Nominal Group Technique still seem promising for your own school system? If "yes" continue; if "no", try another technique.

HOW TO CONDUCT A NOMINAL GROUP TECHNIQUE SESSION

The Nominal Group Technique is a structured group meeting which follows a prescribed sequence of problem-solving steps. It is designed for a small group of seven to nine members whose goal is to generate a variety of quality ideas about a topic.* A larger group must be divided into smaller groups of this size. To complete all NGT steps, each group meets continuously for a maximum of three hours.

Participants should include both service providers and consumers. In the present context, this would include vocational educators, special education instructors, vocational rehabilitation counselors, program administrators and handicapped persons. It is important to include persons with different perspectives in order to obtain a wide spectrum of solutions and to provide realistic feedback on the ideas offered. You should consider using your Local Planning Committee.

Prior to scheduling the nominal group meeting you, as group leader, must clarify the objectives for the meeting through consultation with other administrators (and with group leaders if more than one group is involved). Specifically, the NGT question and alternative forms of the question should be developed to which participants can respond. Questions should encourage the expression of individual perspectives on the issue.

Sample questions for generating solutions to major identified barriers for the Tigris and Euphrates examples found in the Guide might include:

Tigris:
How would you suggest that the vocational program increase the willingness of the vocational staff, through improving teaching skills and teacher attitude, to serve special needs students in regular vocational education classrooms?

Euphrates:
What means would be used to eliminate unnecessary pre-requisites and thereby increase enrollment of handicapped students in vocational programming?

*The technique can be used effectively with up to 12 people once the group leader is familiar with the technique.

Here are a few quick questions about the NGT procedures so far. Fill in the blanks.

a. Who can be a member of an NGT group? _____

_____

b. What is the optimal number of people in an NGT group? _____

c. What is the first task which the administrators or group leader must perform?

_____

_____

Answer:
a. providers and consumers of services;
b. 7-9; c. phrase the question.

You, as group leader, should prepare an opening statement to begin the meeting which conveys a sense of the importance of the task, clarifies each member's role in the meeting, and identifies the mission of the group. The question to be answered or problem to be solved should then be posed and fully explained by the leader including necessary background about identified barriers and priorities. No questions from participants are entertained at this time because (1) your explanation should be sufficiently clear and (2) such questions might inhibit group members' initial responses. After explaining the mission and question, you as group leader initiate group activity according to the following schedule.

Activity 1: Silent Generation of Ideas in Writing. After you have presented background information and have read the nominal question aloud to the group, you should instruct the group to write their ideas in brief phrases or statements on the provided worksheets. Ask the group to work silently and independently. As leader of the group, you are a working participant and should also write down your ideas silently and independently. You may answer clarifying questions but avoid making any statement that might direct the group or focus their attention unduly on a particular idea or area.

The silent generation of ideas in writing should take approximately five minutes; it should not exceed ten minutes. Generally, five minutes is adequate time for generating a large number of useful and different ideas.

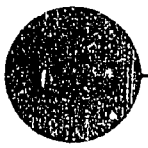
You can perform your role as group leader more effectively by being sure that you: (1) have presented the question in writing and have displayed it in full view of the group, (2) resist clarifying non-process related questions which might direct or impede the group, (3) serve as a model of good group behavior by writing in silence, and (4) sanction individuals who disrupt the silent independent activity.

Activity 2: Round-Robin Recording of Ideas. After participants have completed the silent generation of ideas, the next NGT activity is to record the ideas of the group members on a flip chart visible to the entire group. In this step, go around the table asking for one idea from one member at a time. Write each idea on the flip chart as it is suggested; proceed to ask for another idea from the next group member in turn. Your task during this step in the process is simply to record all of the ideas offered by group members on the flip chart which is visibly displayed in front of the group. During the idea recording process, members should not discuss or defend their ideas. Time will be provided later for discussion and clarification of the items that are generated.

This step in the process provides for equal participation among group members in the presentation of ideas, focuses thinking on the problem, helps to separate ideas from personalities, and provides a written record of the group's thinking. The written list is an important early group reward.

As the group leader, it is important for you to describe the procedures for this step clearly, to solicit ideas from the group members in brief words or phrases in a round-robin fashion, to communicate to the group that variations on a theme are desirable, and to record on the flip chart the suggested ideas as quickly as possible. Be sure to sanction any type of disruptive behavior that may occur during this step. An example of a disruptive behavior would be an individual trying to discuss ideas rather than simply list them; other disruptive behaviors would include arguing with ideas as they are presented, asking the leader to rule on duplications or engaging in side conversations.

Remember the goal of this step is a rapid, accurate list of ideas in brief words or phrases, recorded in writing on a flip chart in front of the entire group. This list will become the guide for further discussion; it provides a clear picture of the group's thinking and is the group's product. Redundancy is permissible at this step in the procedure, though in practice members often simply do not suggest ideas which someone has already essentially presented.



What is a round-robin procedure and why is it useful in NGT?

Answer:
Round-robin means each person gives 1 idea at a time and everyone has a turn before you go around again. This method insures equal participation by all group members.

Activity 3: Serial Discussion for Clarification. After all ideas have been recorded, the next NGT activity is to discuss each of the ideas listed by the group. Serial discussion means addressing each idea listed on the flip chart in order and allowing a short period of time for the discussion of that idea. As the leader of the group, you will point to item #1, read it aloud, and ask the group if there are any questions, clarifications or statements of agreement and/or disagreement which members would like to make about that item. Allow a brief period of time for discussion, if there is any; after discussion, address attention to item #2, then to item #3, and so on. It is important to remember that the major objective of the discussion is to clarify, not to win arguments. Clarification will help other members understand the meaning of the brief words or phrases on the chart. Clarification is not restricted, however. It may include discussion of the logic or analysis behind an item as well as the relative importance placed on the item.

During this step, lobbying, aggressive interaction or disruptive argumentation should *not* be allowed to occur. The purpose of serial discussion is to enhance clarification and to minimize influence based on verbal prominence or status. The group leader should pace the discussion by not allowing discussion to focus unduly on any particular idea or to degenerate into argument.

If there are differences of opinion on a particular item, the leader should allow both points of view to be aired before shifting group attention to a discussion of the next item. Differences of opinion will be accurately recorded in the voting procedure, a later activity in the Nominal Group Technique.

The leader must attempt to balance discussion across all items, making sure that no item suffers from inadequate clarification due to time constraints. Some items may not need substantial clarification. Still, the leader should ask each member of the group if they have a clarifying comment or a question. Make sure

that each person has an opportunity to comment on every item.

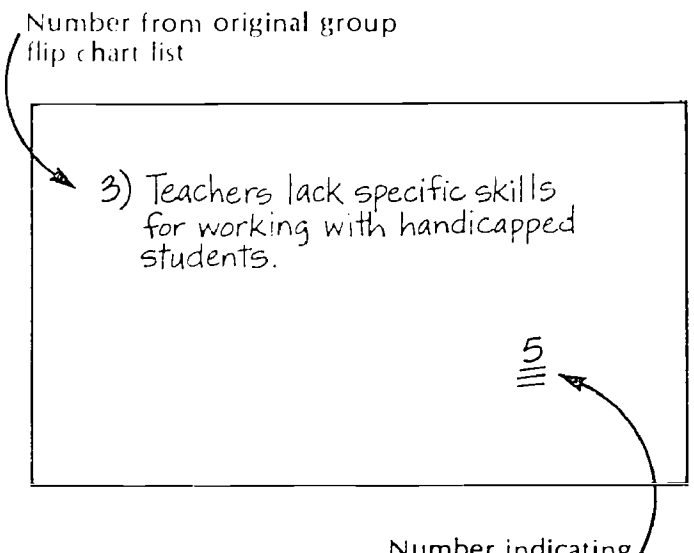
Individual members should not be required to clarify their own items. The leader should instruct the group members not to ask individuals to explain items unless the individual chooses to do so. Although most individuals will volunteer to clarify their own items, it should be established that clarification is a group task and not necessarily the responsibility of the person who suggested the item.

