The Effects of Individual Feedback and Group Feedback on the Nominal Group Technique

Monica Porter
Western Michigan University

Follow this and additional works at: https://scholarworks.wmich.edu/dissertations

Part of the Psychology Commons

Recommended Citation
https://scholarworks.wmich.edu/dissertations/2049

This Dissertation-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Dissertations by an authorized administrator of ScholarWorks at WMU. For more information, please contact wmu-scholarworks@wmich.edu.
THE EFFECTS OF INDIVIDUAL FEEDBACK AND GROUP FEEDBACK ON THE NOMINAL GROUP TECHNIQUE

by

Monica Porter

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the requirements for the
Degree of Doctor of Philosophy
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
December 1991
THE EFFECTS OF INDIVIDUAL FEEDBACK
AND GROUP FEEDBACK ON THE
NOMINAL GROUP TECHNIQUE

Monica Porter, Ph.D.
Western Michigan University, 1991

The nominal group technique (NGT) was modified and implemented in an educational setting. Procedures included (a) targeting and voting on the most important issue, (b) generating a list of possible solutions and providing rationales, and (c) completing a final report as a group consensus.

The effects of individual feedback and group feedback on the NGT were examined. Group 1 received individual feedback followed by group feedback, and Group 2 received group feedback followed by individual feedback.

Twenty undergraduates served as subjects and participated in problem solving tasks in which individual feedback and group feedback were provided on the subjects' written and verbal responses. Each subject's response on each issue was categorized as either an excellent response, good response, poor response, or no response. Each category of response was assigned a point value (i.e., 3, 2, 1, 0, respectively). Each subject privately received a written feedback form consisting of the number of points...
earned in each component of the group process, total points earned, the percentage earned, and the grade earned for the day.

A repeated measure one-factor analysis of variance was used to compare performance during baseline, group, and individual conditions for each group separately.

For Group 1, performance during individual feedback was significantly better than during baseline; additionally, performance during group feedback was significantly better than during individual feedback. For Group 2, performances during individual feedback differed significantly from baseline. However, group feedback performances did not differ from baseline or individual feedback performances.
INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI
University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
The effects of individual feedback and group feedback on the nominal group technique

Porter, Monica, Ph.D.
Western Michigan University, 1991
ACKNOWLEDGEMENTS

I give all honor to God for he has made all things possible. I especially thank Dr. William K. Redmon for his support, encouragement and guidance. I extend my appreciation to my committee members Dr. Alyce Dickinson, Dr. M. Michele Burnette, and Dr. Donald E. Thompson for their support and assistance.

I extend thanks to my family who has supported me with their unconditional love. My mother, Malissia Porter, has sacrificed over and beyond to make my dream possible; Margaret Porter adopted me as her dependent; James Little financed a much needed computer; Estella Price always had some "pocket change" to give; and my family members and friends provided me with moral support. I thank God for each of you. I thank Robert Johnson for his love, friendship, and support. Last, I thank Angela Williams, a true friend.

Finally, I dedicate this dissertation to Ross Little, Thelma Little, and Milton Porter, Sr. for they started out on this journey with me and I know that they are here with me in spirit—"Je t'aime."

Monica Porter
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ACKNOWLEDGEMENTS</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
</tbody>
</table>

## CHAPTER

I. INTRODUCTION ............................................. 1

II. METHOD .................................................. 9

   Subjects and Setting ................................. 9
   Dependent Variable .................................. 9
   Response Measure .................................... 10
   Inter-Rater Reliability ............................. 12
   Independent Variable ............................... 12
   Experimental Design ................................ 13
   Group Leader Training ............................... 14
   Subject Training ..................................... 15
   Procedures ........................................... 15
      Baseline .......................................... 15
      Individual Feedback .............................. 15
      Group Feedback ................................... 16
      NGT Modifications ................................ 17

III. RESULTS ................................................ 20

   Participation ........................................ 20
   Inter-Rater agreement .............................. 20

iii
Table of Contents—Continued

CHAPTER

Within Subject Measures ................... 20

IV. DISCUSSION ................................... 29
  Overview ................................... 29
  Results in Reference to
  Previous Research ......................... 30
  Feedback Effects ......................... 32
  Methodological Issues .................... 34
    Research Design ......................... 34
    Order Effects .......................... 35
  Emotional Effects of Contingencies..... 35
Recommendations for Future Research.... 37

APPENDICES

A. Informed Consent Letter .................. 39
B. Reliability Observer's Training Manual .... 41
C. Group Leader's Training Manual .......... 49
D. Subjects' Training Manual ............... 54
E. Forms Used in the NGT ................... 60
F. Subjects' Individual Performance ........ 66
G. Human Subjects Institutional
   Review Board Approval .................... 77

BIBLIOGRAPHY ................................. 79
LIST OF TABLES

1. Mean Points Earned and Standard Deviations for Group 1 and Group 2 for Baseline, Individual Feedback, and Group Feedback Phases................................. 23

2. Mean Points Earned and Standard Deviations for Group 1 for Baseline, Individual Feedback, and Group Feedback Phases.................................. 24

3. Mean Points Earned and Standard Deviations for Group 2 for Baseline, Individual Feedback and Group Feedback Phases................. 26
LIST OF FIGURES

1. Average Points Earned per Session for All Experimental Phases for Group 1............. 28
2. Average Points Earned per Session for All Experimental Phases for Group 2............. 28
3. Average Points Earned per Session for All Experimental Phases for Subject 1........ 67
4. Average Points Earned per Session for All Experimental Phases for Subject 2........ 67
5. Average Points Earned per Session for All Experimental Phases for Subject 3........ 68
6. Average Points Earned per Session for All Experimental Phases for Subject 4........ 68
7. Average Points Earned per Session for All Experimental Phases for Subject 5........ 69
8. Average Points Earned per Session for All Experimental Phases for Subject 6........ 69
9. Average Points Earned per Session for All Experimental Phases for Subject 7........ 70
10. Average Points Earned per Session for All Experimental Phases for Subject 8......... 70
11. Average Points Earned per Session for All Experimental Phases for Subject 9......... 71
12. Average Points Earned per Session for All Experimental Phases for Subject 10........ 71
13. Average Points Earned per Session for All Experimental Phases for Subject 11........ 72
14. Average Points Earned per Session for All Experimental Phases for Subject 12........ 72

vi
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 13</td>
<td>73</td>
</tr>
<tr>
<td>16</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 14</td>
<td>73</td>
</tr>
<tr>
<td>17</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 15</td>
<td>74</td>
</tr>
<tr>
<td>18</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 16</td>
<td>74</td>
</tr>
<tr>
<td>19</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 17</td>
<td>75</td>
</tr>
<tr>
<td>20</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 18</td>
<td>75</td>
</tr>
<tr>
<td>21</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 19</td>
<td>76</td>
</tr>
<tr>
<td>22</td>
<td>Average Points Earned per Session for All Experimental Phases for Subject 20</td>
<td>76</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Group dynamics first became popular during the 1940s and expanded during the 1950. A 1959 book titled Learning to Work in Groups (Miles, 1959) was the first effort made to formalize the group process. Since then, the focus on group process has increased. The literature is now filled with the application of group process strategies in many areas and disciplines.

Group process is an activity which occurs with two or more individuals (Kemp, 1964) where members work together toward a common goal. Group process strategies have been found to be effective in educational settings (Schmuck, Runkel, Arends, & Arends, 1977; Stanford, 1977); industrial environments (Dyer, 1977; Fordyce & Weil, 1971; Steiner, 1972); and churches (Alban Institute, 1980; Kemp, 1972).

The purpose of a group process is to achieve high quality problem solving by bringing people together with different backgrounds, educational levels, points of view, and encouraging active participation (Daniels, 1986). Gulley (1968) discussed five reasons why groups are more effective than individual efforts. He concluded the
following: (1) groups tend to produce better decisions than individuals, (2) groups have more resources than individuals, (3) groups are generally more productive when tasks result in a division of labor, (4) members of a group are often motivated by other members, and (5) group participation often leads to increased understanding of the subject matter. Other researchers also have found that individuals working in groups tend to generate more suggestions than individuals working alone (Hegedus & Rasmussen, 1986).

Many factors, such as size and structure, determine the success of a group process. For example, Daniels (1986) discussed how the size of a group may affect the process. He concluded: (a) an even number of group members tend to breakup into pairs which often results in conflict among the pairs, (b) five to nine members is a good size because of the mix of resources and interpersonal skills, (c) one to four members usually result in too few perspectives and domination by one member, and (d) nine or more members often result in too many trying to participate.

Brightman (1988) discussed issues of structure and its effects on the group process. He pointed out that unstructured group process results in no formal rules to organize or control level of participation. Further research
developed several types of group processes which have proven to be effective: brainstorming (Carpenter, 1970); buzz groups (Kowski & Eitington, 1977; Larick, 1971); listening teams (Carpenter, 1970; Gibbs, Hewing, Hulbert, Ramsey, & Smith, 1985); role-playing (Cotterell, 1987); delphi method (Facione, 1990; Weaver & Connolly, 1988); problem-solving (Merritt & Walley, 1977; Ulschak, Nathanson & Gillan, 1981); and nominal group technique (Delbecq & Van De Ven, 1968). Of all the group process techniques available, the nominal group technique is the most widely used (Fox, 1989; Richards & Johnson, 1984-85; Scott & Deadrick, 1982; Stephenson, Michaelsen & Franklin, 1982; Vroman, 1975).

Delbecq and Van De Ven constructed the Nominal Group Technique (NGT) in 1968. This approach improves the quality of the group process by helping members generate suggestions and by facilitating a group consensus. The NGT provides a more structured and organized process than most methods and encourages improvements in the quality of participation of group members during the process. Also, the NGT has been found to be successful when used in groups where specific problem-solving activities are required (Fox, 1989; Frankel, 1987).

The NGT consists of five components which facilitate the group process. The first component is initial
thoughts. During this process, group members read a case study, privately generate their diagnoses of the problem, and list alternative solutions in writing. No group discussion occurs during this component. At the end of the first component, each member submits diagnoses and solutions in written form to the group leader. The second component is the round-robin. Each member presents his/her analysis of the problem and describes possible solutions. Clarification through questioning is permitted during this component, but no discussion is allowed. The third step is called idea structuring, wherein all members rewrite their submitted analysis of the problem and possible solutions; this is to ensure that everyone is working at the same level. This component requires that written responses be submitted by each individual and that one diagnosis be submitted for the group. Discussion and synthesis comprise the fourth component of the NGT. During this part, members are allowed to discuss alternative solutions; pro and con arguments are generated, and all solutions must be discussed. The last component of the NGT is closure, during which group members are to reach a consensus. The solutions can be ranked ordered publicly or a silent ballot can be used. The best possible solution should be selected and described in written form, including a rationale.
Some of the advantages of the NGT include: (a) the technique can be used with groups of varying backgrounds, cultures, educational levels, or work roles that involve a common problem; (b) group members do not need previous training in a group process; (c) this process is a method used to bring people together to problem-solve; (d) the process promotes the generation of many solutions surrounding an issue; (e) the process allows for maximum and equal participation of all group members; and (f) it is a relatively easy process to run.

Some of the disadvantages of NGT include: (a) the technique requires a group leader, (b) it deals with only one question at a time, and (c) it is inappropriate for use in a group where interacting problem-solving is to be developed. Those factors which are considered disadvantages of the NGT can be modified and controlled to create a more useful technique.