Activity 4: Preliminary Voting on the Priority Strategies. After completing the list of strategies, the next NGT activity is the preliminary voting on suggested strategies. The average nominal group process meeting will result in more than 12 items being suggested by each group during the idea generation phase. Through discussion and clarification, group members will come to understand the meanings of the items, the logic behind them and arguments for and against the importance of each. The next task is to determine the relative importance of individual items through a combination of individual judgments. In order to make this determination and to increase judgmental accuracy, you will have group members make individual judgments and express these judgments mathematically. Each member of the group should have in front of them five 3" x 5" index cards. Ask group members to select the five most important items from the entire list of solutions or strategies on the flip chart. Members should write each of the five items on a separate 3" x 5" card, including item number and statement.

The voting process is uncomplicated. After each group member has selected five solutions and written each on a separate card, ask group members to choose the card on which the item they consider to be most important is written. Instruct members to write the number "5" in the lower righthand corner of the card and underline that number three times. Have group members turn the card they numbered over. Next instruct them to look at the remaining four cards. Of the remaining four cards, have the group members select the card on which the least important item is written, write the number "1" in the lower righthand corner and underline that number three times. After turning that card over, have the group choose the most important item listed on the remaining three cards, rank this item "4" and underline the number three times. Then, select the least important item of the remaining two cards, rank this item "2" and underline it. Instruct the group to write "3" on the last card and underline the number. The figure below, "Index Card Indicating Voting Process", illustrates a sample index card.

The group should be given a short time to reexamine their rankings before passing the cards to the leader. After collecting the cards the leader may shuffle them to preserve anonymity and insure that no individual's voting pattern can be identified. However, voting can be public, particularly if revoting is not contemplated. You should then make a balance sheet on the flip chart by numbering the lefthand side of the sheet in accordance with the number of items from the round-robin listing. Ask one member of the group to read each item number and the rank number from the collected stack of voting cards. With one group member reading and the leader recording, the preliminary vote is tallied as shown in the figure entitled, "Sample Tally Sheet for Recording Rankings and Calculating Priority Items."

INDEX CARD INDICATING VOTING PROCESS



SAMPLE TALLY SHEET FOR RECORDING RANKINGS AND CALCULATING PRIORITY ITEMS

Item Number*	Rank	Times Ranked	Sum of Ranks	No. of Ranks × Sum of Ranks	Priority
1	3,2,2,2,1	5	10	50	6
2	4,5,5,5	4	19	76	1
3	5,5,5,3	4	18	72	2
4	2,1,3,4,2	5	12	60	4
5	5,4,4,3	4	16	64	3
6	4,4,3,4	4	15	60	4
7	3,1,1,2	4	7	28	7

*List as many items as necessary.

At this point, the Nominal Group Technique process can be concluded.

Activities 5 and 6: Discussions of Preliminary Vote and Final Voting. However, in instances where increased judgemental accuracy is desired or where the output of several small groups must be combined, two additional activities should be used. These are: (1) discussion of the preliminary vote and (2) revoting. In situations where you are working with only one group, discussion of the preliminary vote (Activity 5) and final voting (Activity 6) are conducted similar to Activities 3 and 4 described earlier. In this instance, you should help the group determine inconsistent voting patterns and provide an opportunity to discuss items which are perceived as receiving too many or too few votes. In *Activity 5, Discussion of Preliminary Vote,* you should define the discussion tasks as clarification rather than social pressure to get members of the group to change their minds. The goal of clarification also serves to insure that the discussion remains brief so as not to distort perceptions of items which are not discussed. Please follow the discussion procedures of Activity 3.

How is the final list of alternatives determined?

a. selected by the leader
b. thought up privately by group members
c. through debate
d. secret ballot
e. by outside team of evaluators

Answer: d.

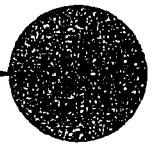
In *Activity 6, Final Voting,* individual judgments will be combined into a group decision. The final vote determines the outcome of the meeting, provides a sense of closure and accomplishment, and documents the group's judgment. Voting follows the procedures followed in Activity 4.

Activities 5 and 6 should also be used when you have had to split your faculty or school system personnel into several small groups in order to conduct the nominal group process. For example, if your meeting included 22 people divided into two groups of 8 and one group of 6 individuals, then at the end of Activity 4 you would have five priority strategies listed for each group, or three sets of statements.

Integration of the lists produced by these three groups can be accomplished through procedures similar to those identified in Activities 5 and 6 above. After concluding Activity 4, bring the members of the different groups together and compile the ranked output of the three groups into a single list of priority strategies.

Following the compilation of the list, proceed with serial discussion of each item in order to clarify each item on the compiled list. While conducting this serial discussion, duplicate items can be eliminated and/or regrouped as appropriate, thereby reducing the size of the overall list. In addition, discussions about each item as well as information about the preliminary voting permit the entire group to consider the importance of each item compared to the others. The group leader must insure that each item is discussed sufficiently to encompass all points of view; however, excessive time should not be devoted to any single item.

After clarification and discussion of the items, the membership should be instructed to vote on the entire list following the procedure outlined in Activity 4, as described earlier. As you will recall, this procedure called for each group member to select the five most important strategies from the list of items, and to write each of those strategies on a single 3" x 5" card. The items on the cards are then ranked with the most important item receiving a rank of 5 and the least important item receiving a rank of 1. The cards are collected and the votes are tallied on a tally sheet as depicted in the figure entitled, "Sample Tally Sheet." Calculations of the priority item can be accomplished through multiplication of the number of times the item was ranked by the sum of the ranks. The items with the highest overall scores are the most important items.



In the last discussion period of the NGT, what do group members talk about?

a. time and place of next meeting
b. whether the NGT was worthwhile
c. the first rank-ordering
d. their initial ideas
e. whether to vote by secret ballot or not
f. who should be the group leader

Answer: c.

At the end of Activity 4 or Activity 6, you will have completed the Nominal Group Technique process. At this point, the most important strategies or solutions will have been identified and there will be consensus among involved personnel about the solutions. Note that implementation of the NGT takes at least two to three hours. Because the activities of the process are structured, a break for participants is possible. After the session is ended, the leader should summarize the procedures and results in a written report to distribute to all participants.

ADDITIONAL RESOURCES

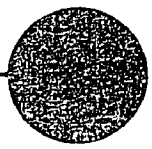
The Nominal Group Technique is well-publicized, and numerous resources, people and written materials, are available to assist you with the method. Delbecq and Van de Ven, who first developed the technique, have published many books and articles which are available through libraries and bookstores. One in particular, *Group Techniques for Program Planning*, Scott, Foresman and Co., 1975, is recommended for your use. For reports of research comparing this technique with other group methods having the same purpose, you might check the subject indices of *Psychological Abstracts* and *Current Index to Journals in Education* for current articles of interest.

Brainstorming

Brainstorming was introduced in 1949 by advertising executive Alex Osborn as a method for a group of people to generate ideas in quantity. It was a very popular technique during the 1950's, primarily with advertising firms and other businesses. It has become less popular in recent years as newer group methods, retaining many of the strengths of Brainstorming and few of its limitations, have been developed. Brainstorming often has been incorporated as one step in these newer procedures.

When Brainstorming was introduced most decisions represented a consensus or compromise arrived at in "committee meetings" through "group discussions." Often decisions were made just to end the meeting. Meetings usually were dominated by the person in authority who called the meeting, and the decision made usually reflected the leader's opinion. Few participants were satisfied with their contribution; few supervisors would use the outputs of such groups because they were sometimes inconclusive or even erroneous. Brainstorming represented a real improvement in group management, given the context in which it was introduced.

The administrator can expect to receive from a Brainstorming session a list of workable ideas numbering five or six times the number of people in the group. Participants in the session will feel that they have made a positive contribution to the solution of the problem. According to proponents of Brainstorming, the enhancement of creative potential resulting from participation in the session should be carried over to other aspects of job performance.



Brainstorming can result in:

a. achieving a consensus
b. developing creative solutions in depth
c. generating many clever ideas
d. breaking a problem up into more manageable elements
e. arranging problem-solving steps in logical order

Answer: c.

STRENGTHS AND LIMITATIONS OF BRAINSTORMING

Brainstorming groups have been described as fun, interesting and stimulating by those involved in them (Clark, 1969). The operational rules of "suspended judgment" and "building on the ideas of others" encourage all members to participate. Hopefully, the power hierarchy in which group members are involved outside the Brainstorming group does not operate during the process, allowing the resources of a diverse group of people to be tapped.