One element of the NGT that has received some attention is motivation of group members to engage effectively in the required steps. One way to improve the motivational technology used with NGT is to adopt management methods which have been shown to be effective in other areas. One such example is performance feedback which has been used effectively in many different settings including industry (Chhokar & Wallin, 1984; Fellner & Sulzer-Azaroff, 1984);

The effects of feedback have been studied in depth over the past decade. Feedback is defined as information concerning past performance and has been found to be effective as a management strategy (Adam, 1975; Cantano, 1976; Sulzer-Arazoff, 1978).

Research indicates that immediate feedback is more effective than delayed feedback (Chhokar & Wallin, 1984; Emmert, 1978). Much attention has also been directed towards individual versus group feedback (Emmert, 1978; Goltz, Citera, Jensen, Favero & Komaki, 1989; Karan & Kopelman, 1986; Newby & Robinson, 1983; Smith, 1972). Group feedback includes information concerning the combined performance of two or more individuals, whereas individual feedback consists of information concerning each individual's performance. It has been found that group feedback is more economical to administer than individual feedback, increases peer interactions, and produces behavior changes as effectively as individual feedback (Herman & Tramontanta, 1971; Litow & Pumroy, 1975; Luke & Sulzer-Azaroff, 1973). Research also has shown that group
feedback is effective when each individual's success is highly dependent upon the performance of the other members in the group (McCarthy, 1978).

The present study included the implementation of the NGT during a group problem solving process. Measures of the effects of individual feedback versus group feedback on group problem solving performance were taken. Feedback included information concerning the participant's verbal and written responses during the group process in each of the five NGT components. This study differs from previous research in that it included: revised steps of the NGT appropriate for an educational setting, feedback on group process outcomes which related to the quality of the subjects' performances, and an operational measure of individual responses in the NGT process. Thus the purpose of the present study was to determine the effects of group versus individual feedback on performance in an NGT situation. This research contributes to the literature on group versus individual contingencies in performance feedback and examines the effects of an inexpensive and simple management program on NGT group performance.

Specifically, the present study addressed two questions: (1) Does individual feedback improve performance relative to a no-feedback condition in a group process?
(2) Does group feedback improve performance in a group process more than individual feedback?
CHAPTER II

METHOD

Subjects and Setting

The study was conducted with undergraduate students (age range 17-19) at Western Michigan University, Kalamazoo. A total of twenty subjects participated. Subjects were divided into two groups. Group 1 consisted of 6 males and 3 females, whereas Group 2 consisted of 6 males and 5 females. Students were recruited from a freshmen seminar course on campus. The purpose of this course was to acclimate freshman students to campus life and resources. The subjects' participation in the group process was a part of the course requirements; however, subjects were instructed that the usage of their data was strictly voluntary and no data were used without permission (see Appendix A).

Dependent Variable

Students who participated in this study were enrolled in several remedial college courses which were targeted for special assistance. They were asked to develop solutions
to problems presented in case studies. Each group received one case study to complete during each session. Both groups received the same case study. Case studies included problems or situations that are common in university settings for freshman students. For example, in a situation where students are assigned a term paper (i.e., one which requires that they complete a literature search, outline, and a final draft), the case study asked group members to devise a time management strategy for the completion of a good final paper.

The dependent variables consisted of measures of verbal and written responses emitted in reaction to the case studies in the NGT. Responses were recorded for each group member when the group leader either asked all subjects to generate a written response (e.g., "For the next five minutes, I would like each of you to generate one possible solution"), or asked a specific subject to share his/her written responses with the other group members (e.g., "Angela, what could be one possible solution?"). Subjects were allotted five minutes to generate written responses. Only verbal responses prompted by the group leader were recorded, and a point value was assigned to each response.
Response Measure

Each verbal or written response was placed into one of the five categories. An excellent response was relevant to the case-study topic and supported by a reason, explanation, or an example (i.e., "The most important issue is to identify a technique which can improve a car wash system, because the technique will include other needed improvements"). This type of response received the maximum number of points possible (i.e., 3). A good response was similar to an excellent response, but it was missing one of the two components. A good response was one that was relevant to the case-study topic, but was not supported by a reason, explanation, or an example (i.e., "The most important issue is to identify a technique to improve the car wash system"). Or conversely, a reason, explanation, or an example was given, but the response was not directly related to the issue under consideration (i.e. "The most important issue is to identify a technique to improve the car wash system, because car washing has been around for the past 50 years"). A good response received two points of the possible three points. A poor response was one that was missing both components. A poor response was neither relevant to the issue under consideration nor supported by reason, explanations, or examples (i.e., "Car
washing is cool"). This response received the minimum number of points possible (i.e., 1). No response received no points and was defined as "no verbal or written response emitted."

Inter-Rater Reliability

The author served as non-participant observer and recorded independently the behavior of group members for 50% of the sessions (see Appendix B).

A percentage agreement method was used to assess inter-rater agreement in which the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. An agreement was tallied when both the rater and the group leader assigned the same number of points for a single response (verbal or written) for an individual subject.

Independent Variable

The independent variable included individual feedback versus group feedback. Individual feedback was defined as information related to the previous performance of an individual. Group feedback was defined as information related to previous performance of a group.

For the individual feedback case, each subject received written feedback at the end of the group process.
Individual feedback consisted of the following: the number of individual participation points earned for each component of the group process, the total number of points earned, the individual's percentage, the grade earned for the session, and the instructor's comments concerning their performances during the NGT.

For the group feedback case, each member of the group received written feedback at the end of the group process. Group feedback consisted of the following: the average number of participation points earned per person for each component of the group process, the average total number of points earned per person, the group's average percentage and grade earned for the session, and the instructor's comments. Group feedback did not include information concerning any particular subject's performance.