The list of ideas that a Brainstorming group produces has been found to be superior to the nebulous reports issued by the unstructured committees which the technique replaced (Taylor, Berry & Block, 1958). Most often a large number of ideas or solutions are generated, of which eight or ten will be totally appropriate; if the followup ranking of ideas by group members is carried out, you, as administrator, will have a recommendation of the best course of action.

How do you think the output of a Brainstorming group would compare with the output of other kinds of groups?

Quantity		Quality
_____	Very high	_____
_____	Somewhat higher	_____
_____	About same	_____
_____	Somewhat lower	_____
_____	Very low	_____

Answer:
Very high on quantity and somewhat lower on quality. Quality can be improved by follow up ranking of suggested solutions.

In comparison studies of Brainstorming, newer techniques have been found to be better for group decision-making. Groups using the Nominal Group Technique or the Delphi technique produced more ideas of better quality than Brainstorming groups (Dunette, Campbell & Justad, 1963; Bouchard and Hane, 1970). In operation Brainstorming groups have been observed to be convergent, settling on one line of thought rather than stimulating many lines of thought (Madsen & Finger, 1978). Opinion leaders or persons in authority have been found to dominate the group process despite the rules prohibiting such influence. In other studies, Brainstorming was found to be better than other techniques with simple and familiar problems but worse with more complex, unfamiliar problems; it *was* the best technique in at least one study when totally novel solutions were required.

Some observations about the research done on Brainstorming are in order given some of the critical comments about the technique. In many of these studies researchers have failed to run the group in its classical fashion, with followup prioritizing and summary by the facilitator. Most studies have been done in college social psychology laboratories rather than in real organizations. Experiment participants lack familiarity with the problem or with other participants, so perhaps

Brainstorming in this context failed to liberate participants from the organizational structure found in business contexts and failed to generate enough anxiety to prompt great creativity. It would be important to compare Brainstorming with other techniques in a real-life setting.

Though Brainstorming has usually proven less productive than newer group problem-solving methods, it has been found uniformly superior to traditional, unstructured group discussion in arriving at decisions.

Nelson, Petelle, and Monroe (1974) suggest giving the Brainstorming group a list of cue words to increase the quality of ideas. Conducting the group as originally outlined by Osborn with after-the-meeting rankings of alternatives by participants will also improve the output (and reputation) of Brainstorming.

List at least three ways in which other group techniques can be more effective than Brainstorming.

1. _____

_____

2. _____

_____

3. _____

_____

Answer:
Any of the following: better quality of ideas, ideas are not all from one train of thought, not dominated by one person, better at more complicated problems, yield a more complex solution.

WHEN SHOULD BRAINSTORMING BE USED?

Brainstorming is unlimited in its applications, according to its proponents; however, 20 years of experimentation with the technique suggest a more restricted range. The method has proven most useful in generating numerous novel solutions to problems with which group members have had some first-hand experience. Brainstorming has been found to be equal or superior to the other methods of problem solving with respect to simple problems but more effective with complex problems (Bayless, 1967). Its capacity to stimulate very novel and unique ideas related to familiar topics is most useful in advertising, the area in which it was originally developed. Brainstorming might also be considered when time and cost limitations rule out other techniques as possibilities.

Think of the problem(s) you face in making vocational education accessible to handicapped students. Is it simple or complex? Does it involve many people or few?

For what kind of problem does brainstorming produce good solutions?

a. complicated, intricate
b. those involving transportation and advertising
c. logical, sequential
d. novel or unusual
e. simple, familiar

Should you consider this technique further?

Answer: e.

RESOURCES AND MATERIALS REQUIRED

The effort needed to conduct a Brainstorming group is slight considering the benefits accrued. The first requirement is a group leader, probably you, as administrator, who will accept responsibility for describing the problem, convening the group, conducting the session, and compiling the output in some readable form. The leader should have some experience in Brainstorming groups, preferably in leading them. If you are familiar with the technique, the instructions which follow should sufficiently train you to conduct Brainstorming.

The meeting itself will use one-half hour of each participant's time plus a small amount of time—not more than one-half hour—for followup procedures. One session will require up to four hours of secretarial time to record the session, type and circulate the final list, and tabulate and circulate the rank orderings of strategies or solutions.

To estimate the costs of operating a Brainstorming group, fill in the following information:

Who in your system would you ask to be in a Brainstorming group?

_____

_____

Would you need to pay any of these people extra for ½ hour to 1 hour of their time?

NO____; YES ____; if YES, how much? $_____

Who would you designate as leader or coordinator of the group:

_____

How much would 2 days of a leader's time cost? (Include your own rate if you will serve as group leader) $_____

How much will 4 hours of secretarial time cost? $_____

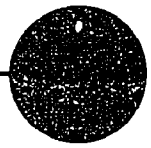
Total Cost: $_____

In addition to the people costs, Brainstorming requires several physical supplies. The group should have a comfortable, spacious room with tables and chairs; such accommodations might be rented if not available. Paper and pencils for participants are optional but necessary in ample quantity for the leader and secretary of the group. The possibility of obtaining 40 or so good remedies, for a chronic organizational problem for example, might well be worth the investment. Paper and reproduction facilities to circulate the list for rank ordering of solutions after the session is an important though nominal cost that must be considered.

HOW TO CONDUCT A BRAINSTORMING GROUP SESSION

A Brainstorming group consists of 8 to 15 people called together by a leader to generate ideas about a specific topic or problem; 12 people is considered ideal. Your Local Planning Committee is recommended. Most often, members of the group are all employed by the same company or by the same public agency. Characteristics of the leader and of the group will be discussed in turn.

Though no special leadership skills, characteristics, or training are required, according to developers of Brainstorming, the role of the leader in Brainstorming is critical although unobtrusive. The leader must select the members of the group, making sure members are of equal or nearly equal status in the organization, because having a person with authority over other members in a Brainstorming group has been found to restrict its productivity. The leader must issue written invitations to the meeting in which the problem or topic to be considered is stated completely and concisely. In this manner, participants can begin to think about the problem before they convene. The leader must also arrange for time, space and supplies for the meeting.



Write down two things the group leader must do before the group convenes.

1. _____

2. _____

Now, in checking your answers in the text above, fill in the third activity of the leader. You omitted it from your list because yo were asked to list only two activities.

3. _____

Answer:
Select group members; invite members; arrange for time, space and supplies.

The people who make up the Brainstorming group may be from any part of the organization that has the problem, provided they have some basic understanding of the topic being considered. Group membership should be from the same general level in the organization, middle ma ent, for example. If the group has functioned as a group prior to Brainstorming and/or if the leader is skilled, equal status of group members becomes much less important. The group is given a time limit for their session (25 minutes maximum) and a secretary or tape recorder to collect, verbatim, all the ideas which are generated.

Why does a Brainstorming group need a secretary?

Answer:
To free members to participate fully in the generation of ideas.

For groups undertaking Brainstorming for the first time, a warm-up exercise, practicing the procedures on a very simple problem, is highly recommended. For example, you might have participants suggest as many ways as possible to get a student in a wheelchair into the woodworking shop; encourage novel solutions such as a crane to lift the wheelchair to window height and replacement of the window with a chute. Suggestions should not be bound by historical or traditional constraints. A practice Brainstorming session should be limited to five minutes.

Brainstorming groups are almost unique in the strict observation of the following rules. You, as leader of the group, are responsible for making sure the rules are observed by the membership. Violation of the rules, especially the first one, is indicated by the leader ringing a bell.

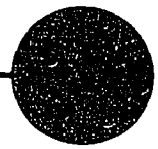
1 No criticism of anyone's ideas, actual or implied, is permitted.
2 "Free-wheeling" (spinning wilder and wilder ideas) is welcomed and encouraged by the leader.
3 The group should seek to generate as many ideas as possible in the time allowed. The leader frequently urges members to "come up with just 10 more ideas."
4 Combinations of other ideas (if no denigration is intended) and improvement or refinements of other ideas are sought and encouraged.

If, as is probable with the issues addressed by the Planning System, the problem to be considered by the group is very broad, it must be defined or refined before beginning the session. You might consider as a preliminary step, having all participants write down what the topic means; you might then discuss with the group several aspects of the problem—such as who, what, when, where, why, and how. Several more specific problems should emerge. The group can be divided in order to consider each of the specific problems or it may focus on one topic at a time as an entire group.