Experimental Design

An A-B-C replication across groups design was used. A total of two groups and three experimental conditions were employed. The three experimental conditions included (a) baseline, (b) individual feedback, and (c) group feedback. Baseline data were taken on students' verbal or written responses during each component of the group process. No feedback was given during the baseline phase. After NGT performance data became stable during baseline,
individual or group feedback was introduced. Group 1 received individual feedback followed by group feedback. Group 2 received group feedback followed by individual feedback. The first phase (i.e., baseline) and the second phase (i.e., Group 1--individual feedback or Group 2--group feedback) consisted of four sessions, while the last phase (i.e., Group 1--group feedback or Group 2--individual feedback) consisted of six sessions.

Group Leader Training

Two undergraduates served as group leaders. The group leaders were asked to direct the NGT during their group process. They received a written manual describing the NGT and their responsibilities (see Appendix C). Study questions were included at the end of the manual. After each group leader finished the entire manual, the experimenter graded the study questions and asked the group leaders to correct any incorrect answers. After initial training, the experimenter met with both of the group leaders and conducted a simulated group process. The group leaders were trained on the following: (a) prompting subjects during each component of the group process, (b) keeping the group process conversation on the topic, and (c) giving each subject the opportunity to respond during each component of the group process.
Subject Training

Each subject was given a manual describing the NGT (see Appendix D). All subjects were required to read the manual and encouraged to ask questions for clarification. The NGT manual consisted of descriptions of each of the components and examples of the responses required. Study questions were included at the end of the manual. After each subject completed the entire manual, the experimenter graded the study questions and asked subjects to correct any incorrect answers.

Procedures

Baseline

During baseline, subjects participated in a group process. The group process was structured using the NGT. No active feedback occurred during this phase; however, the group leaders prompted responses during this condition. During session activities, every subject was required to complete a verbal or written response during each component of the group process.

Individual Feedback

Subjects were informed at the beginning of this phase that "to better assist them, they would receive written
feedback at the end of the group process about their performance." Subjects were assigned points based on their verbal and written responses during every component of the group process. At the end of the group process, all of the points were tallied and written feedback was delivered confidentially on a feedback form. The feedback form included the following information: (a) the number of points earned for each component of the group process, (b) the total points earned, (c) the percentage (the number of points obtained divided by the number of points possible), (d) the grade earned for the day (based on the university grading system), and (e) additional comments given by the group-leader (see Appendix E).

**Group Feedback**

Subjects were informed at the beginning of this phase that "to better assist them, they would receive group feedback at the end of the group process." This feedback consisted of a group's average. Each group member received feedback concerning the group's written and verbal responses. As during individual feedback, all responses were assigned points for each component of the group process. At the end of the group process, each subject's points were added and a group average was derived. At the end of each group process, group members received a feedback form which
included the following: (a) the average total points earned per person, (b) the average total points earned by the group, (c) the average percentage earned (the number of points earned divided by the number of possible points), (d) the group grade earned for the day (based on the University grading system), and (e) additional comments by the group leader (see Appendix E).

NGT Modifications

The NGT typically includes five steps; however, in this study those steps were modified (a) so that the performance of the subjects could be measured during each component of the group process; (b) to control the subject's level of participation, therefore, minimizing off-task behaviors and maximizing on-task behaviors; and (c) to complete the necessary components during the allotted class time.

The five steps of the typical NGT are: (1) initial thought—subjects read the case-study, diagnose the problem and list alternatives; (2) round-robin—subjects discuss their analysis of the problem and the alternatives; (3) idea structuring—subjects rewrite their analysis of the problem to ensure that everyone is on the same level; (4) discussion and synthesis—subjects discuss the alternative
solutions; and (5) closure—the group reaches a consensus by ranking the solutions.

The modified steps included all the original steps and additional steps so that the NGT was more applicable in an educational setting. The modified NGT steps included the six steps. The first step consisted of the group leader instructing the group members to silently read a description of the problem to be solved. The group members were asked to identify the most important issue of the case-study and submit their response in written form. Next, the group leader prompted each group member to discuss his/her written response with the group.

During the third step the group leader asked the group to individually select two issues that they considered to be important. The group leader informed the group members to give the two selected issues rankings (the most important issue was assigned two points and the next important issue was assigned one point). Each group member's point values were recorded on the blackboard next to each issue. The issue with the most points was the targeted issue for the group process.

For the next step, the group leader asked the group to individually generate one strategy to address the targeted issue and to provide a rationale for the selection of the strategy. Group members' responses were submitted in
written form. The fifth step consisted of the group leader verbally prompting each group member to discuss his/her written responses with the group.

Lastly, after the improvements were listed, the group leader asked the members to finalize their discussion, and as a group, complete the final report by incorporating all of the solutions into the report. The final report was submitted to the group leader by the recorder for the group. The group leader tallied the points and gave the written feedback form to the instructor; and the instructor distributed the feedback forms privately (i.e., folded the forms inside out) to the students. Subjects could receive a maximum of eighteen points for the NGT. A maximum of three points could be earned for each of the following categories: (a) identifying the most important issue; (b) discussion of the most important issue; (c) generating one solution; (d) providing a written rationale for the generated solution; (e) discussion of the written solution and rationale; and (f) completing the final report.
CHAPTER III

RESULTS

Participation

Five subjects missed at least one session because of illness. One of the five subjects missed two sessions and the remaining four subjects each missed one session.

Inter-Rater Agreement

Inter-rater agreement was calculated for 50% of the group process sessions. There was a total of fourteen sessions; therefore, seven of the sessions were observed. The inter-rater agreements were 87%, 88%, 85%, 86%, 85%, 89%, 92% for an average of 87%. The percentages represent the number of agreements (i.e., between the inter-rater and the group leaders) divided by the number of agreements plus disagreements and multiplied by 100.