The first "sitting" of the group should not exceed 25 minutes; therefore, it might be advisable to break up the group before beginning the Brainstorming session if further definition, as described above, is undertaken. When two sessions are needed, one for clarifying issues and one for Brainstorming, group members should be urged to switch chairs between sessions, a practice which facilitates idea production by indicating a change in activity and thought patterns.

To begin the session, the leader restates the problem to be brainstormed, indicates the time limit to be imposed (20-25 minutes is recommended), and asks for suggestions about how the problem may be resolved. The leader's role after beginning the session is to keep the ideas coming and to ring a bell when criticism is offered. Group members spontaneously and voluntarily offer their ideas. If they wish to build upon another's idea, they should be provided "clickers" for signaling their desire to break into the discussion. The desire to build on another's idea can be indicated by hand signals as well.

If silence occurs, you as leader may choose to wait until someone suggests another idea, to throw out an idea of your own, or to have the secretary read out every third item on the list. You may also ask, "What if you added something to the problem or took something away from it? How would that affect possible solutions?" You also might ask who-what-when-where-why-how else is involved in this problem or solution? If these methods fail, you should consider the session terminated, even if the time has not expired. A group which produced 15 ideas or less should be considered unsuccessful; you should initiate another practice session and try the Brainstorming procedure again.

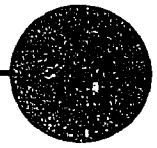


Which of the following does the leader of a Brainstorming group do during a session?

a. volunteers ideas
b. writes down the solutions mentioned
c. tries to keep suggestions coming
d. restates the problem
e. facilitates the accurate communication of ideas

Answer:
c and d.

Once the Brainstorming session is completed, you as group leader have several responsibilities. You should thank each participant for their contribution, either in person or in writing. Because Brainstorming only *starts* the creative process in individuals, it is often fruitful to contact group members within 24 hours after the session to elicit additional ideas. You also are responsible for compiling a list of non-redundant ideas and circulating it to participants to have them categorize the ideas as being usable, questionable or unusable. A final summary and list of suggestions is then composed and can be circulated to participants to have them rank usuable solutions. Omission of these concluding steps has contributed to the discrepancy in productivity between this procedure and others with the same purposes.



How do the products of Brainstorming groups with and without these follow-up procedures differ? _____

Answer:
The follow-up procedures eliminate redundancies, elicit additional ideas, and provide average rankings of all ideas by all participants.

ADDITIONAL RESOURCES

Further details of the Brainstorming procedure may be found in several references. Clark has furnished an extensive description supported by personal testimony in *Brainstorming, The Dynamic Way to Create Successful Ideas* (1969). Napier (1973) and Souder and Ziegler (1977) offer fairly adequate descriptions, though many significant details are o Important studies comparing Brainstorming with other group techniques were reported by Dunnette, Campbell and Justad (1963), Taylor, Berry and Block (1958), Nelson, Petelle and Monroe (1974), and Madsen and Finger (1978).

Synectics

W. J. J. Gordon, developing a new technique of group problem-solving around 1950, named it *synectics*, a Greek derivation meaning to draw together diverse elements. He had in mind two aspects of his technique when he gave it this name—participation of persons with diverse backgrounds and the drawing together of different but analogous ideas from the group's "free association" process of problem-solving. Gordon believed that the process of invention was not the "divine inspiration" of a genius but a process of speculation that could be made observable by means of tape recording of the mental "mutterings" of an individual or group. Gordon, Prince and other of their associates developed some specific procedures to stimulate and support a group in its efforts to solve a problem via "group free association" or muttering, using analogy and metaphor. Though introduced as a tool for the business community, Prince and others have successfully used it in other settings such as government to solve "people" rather than "product" problems.

Gordon developed the Synectics technique after experiencing psycho-analysis and realizing the tremendous creative potential residing in every person's unconscious which might be unlocked by the verbal means of analogy and simile which depend for their richness on unconscious associations of meaning. Finding a method to tap this potential became his goal. His early efforts at group free-association were recorded and the tapes carefully analyzed for characteristic response patterns and avenues by which novel solutions were reached. This led to the formulation of certain principles of operation and methods of directing group meetings.

When considering this approach, you as group leader and administrator may expect some completely novel solutions to old problems or a completely new invention or suggestion which may, at first, appear improbable. You should expect to use, temporarily, experts outside the organization to advise the Synectics group working on a behavioral problem. Unfortunately, the technique is expensive. When used in other settings, several products of Synectics have been (1) vapor-proof closures for astronauts' suits, (2) organic paint, and (3) a flexible budgeting strategy for the Department of Defense.

The word synectics is a Greek derivation which means:

_____

_____

Answer:
drawing together diverse elements

A Synectics group in operation might be best described by an observer as:

a. "verbal basketball" with two teams competing to score the most points
b. a shouting match in which each person tries to utter the most creative ideas to solve a problem
c. group free association
d. selection of the best method of problem-solving from among several alternatives by means of group voting and discussion

Answer:
c

STRENGTHS AND LIMITATIONS OF THE SYNECTICS METHOD

Synectics represents an improvement over the formal or traditional methods of decision-making and idea development in terms of the quality and usefulness of the output. It may be that diverse group membership leads to more general, more original solutions. At least theoretically, the Synectics leader does more directly to free the individual's unconscious than in any other method, which should lead to more creative solutions.

Synectics has other advantages. In this process the knowledge of experts within and outside the organization is effectively and efficiently used. Synectics includes small-group testing of working models of the chosen solution. It is also flexible—it has demonstrated potential to solve people problems as well as those which represent a combination of technical and people problems, such as providing accessible programming in vocational education for handicapped students. Though not as well-known as some of the other suggested techniques, it has become more available through Prince's recent reformulation of Gordon's theory and his specification of procedures.

One problem with Synectics is the qualifications of group members. Members need to be able to make generalizations, to recognize similarities and differences, to transfer knowledge or principles from one situation to another. In addition, they have to feel self-confident and be well-adjusted enough to function comfortably in the Synectics group. Given these requirements, some individuals will not function well as Synectics members, which limits the generalizability of the method.

The leader is also a crucial figure in the Synectics group. Probably more is required of this person than of the leader of Brainstorming or the Nominal Group Technique because the leader must simultaneously (1) keep the group focused and moving, (2) keep the atmosphere unthreatening for all participants, and (3) be able to recognize ideas of quality and develop them. Obviously, the leader must have some experience and training which can add to the expense of implementation.

Compared to other techniques available for identifying ways of overcoming barriers, Synectics is

a. more creative and more expensive
b. more creative and less expensive
c. a little less creative and a lot less expensive
d. less creative and much more expensive
e. more creative and equally expensive

Answer: a

In order to function effectively in a Synectics group an individual must be able to

a. get along well with fellow participants
b. understand what the leader of the group is trying to get them to do
c. use analogy, simile and metaphor
d. think fast
e. build models and such using the appropriate tools and machinery

Answer: c

WHEN SHOULD SYNECTICS BE USED?

Though first applied to industrial product development. Synectics has been used successfully in government and in middle management personnel areas. Even critics acknowledge the success of Synectics groups for improving old products and inventing new ones. Though best known for the impressive inventions to which it has given rise, Synectics is potentially adaptable and useful in any situation requiring "making the familiar strange" (or vice versa) with the following precaution: success of the group depends on the skill and training of the leader in eliciting and using the metaphorical and analogous materials generated by group members.

RESOURCES AND MATERIALS REQUIRED

Gordon contracts with businesses for a four-week initial session and then weekly sessions each month for a year for training a Synectics group, which would be very costly. Prince does not mention specifics about training but offers sufficient guidance for persons experienced with other group methods to undertake Synectics on their own. Training courses for leaders are offered at Synectics, Inc. and SUNY-Buffalo in the Training for Creativity program.

How much a Synectics group would cost to operate would depend on local resources. The time of five to seven staff persons participating in the sessions is one expense. Consultants, to estimate the cost of possible solutions or strategies, also might have to be paid. If none of the existing administrative staff have sufficient experience leading groups to assume that role, then training a staff member or hiring a leader just for this task would add to the expense. The skills Synectics participants develop could be expected to generalize to other problems they encounter on the job, however, so part of the costs would be recovered. If the requirements for physical facilities could not be met locally, these would have to be rented at additional expense.