Within Subject Measures

A repeated measure one-factor analysis of variance (ANOVA) was used to determine if a significant difference was present among baseline, individual and group conditions for both groups combined. The mean scores per person, per
group, per session, and per phase were used for the analysis of this research. The within subject measure yielded a statistically significant treatment effect ($F(19,40)=10.52, p<.05$). Post hoc analysis using the Fisher Least Significant Differences (FLSD) test indicated that the mean difference between baseline and individual feedback phases exceeded the critical value ($p<.05$), and that the mean difference between baseline and group feedback phases exceeded the critical value ($p<.05$). However, no significant difference was observed in mean performances during individual feedback and group feedback phases. Further testing of treatment effects by groups was completed. This was implemented to determine if the order of presentation of treatments had an effect on mean performances. Group 1 which received individual feedback followed by group feedback yielded a significant treatment difference ($F(8,18)=14.74, p<.05$). The Fisher Least Significant Differences test indicated that (a) mean performance differences between baseline and individual feedback phases exceeded the critical value ($p<.05$), (b) mean performance differences between baseline and group feedback phases exceeded the critical value ($p<.05$), (c) and that mean performances in individual feedback and group feedback phases also significantly exceeded the critical value ($p<.05$).
Analysis of data based on performances by Group 2 which received group feedback followed by individual feedback yielded a significant treatment effect ($F(10,22)=4.73, p<.05$). The Fisher Least Significant Differences test indicated that (a) mean performance difference between baseline and group feedback phases did not exceed the critical value ($p>.05$), (b) mean performance difference between group feedback and individual feedback phases did not exceed the critical value ($p>.05$), but (c) the mean performance difference between baseline and individual feedback phases did exceed the critical value ($p<.05$).

Table 1 displays group means and standard deviations for each phase of the group process. The means were calculated by averaging individual session scores for group members for each phase. The baseline performance averages for Group 1 and Group 2 show a mean difference of only .22; the individual feedback performances show for the two groups a mean difference .35, but the group feedback performance of the two groups differed by 1.82. Thus Group 1 performance was affected more by group feedback than that of Group 2.
Table 1
Mean Points Earned and Standard Deviations for Group 1 and Group 2 for Baseline, Individual Feedback, and Group Feedback Phases

<table>
<thead>
<tr>
<th>GROUP</th>
<th>PHASES</th>
<th>MEANS</th>
<th>STD. DEV.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Baseline</td>
<td>13.25</td>
<td>1.403</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.66</td>
<td>0.415</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>16.07</td>
<td>1.508</td>
</tr>
<tr>
<td>2</td>
<td>Baseline</td>
<td>13.47</td>
<td>1.207</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>14.25</td>
<td>1.609</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.01</td>
<td>1.145</td>
</tr>
</tbody>
</table>

Table 2 displays the means and standard deviations for all subjects in group one for baseline, individual feedback, and group feedback phases. All nine subjects evidenced their lowest mean scores during baseline. Six of the subjects' group feedback means were higher than their individual feedback means, while only two of the subjects' individual feedback means were higher than their group feedback means. One subject's individual feedback mean was equal to the group feedback mean.

Table 3 displays the means and standard deviations for all subjects in Group 2 for baseline, individual feedback, and group feedback phases. Six of the subjects evidenced their lowest mean scores during baseline, four of the subjects evidenced their lowest mean scores during group feedback, and two of the subjects evidenced their lowest means during individual feedback. Eight of the subjects'
Table 2
Mean Points Earned and Standard Deviations for Group 1 for Baseline, Individual Feedback, and Group Feedback Phases

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PHASES</th>
<th>MEANS</th>
<th>STD. DEV.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>14.25</td>
<td>2.062</td>
</tr>
<tr>
<td>1</td>
<td>Individual Feedback</td>
<td>14.50</td>
<td>1.291</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>16.16</td>
<td>1.722</td>
</tr>
<tr>
<td>2</td>
<td>Baseline</td>
<td>12.50</td>
<td>0.577</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.50</td>
<td>1.291</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>17.00</td>
<td>0.894</td>
</tr>
<tr>
<td>3</td>
<td>Baseline</td>
<td>13.00</td>
<td>2.582</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.00</td>
<td>1.826</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>13.83</td>
<td>6.824</td>
</tr>
<tr>
<td>4</td>
<td>Baseline</td>
<td>10.00</td>
<td>6.782</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.50</td>
<td>1.915</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>14.50</td>
<td>7.148</td>
</tr>
<tr>
<td>5</td>
<td>Baseline</td>
<td>14.25</td>
<td>2.754</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.00</td>
<td>2.160</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>17.66</td>
<td>0.816</td>
</tr>
<tr>
<td>6</td>
<td>Baseline</td>
<td>13.25</td>
<td>3.0594</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.25</td>
<td>2.363</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>17.33</td>
<td>0.816</td>
</tr>
<tr>
<td>7</td>
<td>Baseline</td>
<td>14.75</td>
<td>1.500</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.50</td>
<td>0.577</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.00</td>
<td>7.348</td>
</tr>
<tr>
<td>8</td>
<td>Baseline</td>
<td>13.75</td>
<td>1.500</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.50</td>
<td>1.291</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>18.00</td>
<td>0.000</td>
</tr>
<tr>
<td>9</td>
<td>Baseline</td>
<td>13.50</td>
<td>2.082</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.25</td>
<td>0.957</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.16</td>
<td>2.483</td>
</tr>
</tbody>
</table>
individual feedback means were higher than their group feedback means, while two of the subjects group feedback means were higher than their individual means. One subject's group feedback mean was equal to the individual feedback mean.

Figure 1 displays the average points earned per session for all experimental phases for subjects in Group 1. The data displayed in Figure 1 demonstrate an upward trend in performance. The performance average progressed from 13.25 to 14.66 to 16.07 for baseline, individual feedback and group feedback, respectively.

Figure 2 displays the average points earned per session for all experimental phases for subjects in Group 2. The data displayed in Figure 2 also demonstrate an upward trend. However, the data in Figure 2 show a smaller increase across phases than that observed for group one. The performance average progressed from 13.47 to 14.25 to 15.01 for baseline, group feedback, and individual feedback phases, respectively.

The average points earned per session for all experimental phases for each subject are displayed in Appendix F.
Table 3
Mean Points Earned and Standard Deviations for Group 2 for Baseline, Individual Feedback, and Group Feedback Phases

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PHASES</th>
<th>MEANS</th>
<th>STD. DEV.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Baseline</td>
<td>13.00</td>
<td>1.414</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>13.50</td>
<td>3.000</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.16</td>
<td>1.329</td>
</tr>
<tr>
<td>11</td>
<td>Baseline</td>
<td>14.00</td>
<td>1.414</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.00</td>
<td>1.826</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>13.33</td>
<td>6.623</td>
</tr>
<tr>
<td>12</td>
<td>Baseline</td>
<td>12.75</td>
<td>2.872</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.25</td>
<td>1.708</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>16.00</td>
<td>1.265</td>
</tr>
<tr>
<td>13</td>
<td>Baseline</td>
<td>11.75</td>
<td>3.594</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>11.25</td>
<td>2.500</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.66</td>
<td>1.862</td>
</tr>
<tr>
<td>14</td>
<td>Baseline</td>
<td>14.00</td>
<td>2.160</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>14.50</td>
<td>1.915</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>14.50</td>
<td>1.643</td>
</tr>
<tr>
<td>15</td>
<td>Baseline</td>
<td>14.00</td>
<td>1.414</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.25</td>
<td>1.500</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>13.00</td>
<td>6.419</td>
</tr>
<tr>
<td>16</td>
<td>Baseline</td>
<td>12.50</td>
<td>1.915</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>13.75</td>
<td>2.217</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>14.33</td>
<td>1.366</td>
</tr>
<tr>
<td>17</td>
<td>Baseline</td>
<td>16.25</td>
<td>0.957</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>16.00</td>
<td>1.414</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>16.83</td>
<td>0.983</td>
</tr>
<tr>
<td>18</td>
<td>Baseline</td>
<td>12.75</td>
<td>1.708</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.75</td>
<td>1.258</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.83</td>
<td>1.169</td>
</tr>
</tbody>
</table>
Table 3—Continued

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PHASES</th>
<th>MEANS</th>
<th>STD. DEV.</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Baseline</td>
<td>14.25</td>
<td>2.062</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>15.00</td>
<td>1.414</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.16</td>
<td>1.169</td>
</tr>
<tr>
<td>20</td>
<td>Baseline</td>
<td>13.00</td>
<td>2.160</td>
</tr>
<tr>
<td></td>
<td>Individual Feedback</td>
<td>11.50</td>
<td>2.887</td>
</tr>
<tr>
<td></td>
<td>Group Feedback</td>
<td>15.33</td>
<td>1.366</td>
</tr>
</tbody>
</table>
Figure 1. Average Points Earned per Session for All Experimental Phases for Group 1.

Figure 2. Average Points Earned per Session for All Experimental Phases for Group 2.
CHAPTER IV

DISCUSSION

Overview

At the beginning of this research, two questions were asked: (1) Does individual feedback improve performance relative to no feedback in a group process? and (2) Does group feedback improve performance in a group process more than individual feedback? The results showed that a significant difference was observed between baseline and individual feedback and group feedback conditions. The data showed that Group 1 and Group 2 mean performances increased from baseline to individual feedback. In addition, Group 1 performance during the group feedback condition was higher than during the individual feedback condition. However, for Group 2, performance was superior during individual feedback. Therefore, it seems that the order in which the feedback conditions were introduced may have had an effect on performance.

Several issues must be considered in order to understand the findings. For the remainder of this section the following issues will be discussed: (a) the results in
reference to previous research, (b) feedback effects, (c) methodological issues, (d) problems which occurred, and (e) recommendations for future research.

Results in Reference to Previous Research

The results of the present study support the positions of Schmuck and Schmuck (1971), Schmuck et al. (1977), and Stanford (1977) in that group process strategies were shown to be effective in an educational setting. For example, Schmuck and Schmuck (1971) described five steps for teachers to incorporate into the classroom setting. The five steps were similar to the NGT in the present study in that it included stating the problem, diagnosing the problem in behavioral terms, brainstorming, designing a plan of action, and implementing the plan. These authors stressed the importance of stating the problems in behavioral terms. The issues in the present study were designed so that the solutions generated were specific behaviors which the subjects could actually emit given the appropriate situation. Overall NGT allowed subjects to solve problems regardless of variation in education history, backgrounds, and perspectives (Daniels, 1986).

Other group structure factors have been examined. Daniels (1986) discussed how group size might affect the success of a group process. He stated that an even number
of group members tend to break up into pairs and that conflict often results among pairs. In the present study, both groups were composed of an odd number of group members (i.e., Group 1 = nine and Group 2 = eleven); therefore, conflict among pairs was not likely. Daniels went further to argue that nine or more members often result in too many trying to participate. However, this behavior was not observed in this study. A reason for the absence of this type of behavior may have been that the group leader prompted group members for their responses so that each member was given the chance to participate, therefore, maintaining order during the group process.

Issues of structure and its effects on the group process also were addressed by Brightman (1988). Brightman stated that unstructured group process results in no formal rules to organize or control levels of participation. The NGT is a structured group process which controls levels of participation. As stated earlier, group members were prompted to participate by the group leader. The incorporation of prompting procedures to assist the group leader in facilitating the group process seemed to be effective. All subjects participated and the group leader was able to control the levels of participation.

Finally, Fox (1989) and Frankel (1987) argued that the NGT has been found to be successful when addressing a
specific problem. The results of the present study seem to support their statement. By specifying a target problem, time spent seeking the purpose of the group was managed efficiently.