The cost of a Synectics group for identifying alternatives for removing barriers would depend on a number of factors which vary from educational unit to educational unit. First of all, how complicated is the task of providing vocational education for the handicapped for the district? How many students are involved and how spread out are they geographically? To what extent have the existing programs already been changed in order to accommodate special needs students? In general, the more complex the presenting problems, the more appropriate the Synectics method would be for addressing those problems.

A second factor to weigh when considering the Synectics technique is the personnel available in the local system who might participate in the group process. Is there someone who could assume or be trained to assume the leadership role in Synectics? Are there potential participants who can recognize similarities and differences between situations and can transfer learning—apply principles of a solution to a natural science problem to the problem of overcoming barriers, for example? If adequate personnel are present, then Synectics group techniques would provide the best information of all the methods available.

Mark the two most important characteristics of the local school system to evaluate when considering the Synectics technique.

a. the amount of money available
b. verbal and abstract abilities of participants
c. how long the technique takes to generate results
d. cannot say; it depends on the local school system
e. how complicated the local problem is

Answers: b and e.

The five- to seven-member Synectics group would need a room equipped with table and chairs in which to meet for one to three days consecutively or weekly after an initial session. Coffee, tea, or soda should be available. Meals are sometimes provided in order to preserve the concentration of the group. A tape recorder or secretary to create a transcript of the group process is also needed for participants' reference and to stimulate further thinking as the group progresses.

Are the above facilities available in your school?

Yes _____ No _____

How much would Synectics cost in terms of personnel?

	Member Name	Per Day Salary	x	# Days =	
1	_____	_____		_____	_____
2	_____	_____		_____	_____
3	_____	_____		_____	_____
4	_____	_____		_____	_____
5	_____	_____		_____	_____
Leader	_____	_____		_____	_____

Total Personnel Cost: $_____

HOW TO CONDUCT A SYNECTICS SESSION

The method originally developed by Gordon was to deal with highly specific and well-defined problems of invention in industry. The description which follows is based on Prince's derivation of Gordon's model, which is more applicable to groups solving human problems. A Synectics group operates like no other and needs careful explanation, so the mechanisms of the process are described and examples are suggested. The role of the leader is crucial and is discussed next. Some comments on the functions of group participants complete this section.

Perhaps it would be best to try first to describe the process of group "free association" characteristic of Synectics groups. Gordon described it as a process of "making the familiar strange" and "making the familiar familiar." When faced with strangeness, a person tends to force it into a familiar, acceptable pattern. Usually analysis, generalization, and analogy are involved. Unfortuantely, people often get bogged down in analysis. Making the familiar strange is to distort, invest, or transpose the ordinary ways of looking at things. Both these principles are incorporated in the procedures outlined by Prince.

Which of the following responses to the problem of transporting handicapped students would involve the process Gordon had in mind?

a. moving the program rather than the students
b. reorganizing bus routes
c. plotting on a map the locations of all handicapped students
d. a water vacuum cleaner
e. identifying public buildings of recent construction

Answer: All of them.

All members of the group are asked to use the "spectrum policy," the habit of looking at the positive aspects in the "spectrum" of characteristics of a particular idea. Because of natural competiveness and a tendency to criticize the negative facets of the problem arrest attention immediately, and criticism springs to the lips of participants. Often new ideas are ill-formed. By first citing the positive characteristics of the idea, asking for clarifications and only then pointing out the flaws in the idea, a participant practices the spectrum policy.

To give you some practice at using the spectrum policy, consider this idea for getting orthopedically handicapped students into second-story shop class: "We would construct an exterior elevator and knock a hole in the shop wall." Positive characteristics of this idea:

Prince has organized Gordon's methods of analogy into a sequence of activities which he advocates to aid in problem-solving. He comments that these steps do not need to be followed rigidly and that they are characteristic of all successful problem-solving, individual or group. Think of what you might say as a group member considering the problems of "students who cannot read simple directions" as you read through the steps.

Activity 1: Formulation of the Problem as Given (PAG). The leader must present the problem as given. *Analysis,* an explanation of PAG by an outside expert or a well-informed group member, the first step in problem-solving, should provide enough detail so the group has a common understanding of the problem. *Purging* involves the airing of immediate solutions which pop into mind which should be voiced quickly less they inhibit the participants' ability to think of anything else.

Please consider the following problem. How can a regular vocational education training program in printing be made accessible to handicapped students, particularly those with learning disabilities who cannot read? The particular problems have to do with operating controls and reading requirements.

Your immediate solution to the problem suggested:

Activity 2: Goals as Understood. Next, each member of the group expresses their *Goals as Understood* (GAU) which the leader writes up for all to see. This formal collection of many personal ways of understanding the problem permits each member to make the problem their own, spurs each member to see the problem in several lights, and often helps to break a complex problem into manageable parts (particularly characteristic of people problems). The leader, with consultation from outside experts if necessary, then chooses one GAU on which to focus the group's attention.

Your GAU for the suggested problem:

Other GAUs: (1) do away with the need to read in the program, (2) develop a technique which would help non-readers to cope with similar situations, (3) provide a mechnical device to "translate" for the student.

Activity 3: Mental Excursion and Leader's Question. First, the leader asks members to put the problems out of their minds and to concentrate on doing what is asked. Next, the leader begins the metaphorical search for solutions by requiring analogical or metaphorical responses by encouraging the mind of each member to venture into areas seemingly irrelevant to the problem. By focusing *away* from the problem the leader hopes to increase the probability of viewing the problem in unhabitual ways, once the group comes back to it with these new responses. This technique is termed the Leader's Question (LQ). Some of the procedures a leader can use in developing the LQ include the following types of analogy.

The first type of analogy is an *Example* (direct analogy), a direct comparison of parallel facts or technology. *Direct analogy* means looking for similar problems or circumstances in other contexts and noting solutions already devised; mechanical devices are often analogous to people problems (Prince, 1970). For example, asking for an example of a closure one might get "door" and "mental block." "Mental block" is more likely to produce more solutions because it is stranger, there is more logical distance between the subject and the example, and it is more difficult to make the example seem relevant.

Now let's try out this method on the problem of making vocational education accessible to handicapped students. Write a *direct analogy* of your own in the space provided after the example given.

Direct analogy. Ex.: The problems generated by enrolling handicapped students in vocational education are similar to mainstreaming them into regular academic classes. In mainstreamed academic classes, it has proven useful to individualize instruction so that students work independently more often; this technique frees the teacher to work with more students individually and spend more time where needed.... Another example:

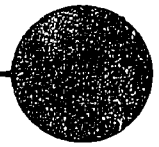
A second type of analogy is termed *Book Title;* this symbolic analogy is a two-word phrase that captures a paradox involved in a particular thing or set of feelings. *Symbolic analogy* is an esthetically satisfying though technologically inaccurate image which incorporates a compressed description of the functions or elements of the problem. An example would be the Indian rope trick as a symbol to solve the problems of a collapsible lifting device.

Most often *Book Title* is used to generalize about the particular problem and to suggest another example. For example, book titles given for "dependable intermittency" from the world of nature were "Old Faithful, changing seasons, tides and rain."

Now try your hand at *symbolic analogy* with the same problem.

Ex.: What we really need is a suit, like an astronaut's suit, which is equipped with all the auxiliary devices that a student might need in order to function in our classes. The teacher would have to turn on the appropriate aides to sight or hearing. The suit would also protect the students from the equipment. Your example:

A third type of analogy is *Personal Analogy;* this logic requires participants to put themselves into the problem situation as a central element (even as an inanimate object) and to imagine what it feels like to be there, assume the role of a handicapped student as a starting point, for example. Personal analogy is developed by the leader's asking such questions as, "You are a tuning fork. How do you feel?" The leader looks for empathetic involvement responses—attributions of human feelings to inanimate objects. Personal analogy goes beyond role-playing because it relies on highly individual responses and sometimes prompts a Book Title. It also increases group trust—after identifying with inanimate objects in particular and sharing that experience, members tend to trust each other with other material.



Ready to think of a *personal analogy?*
Ex.: I am a machine in the printing shop which a handicapped student wants to use. I wish I could talk so I could tell the student how to operate me. Your idea:

_____

_____

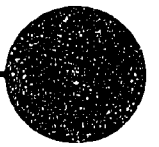
_____

_____

_____

_____

The fourth type of analogy, *Force Fit (FF),* is the most difficult step in Synectics because the metaphorical material produced must then be forced to be useful. The leader may choose one of several approaches to the problem. The leader may try to stimulate a "happening" by quoting the goal as understood and asking how a particular piece of metaphorical material might be used to solve the problem. Group members then suggest various solutions which utilize the metaphorical ideas. If the group is unsuccessful in generating a solution the leader can go back to the analysis in Activity 1 and make some loose connections of their own. A third technique for FF involves (1) having the leader write down the elements of the problem and the metaphorical material for a more conscious consideration of them, (2) making a dynamic connection ("What is the moral of this story?"), (3) encouraging wild speculation ("If you had all the money you needed, how would you solve this problem?"), and (4) finding some feasible way to make the idea work. The fourth method of *Force Fit* is the "get-fired" technique: the leader urges participants to come up with solutions so outrageously violating common sense that they would immediately be fired for suggesting them.



Here are some solutions offered to the non-reader problem: picture instructions, remedial reading programs, tape cassettes with head phones. What is your solution? _____

_____

How could some of these ideas be combined? _____

_____

_____

_____

Activity 4: Viewpoint. The fourth activity in Synectics, *Viewpoint* (VP), is a potential solution and is developed if *Force Fit* is successful. VP's are not final solutions until they have been made to work subsequent to the Synectics group meeting. In dealing with people problems, *viewpoints* usually contain old and new elements and no single *viewpoint* suffices; several VP's set out together may constitute a new policy for dealing with a particular problem.

Here is a transcript of a Synectics group working on the problem of product technology taken from a case study. The specific problem was how to create a roof covering that would change colors from winter to summer.

A: What in nature changes color?

B: A weasel—white in winter, brown in summer: camouflage.

C: Yes, but a weasel has to lose his white hair in summer so that the brown hair can grow in. . .Can't be ripping off roots twice a year.

E: Not only that. It's not voluntary and the weasel only changes color twice a year. . .I think our roof should change color with the heat of the sun. . .There are hot days in the spring and fall. . .and cold ones too.

B: Okay. How about a chameleon?

D: That is a better example because he can change back and forth without losing any skin or hair. He doesn't lose anything.

E: How does the chameleon do it?

A: . . .a flounder must do it the same way.

E: Do what?

A: Hell! A flounder turns white if he lies on white sand and then he turns dark if he lands on black sand... mud.

D: By God, you're right! I've seen it happen! But how does he do it?

B: Chromatophores. I'm not sure whether it's voluntary or nonvoluntary . . .Wait a minute; it's a little of each.

D: How does he do it? I still don't plug in.

B: Do you want an essay?

E: Sure, fire away, professor.

B: Well, I'll give you an essay, I think. In a flounder the color changes from dark to light and light to dark. . . I shouldn't say "color" because although a bit of brown and yellow comes out, the flounder doesn't have any blue or red in his register. . . Anyway, this changing is partly voluntary and partly nonvoluntary where a reflex action automatically adapts to the surrounding conditions. This is how the switching works: in the deepest layer of the cutis are black-pigmented chromatophores. When these are pushed toward the epidermal surface the flounder is covered with black spots so that he looks black. . .like an impressionistic painting where a whole bunch of little dabs of paint give the appearance of total covering. Only when you get up close to a Seurat can you see the little atomistic dabs. When the black pigment withdraws to the bottom of the chromatophores then the flounder appears light colored. . .Do you all want to hear about the Malpighian cell layer and the guanine? Nothing would give me greater pleasure than to. . .

C: You know, I've got a hell of an idea. Let's flip the flounder analogy over on to the roof problem. . .Let's say we make up a roofing material that's black, except buried in the black stuff are little white plastic balls. When the sun comes out and the roof gets hot the little white balls expand according to Boyle's law. They pop through the black roofing vehicle. Now the roof is white, impressionistically white, that is, a' la Seurat. Just like the flounder, only with reverse English. It is the black pigmented part of the chromatophores that come to the surface of the flounder's skin? Okay. In our roof it will be the white pigmented plastic balls that come to the surface when the roof gets hot. There are many ways to think about this. . .(Prince, 1970.)

General Suggestions for the Leader. The leader of a Synectics group was first described by Gordon as a highly energetic, optimistic, risk-taking individual with a background in diverse fields who operated on equal terms with a group of similar professionals as an unobtrusive organizer of the group's activities. In Prince's view, the group leader must take a more forceful role and follow a prescribed sequence of activities in implementing the technique. A good Synectics leader observes the following rules, according to Prince.

1. *Never go into competition with group members.* Leaders should not contribute their own ideas until all members of the group have expressed theirs. Leaders should restate each idea expressed and build on or strengthen it if they can. Moderators

can present their ideas during the steps called *Purge* (early possible solutions) and *Force Fit* (pressing for ideas later in the meeting). Generally, leaders always give the ideas of other group members precedence over their own.

2. *Be a 200 percent listener to your group members.* During the session, through interactions with each member, leaders prove that they understand and approve each idea by restating and supporting it. This posture gives satisfaction to each member, creates an atmosphere in which it is safe to express ideas, and serves as a model for group members in their dealing with each other.

3. *Do not permit anyone to be put on the defensive.* Leaders do this by seeking out the value in any comment made. They never require justification of metaphorical contributions. They accept both points of view in the event of a disagreement, ask for positive rather than negative reactions, keep ideas alive by stressing generality, and never pin down an individual (instead leaders pose the question to the whole group).

4. *Keep the "energy level" high.* Leaders of a Synectics group stay alert and interested; they select as examples and analogies those that are of personal interest. They move the meeting along at a fast pace and are humorous or (at times) over-demanding in order to accomplish this goal.

5. *Use every member of the group.* To get every member to contribute it is often necessary for the leaders to look to the quiet persons and support warmly their comments while looking away from and only briefly restating the contributions of members who dominate the group.

6. *Do not manipulate the group.* Leaders must be careful not to have a preconceived goal for the group in mind which they foster with leading questions or chosen comments. Keeping track of the discussion on large sheets of newsprint often prevents this from happening.

7. *Keep in mind that leadership will be rotated.* Rotating leadership engenders more cooperation because members think ahead to when they will be leader. Their interest is better maintained for the same reason.

As can be gathered from the description of the leader's role, many needed characteristics are fostered by other leadership training programs such as NTL. Synectics leaders should be sensitive to the feelings of others and be able to recognize subtle communication, to judge which ideas to pursue and which to discard, to protect all members egos. Persons who have already developed these qualities may more easily lead Synectics groups.

One final comment about group participants is in order. From the above discussion it should be clear that group participants need to have some knowledge of the problem they are trying to solve in order to contribute to the process. They also need to be "flexible" in their thinking—not rigidly bound to the concrete, able to reverse the order of events if necessary. This ability to "make the familiar strange" is present to some degree in everyone, and may be elicited in appropriate circumstances. Such creativity is not associated with academic or job standing, it should be remembered when choosing group members.

ADDITIONAL RESOURCES

The most complete description of the operational mechanisms of Synectics is found in the original writing of Gordon (1956, 1961). His account of how the method evolved and grew is quite interesting. More concise information and exact recommendations are provided by Prince in his book, *The Practice of Creativity* (1970). For comparison of Synectics with other problem-solving techniques see Haefele (1962) and Souder and Ziegler (1977).

Charrette

Another method of group planning or decision-making which has been derived from other techniques is the "Charrette," a French word meaning an "intensive group planning effort in an open forum format to achieve creative solutions" (Holt, 1974). The technique is used most often by architects to elicit community reactions or input when designing public buildings. When a need exists for those directly and indirectly involved in a program to contribute to the planning process by defining what they want their experience in that program to be like, the Charrette provides a suitable mode of addressing that need. The Charrette can be used by planners of vocational education for handicapped students where problems of physical space or allocations exist. It can be adapted for several other barriers as well.

The Charrette is similar to the Community Forum Technique, one of the procedures suggested to identify barriers; distinctions must be drawn between the two techniques. The Charrette requires that all factions within the community be represented at the meeting, and a structured set of prescribed steps are followed. The Charrette also relies more heavily on outside experts for information and group management than other techniques. Though most often used by architects, Charrettes have been used by social planners and educators to develop new educational facilities in Brooklyn, Baltimore, and Boston (Holt, 1974), multi-purpose structures which met a wide range of community needs, such as year-round recreation.