Feedback Effects

Feedback has been identified as an effective management strategy in previous research (Adam, 1975; Cantano, 1976; Sulzer-Arazoff, 1978). The results of this study support previous work. Group members' performances improved when they changed from no-feedback (i.e., baseline) to either feedback condition (i.e., individual feedback or group feedback). Therefore, one could conclude that this inexpensive strategy served as an effective approach.

Herman and Tramontanta (1971), Litow and Pumroy (1975), and Luke and Sulzer-Azaroff (1973) argue that group feedback is more effective than individual feedback. These authors contend that group feedback: (a) motivates peer interactions, (b) produces behavior changes as effectively as individual feedback, and (c) is more economical to administer than individual feedback.

The present study supported all but one of these authors' arguments. The results of the present study suggested that group feedback was more effective than
individual feedback. Nonetheless, individual feedback did produce effective behavior changes. During the group feedback condition, members of Group 1 appeared to be very motivated (i.e., group members verbally encouraging one another). However, this behavior was not observed in the performances of the members of Group 2 during the group feedback condition.

Even though the results showed that the feedback components were effective in improving performance, the process of providing immediate feedback became rushed. For twenty subjects, it took approximately ten minutes to calculate all of the points and to complete each of the feedback forms for every subject. Group feedback required less time than individual feedback (i.e., approximately five minutes). This supports the argument that group feedback is more economical to administer than individual feedback (Herman & Tramontanta, 1971; Litow & Pumroy, 1975; Luke & Sulzer-Azaroff, 1973). It has been suggested that the delivery of feedback is most effective when it is presented immediately (Chhokar & Wallin, 1984; Emmert, 1978). However, since both of the feedback conditions were considerably delayed (i.e., feedback occurred ten minutes after the completion of the group process), this research did not directly test the immediacy issue. However, if a less time-consuming method could be developed so that the
amount of time before delivery of feedback is reduced, the process might be more effective.

Finally, McCarthy (1978) contends that group feedback is effective when each individual's success is highly dependent upon the performance of the other members in the group. However, the subjects in this research each completed individual tasks which were not highly dependent upon the performance of the other members in the group. In spite of the individualized tasks, group feedback was still effective. Future research needs to be implemented to better examine interdependence of work as a factor.

Methodological Issues

Research Design

As stated previously, the research design in this present study consisted of an A-B-C replication across groups. This design was selected because of time limitations (i.e., seven weeks for the summer semester). More important, the design was selected for ethical reasons. Withdrawing the feedback condition, which occurs during an A-B-A design, may have hindered students' academic performance. It may be argued that the A-B-C design is a weak experimental design; however, the replication of the conditions across two groups significantly strengthens the research design (Hersen & Barlow, 1977, chap.9).
Order Effects

The results were affected by the order in which the conditions were presented. Subjects in Group 1, who received individual feedback followed by group feedback, performed better in the second condition than Group 2 whose treatment conditions were the reverse. One might contend that at the beginning of a new group process, individual feedback is more effective, and that as the group process progresses, group members become familiar with one another, making group feedback more effective (Herman & Tramontanta, 1971; Litow & Pumroy, 1975; Luke & Sulzer-Azaroff, 1973).

A second reason for the increase in performance during the second feedback condition could be practice. As the time passed, the subjects had the opportunity to practice more on the NGT; therefore, their performances increased. Future research is needed to directly test this suggestion.

Emotional Effects of Contingencies

In this section, a discussion of anecdotal data concerning emotional effects will be addressed. Subjects' levels of satisfaction were not directly measured, but comments were noted.

Subjects in Group 2 who began the group process by receiving group feedback complained about points and per-
percentages earned based on the group's average. Perhaps their dissatisfaction with the group feedback component first contributed to the small performance increase from the baseline to group feedback. The subjects seemed to want to know information about their individual performance and not the group performance. When the subjects were switched from group feedback to individual feedback, their performances increased.

The members of Group 1, who received individual feedback first followed by group feedback, performed similarly to Group 2 during the first feedback condition. Their first feedback condition resulted in a smaller increase than their second feedback condition. However, the subjects in Group 1 did not voice any complaints about the group feedback condition. General observations indicated that Group 1 subjects preferred group feedback over individual feedback. The group members interacted more with each other when moved into the group feedback condition. This increased verbal behavior consisted of group members providing each other with verbal praise on their responses. This behavior was not observed in group two. Did this additional verbal praise have an effect on group members' performances? Did the verbal praise make group feedback more reinforcing than individual feedback? Future research is needed to answer these questions, but this
additional variable may explain the increase in performance for group one.

Recommendations for Future Research

As indicated earlier, a modified NGT was used in the present study where formal ranking of ideas was omitted. It would be of interest to incorporate all of the components of the NGT in future studies. In particular, given more time, the ranking of ideas should be added to the group process. In cases where time is short, then perhaps the NGT could be divided into two parts. The first part would consist of identifying the problem and generating solutions prior to the meeting, class, etc. The second part of the group process would consist of disseminating the information, voting, and developing a consensus. The NGT could only save time and money if all group members completed their two steps prior to the group process.

A second recommendation involves structuring problems for the classroom setting so that there is a specific answer to the problem. In most classroom settings this is usually a requirement. Structuring the problems so that a specific answer could be obtained would help to ensure that group members are on target.

In addition to structuring problems, quality issues should be addressed. In the present study, the quality of
solutions was not examined directly, but the measurement system was described so that maximum possible points were awarded only when responses were relevant to the issue under consideration. Subjects seemed to generate possible solutions and support for each of the solutions with ease. This additional component (i.e., rationale) ensured that the solutions were on target and served partially as a quality control measure. Therefore, this modified NGT shaped a valuable behavior which could be beneficial for subjects throughout their academic careers.