In these materials the Charrette is an activity that brings community members and experts together for a limited time period to suggest solutions to a specific problem. The conditions optimal for a Charrette include (1) a problem which has not been solved but has been specified, (2) members of the community who will participate, (3) experts at group management techniques and at the technical problems which may be involved, and (4) a commitment to use the plans and recommendations the Charrette produces. A school planning Charrette involves the consumers, teachers, parents, and children who will be affected by the programs which result. Often the most valuable outcome of the process is the sense of commitment and cohesiveness that develops in the struggle of planning together (Sanoff and Barbour, 1974).

In what planning context was the Charrette originally developed?

a. vocational education
b. government
c. special education
d. business
e. architecture
f. medicine
g. environmental science

Answer: e.

How does the Charrette differ from other techniques?

a. much more expensive to run
b. can be led by almost anyone
c. relies more heavily on outside experts
d. participants must be well-informed about the problems
e. requires more input from consumers

Answer: c and e.

The time allocated for a Charrette is:

a. unlimited
b. allocated in blocks
c. spent in small group meetings
d. limited
e. spread over weeks and months

Answer: d.

STRENGTHS AND LIMITATIONS OF CHARRETTE

Most advantages of the Charrette are obvious. Consumers who participate develop positive feelings of involvement in the activity, can offer a variety of ideas, and are disposed to support the program long after the Charrette is concluded. The process also permits input from more than just the Local Planning Committee. The scope of the problem which a Charrette can consider is quite broad and may be very complex. More can be accomplished in a Charrette than in some other types of group planning since the problem is broken down and each small group considers some unique problem. The flexible time and cost range are other attractive aspects of the Charrette.

There are several limitations to the use of the Charrette. Its success hinges on the sensitivity and skill of the Charrette manager. Usually a trained manager must be hired and there is no guarantee that a particular human relations expert will be able to meet the needs of a particular group, despite past successes. A second potential limitation can occur if the Local Planning Committee fails to develop sufficiently clear goals or fails to relate the solutions suggested in the initial Charrette meeting to those goals; the small group will waste time identifying its issue and produce relatively little useful information. A third caution about Charrettes is that relatively little research has been done on the effectiveness of the technique. Architects who have employed the method advocate its use in building design, but virtually no systematic research has been reported on the Charrette when used to address human social problems.

Name two advantages of Charrettes.

1. _____

_____

2. _____

_____

Answer:
Positive experience for participants and commitment to plan adapted; unlimited complexity of problem; many sub-problems considered; time and therefore costs involved are adjustable.

List two problems one might encounter in holding a Charrette:

1. _____

_____

2. _____

_____

Answer:
Poor leadership, failure to set out goals clearly; failure to communicate goals to participants; little substantive research reported on the method.

WHEN SHOULD CHARRETTE BE USED?

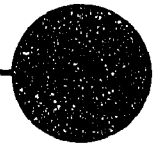
Under what conditions has the Charrette technique been found effective? In general, Charrettes have been reported to be successful in planning programs, services and buildings which serve a wide public audience whose opinions, reactions and suggestions are important in shaping the project to fit local needs. Charrettes have been used to plan school *buildings* but not school *programs*. To employ this method in planning vocational programs for handicapped students would be an application unique but not far removed from previous successful Charrettes. It would be particularly useful when broad community representation is desired or when the problems are well defined and a broad range of possible solutions are required.

RESOURCES AND MATERIALS REQUIRED

Charrettes actualiy require relatively little expenditure of resources or materials. A room large enough to assemble all participants (who can number in the hundreds) is necessary for two to five sessions. Smaller work areas for committee meetings are desirable in order to control noise; if the large room can be divided comfortably, all the better. Each individual needs paper and pencil for note-taking, and large charts that everyone can see are also handy. The availability of tables and chairs is assumed. Since Charrettes sometimes are run for several days consecutively, some arrangements for meals for participants or at least coffee, tea, or juice and snacks from vending machines must also be considered.

How much would a Charrette cost? Riddick (1971) estimates the price to run from a few hundred to a few thousand dollars, depending on (1) how long it would run, (2) whether full-time people had to be employed to organize it, and (3) how much could be donated by local groups in terms of man hours, facilities, or supplies. The major expense, representing over half the budget, is the cost of outside professional consultants. However, free consultants can sometimes be obtained from Federal or state governments or from universities. The possibility of Federal and state financial aid for the whole Charrette is worth investigating.

Additional costs of operating a Charrette can vary widely, depending on the size of the planning effort and the number of program consumers whose interests need to be represented at the Charrette. Charrette participants use lots of paper and many pencils as they work. The use of a mimeograph and a secretary to compile up-to-the-minute reports of all activities of every committee is helpful, especially with really large Charrettes involving hundreds of people. Obviously, physical space can also be an expense, though space, paper and duplicating facilities are easier for school systems to provide than for other kinds of organizations.



What is the largest single expense of operating a Charrette?

Answer:
side professional consultants.

Remember that the chief goal of Charrettes is to gather ideas, suggestions, and other input from consumer groups, those people who will be using the facility or program. List some consumer groups in your school system that would be affected or served by making vocational programs accessible to the handicapped.

Groups	Number to Invite
_____	_____
_____	_____
_____	_____
_____	_____

Total_____

Now you only need to invite to the Charrette a few representatives of each group. Fill in the number which you think you would want to include from each group. Do you have physical facilities available in your school system to accommodate this many people?

HOW TO CONDUCT A CHARRETTE

Several activities must occur before the Charrette itself is conducted. The Local Planning Committee must meet several times to insure that the data developed through other steps in the Planning System are immediately useful in the Charrette; the leader also must arrange facilities. Advance publicity about the event through the local media and even a house-to-house announcement of the upcoming event is another function of the Local Planning Committee. You also must secure the services of outside experts to assist with the Charrette or become familiar with the technique in order to conduct the procedure; likewise, transportation and child care must be arranged in advance. What food, if any, is to be served during the Charrette is still another problem to be handled in advance.

When Charrettes have been used to plan public transportation or buildings, the steering committee which plans for the Charrette is usually composed of interested citizens. Who would you choose for such a committee to plan a Charrette for accessing vocational programs for the handicapped?

a. handicapped students
b. parents of handicapped students
c. teachers
d. administrators
e. professional planners
f. Local Planning Committee

Answer: f or at least b.

How long should a Charrette be? One day would be sufficient if the problem is well-defined and limited in scope, a marketing problem in industry, for example (Riddick, 1971). Four or five days is recommended when the problem is complex and the group involved is homogeneous in terms of goals and background, teachers or social workers perhaps. For a real community Charrette to which people from all over a town were invited eight to ten days would not be too long. The problem under present consideration, vocational education for the handicapped, would fall somewhere between the second and third types, since it would be important to include students, teachers, parents and community agency representatives (vocational rehabilitation, small businessmen perhaps) in the planning.

Of the following, which temporal arrangement would be best for a Charrette on the problem under consideration?

a. a long weekend
b. a week of evening meetings
c. two long weekends
d. one evening a week for a month
e. eight consecutive days

Answer: Depends on local program, probably a or b.

The Charrette includes a variety of activities, usually arranged in the following manner.

Activity 1: Introduction. The Charrette begins with some sensitizing activity for all participants, a role-play or film or personal testimony which all participants view together. The purpose of the activity is to present, even accentuate, conflicting interests and views about the issue or problem, to get participants involved, to precipitate reactions. A well chosen and carried out "sensitizing" will do this.

Activity 2: Discussion Session. Whatever form the sensitizing activity takes, it is followed by a period of "open discussion" at which time conflicting views often are aired. The outside human relations expert is important in managing this exchange in order that discussion not reach an impasse and that all participants finish with a positive attitude toward the objectives of the Charrette. The discussion may last for several hours or even days and is terminated when the manager feels that all points of view have been expressed. This activity, like the Introduction, is undertaken by all participants assembled in one large group.

The sensitizing activity is designed to make participants

a. conscious of other points of view
b. mad
c. sad
d. righteously indignant
e. more sensitive

Answer: a.

Why is a consultant necessary to the second stage in the procedure, the discussion period? _____

Answer: To prevent deadlocks and to keep participants comfortable.

Activity 3: Identification of Goals. The next stage of the Charrette usually involves specific identification of problems or goals which the group will address. Again in a large group assembly, various specific problems, goals and objectives are listed on cards or large posters. Members elaborate, combine, specify, or further divide the problems, goals and objectives until most are satisfied with the list. The problems or objectives may or may not be rank ordered before being given to smaller groups of participants to "brainstorm" ways of dealing with the issue.

Activity 4: Small Group Work. The major work of the Charrette is accomplished in these small group meetings. Each group has a secretary to keep track of the ideas expressed. The smaller groups make periodic written reports to the larger assembled group, usually at the beginning of each day if the Charrette is run over several days. Each day is begun with a brief large group meeting to make announcements and report on progress. Each smaller group has an outside "adviser" to act as facilitator of the group or a technical adviser if the problem is a technical one.

What method do the small groups use in addressing their problem?

a. NGT
b. Synectics
c. Decision trees
d. Questionnaires
e. Brainstorming
f. Delphi method

Answer: e.

Activity 5: The Jury. The final stage of the Charrette is focused on a "jury" or panel composed of those who control the community resources (and possibly some outside experts) who react to the proposals of each small group in terms of financial and political feasibility. After further discussion between the panel and participants, the proposals may be reworked by each small committee. A followup committee may then be appointed to implement the recommendations of the Charrette for several months or a year after the session has ended.

Which group has final power in evaluating the proposals of the small committees?

a. the large group
b. the school board
c. the community resources panel
d. the Charrette manager and technical advisors
e. the consumers

Answer: c.

ADDITIONAL RESOURCES

Several books outlining the general procedures of the Charrette are available through university libraries and usually have the name of the technique in the title. Several such titles include lists of organizations through which consultants can be contacted. Research and evaluation of the method have been reported in architecture and education journals; references may be located through the appropriate indices and abstracts. The article, "Charrette Processes: A Tool in Urban Planning" by W. Riddick is a recommended source for studying the technique.

Concluding Activity

Now that you have completed reading the discussion of the two techniques you considered to be most applicable to your situation, please return to your Planning Record and enter the name of the technique you will use to conduct this step of the Planning System. You should then continue reading in the *Guide* with *Step 4, Selecting Strategies.*

References

Arends, Richard. *System Change Strategies in Educational Settings.* New York: Human Sciences Press, 1977.

Bayless, Ovid L. An alternative pattern for problem solving discussion. *J. of Communication*, 1967, 18:188-197.

Bouchard, Thomas, and M. Hane. Size, performance and potential in brainstorming groups. *Journal of Applied Psychology*, 1970, 54(1):51-55.

Brauers, W. K. M. *Systems Analysis, Planning and Decision Models.* Amsterdam, The Netherlands: Elsevier Scientific Publishing Co., 1976.

Clark, C. H. *Brainstorming, the Dynamic Way to Create Successful Ideas.* Garden City, N.Y.: Doubleday and Co., Inc., 1969.

Collins, B.E., and H. Guetzkon. *Social Psychology of Group Processes for Decision-Making.* New York: John Wiley and Sons, 1964.

Davis, G. A. Training creativity in adolescence: discussion of strategy. *Journal of Creative Behavior.* 1969, 2(3):95-104.

Deats, T. Educational futures: what do we need to know? *Educational Theory*, 1976, 26:81-92.

Delbecq, A. L., A. H. Van de Ven and D. H. Gustafson. *Group Techniques for Program Planning.* Glenview, Illinois: Scott, Foresman and Co., 1975.

Dunnette, M. D. , J. P. Campbell and K. Justad. Effect of group participation on brainstorming effectiveness for two industrial samples. *Journal of applied Psychology*, 1963, 47:30-37.

Egan, D. Creativity in management. *Journal of Creative Behavior*, 1969, 2(3):178-183.

Enzer, S., W. I. Boucher and F. D. Lazar. *Futures Research as an Aid to Government Planning in Canada: Four Workshop Demonstrations.* Middletown, Conn.: Institute for Futures, August 1977.

Fincher, C. Grand strategy and the failure of consensus. *Educational Record*, 1975, 56(1):10-20.

Fontela, E. Industrial applications of cross-impact analysis. *Long Range Planning*, 1976, 9(1):29-33.

Fromkin, J. Long-range planning for American education in *Long-Range Policy Planning in Education.* Paris, France: Organization for Economic Cooperation Development, 1973.

Gollay, E., and J. F. Doucette. How to deal with barriers in schools. *School Shop*, April 1978, 86-89.

Gordon, W. J. J. Operational approach to creativity. *Harvard Business Review*, 1956, 34:41-51.

Synectics. New York: Harper and Brothers, 1961.

Gourley, T. J. Factors influencing New Jersey county vocational technical school districts to establish programs for handicapped students: study of educational change agents. *Resources in Education*, 1978.

Haefele, J. W. *Creativity and Innovation.* New York: Reinhold Publishing Corp., 6-7.

Holt, J. Involving the users in school planning. *School Review*, 1974, 82(4):706-730.

Holt, K. S. Some key points in planning services for handicapped children. *Child Care Health and Development*, 1976, 2(6):387-394.

Hudson, B. Methods of group decision-making. *Social Policy*, 1975, 6:29-37.

Johnson, D. W., and F. P. Johnson *Joining Together: Theory and Group Skills*. Englewood Cliffs, N.J.: Prentice Hall, 1975.

Kepner, C. A., and B. B. Tregoe. *The Rational Manager*, New York: McGraw-Hill, 1965.

Lewin, K. *Field Theory in Social Science*. New York: Harper and Row, 1951.

Resolving Social Conflict. New York: Harper and Row, 1948.

Madsen, D. and J. Finger. Comparison of a written feedback procedure, group brainstorming and individual brainstorming. *Journal of Applied Psychology*, 1978, 63(1)120-123.

Maier, Norman R. F. *Problem-Solving Discussion and Conferences*. New York: McGraw-Hill, 1963.

The Role-Play Technique: A Handbook for Management and Leadership Practice. New York: Allyn and Bacon, 1970.

Meyer, G. *Participative Decision Making: Analysis and Review*. New York: Holt, Rinehart and Winston, 1970.

Napier, R. *Groups: Theory and Experience*. Boston: Houghton-Mifflin Co., 1973.

Nelson, W., J. Pettelle and C. Monroe. Revised strategy for idea generation in small group decision making. *Speech Teacher*, 1974, 23:191-196.

Patton, B. R., and K. Giffin. *Problem-Solving Group Interaction*. New York: Harper and Row, 1973.

Paul, J. L., A. P. Turnbull and W. M. Cruickshank. *Mainstreaming: A Practical Guide*. Syracuse, N.Y.: Syracuse University Press, 1977.

Prince, G. M. *Practice of Creativity*. New York: Harper and Row, 1970.

Prozer, B. G. Linking program planning, long-range decision making and accountability in special education: a reappraisal of the state of the arts from a user's point of view. *Resources in Education*, April 1977.

Rickards, T., and B. L. Freedman. Procedures for managers in idea-deficient situations: an examination of brainstorming approaches. *Journal of Management Studies*, 1978, 15:43-49.

Riddick, W. Charrette Processes: a Tool in Urban Planning. York, Penna.: George Shumway Publishers, 1971.

Salancik, G. R., J. Pfeffer and J. P. Kelly. Contingency-model of influence in organizational decision-making. *Pacific Sociological Review*, 1978, 21(2):493-498.

Sanoff, H., and G. Barbour. An alternative strategy for planning an alternative school. *School Review*. 1974, 82(4):731-748.

Shull, F. A., A. Delbecq and L. Cummings. *Organizational Decision-Making*. New York: McGraw-Hill, 1970, 151-165.

Siantz, J. E. Long-range planning for special education: technical critique of one strategy. *Journal of Special Education*, 1976, 4:22-26.

Souder, W., and R. W. Ziegler. Review of creativity of problem-solving. *Research Management*, July 1977, 34-42.

Taylor, D. W., P. C. Berry and C. H. Block. Does group participation when using brainstorming facilitate or inhibit creative thinking? *Administration Science Quarterly*, 1958, 3:23-47.

Thorstad, H. L. Psychological decision space in program planning. *Educational Technology*, 1975, 15(1):58-59.

Vroman, H. W. An application of the NGT in education systems analysis. *Educational Technology*, 1975, 15(6):51-53.