Finally, more research is needed on how feedback can be incorporated with the NGT to serve as an effective inexpensive management strategy. The various factors of feedback (i.e., individual vs. group, daily vs. weekly, private vs. public, etc.) should also be investigated to determine their effects on NGT performance.

The NGT has great potential for future application in educational settings as well as other settings. The NGT was proven to be cost-effective in that it required little training for group members and group leaders. The structured process allowed for maximum and equal participation of all group members. Most important, the incorporation of operational measures of performance allowed for feedback to be given concerning observable behaviors.
Appendix A

Informed Consent Letter
Informed Consent

I understand that I am being invited to participate in a doctoral dissertation research study to be conducted by Monica Porter, a student in the Department of Psychology at Western Michigan University. The purpose of this research is to investigate the effects of different forms of performance feedback on group problem solving effectiveness.

Participation in this study involves attending 2 sessions per week of 1/2 hour each period of 7 weeks and engaging in assigned problem solving exercises. I understand that my performance will be scored by observers during the problem solving process and that I will be given feedback on my performance. I also understand that no one else will be informed of my performance on an individual basis, but that the average performance of the entire group may be made public from time to time.

I understand that my participation in the activities of this research a requirement of the course, however, it has been made clear that the usage of my data are strictly voluntary, and that I may chose not to have my data included in the research without penalty or prejudice. Also, it has been made clear that my participation in this research will not affect my course grades or status at Western Michigan University in any way. I have been informed that giving my consent for the researcher to use my data or not to use my data will remain anonymous (in a sealed envelope and in the faculty advisor's office) until the end of the summer semester. I understand that participation in this research involves no risk to me and that information obtained about my performance will be held in confidence by the researcher and her advisor.

I realize that questions or complaints about this study may be directed to Monica Porter (372-1024). I may also contact William K. Redmon, faculty advisor for this study, at 387-4485.

My signature below indicates that I have read and understood the above information.

You may use my data: ____

Signature_________________________ Date_____________ Time_____

Signature of Investigator_________________________ Date______
Role and Responsibilities

The major role of the reliability observer is to listen to the verbal responses occurring in the group process. All responses (verbal and written) will be ranked and recorded. All prompted verbal and written responses emitted in reaction to the case studies in the nominal group technique process will be recorded. Responses will be recorded for each group member when the group leader either asks all subjects to generate a written response (e.g. "For the next five minutes, I would like each of you to generate two possible solutions."); or asks a specific subject to share his/her written responses with the other group members (e.g. "Angela what could be one possible solution?"). Subjects will be allotted five minutes to generate written responses. Only verbal responses prompted by the group leader will be recorded and a point value will be assigned to each response. Each verbal or written response will be placed into one of four categories (excellent, good, poor, or no response).

Individual/Group Feedback

Students will receive either individual feedback or group feedback based on their performance in the group process. Individual feedback is defined as information related to the previous performance of an individual. Group feedback is defined as information related to previous performance of a group.

For the individual feedback case, each subject will receive written feedback at the end of the group process. Individual feedback will consist of the following: the number of individual participation points earned for each component of the group process, the total number of points earned, the individual's percentage and grade earned for the session and the group leader's comments.

For the group feedback case, each member of the group will receive written feedback at the end of the group process. Group feedback will consist of the following: the average number of participation points earned per person for each component of the group process, the average total number of points earned per person, the group's average percentage and grade earned for the session, and the group leader's comments. Group feedback will not include information concerning any particular subject's performance.
NGT FORMAT

(1) REQUIREMENTS IDENTIFIED:
The group leader will instruct the group members to
silently read a description of the problem to be solved.
The group members will be asked to identify The Most
Important Issue of the case study and submit their response
in written form.

(2) DISCUSSION:
The group leader will prompt each group member to discuss
his/her written response with the group.

(3) RANKING THE REQUIREMENTS:
Group leader will ask individuals to select two issues that
they consider to be important. The group leader will ask
the group members to give the two selected issues rankings.
Each group member's point values will be recorded on the
blackboard next to each issue. The issue with the most
points will be the targeted issue for the group process.

(4) SOLUTIONS AND RATIONALES:
The group leader will ask the group to individually
generate one step to improve the targeted issue and a
rationale for the selection. Group member's responses must
be submitted in written form.

(5) DISCUSSION:
The group leader will verbally prompt each group member to
discuss his/her written responses.

(6) FINAL REPORT:
The group leader will instruct the group members to
finalize their discussion, and as a group, complete the
Final Report. The final report will be submitted to the
instructor by the recorder for the group. The group leader
will provide written feedback on the final report and any
additional relevant comments.
Steps for the Reliability Observer:
1. Obtain the NGT form and write the student's initials under the participants column.
2. Silently observer the group process.
3. Verbal responses:
   a. Only record the first prompted response made by the student.
   b. Provide each student with a point (0-3) for his/her response.
4. Written responses:
   a. Read all written responses and determine a point for each written response.
   b. Keep all written responses (for further data collection)
   c. Complete the rating of written responses during the final report phase, where no response measure is required.
5. There will be no recording of responses during selection of requirements. This time can be used to read over some of the written requirements.
6. Complete the NGT form, be sure to add up points at the bottom of the form.

Measurement System

Excellent Response (3 points):
A response which paraphrases relevant and related instructions. It provides detail, structure or an analysis. A excellent response elaborates or incorporates an example into the explanation. The response is clear and focused on the issue, supported by facts, and presented in a logical sequence. A supported statement, fact, or opinion.

Good Response (2 points):
A response which paraphrases some of the relevant and related instructions. Detail, structure or an analysis is given, but not in a precise or logical sequence. Support maybe given, but elaborations or examples maybe missing, unclear, or not focused on the issue. A statement, fact, or opinion which is not clearly supported.

Poor Response (1 point):
A response which is vague and not focused on the issue. A response which provides no detail, structure or analysis. No elaborations are given, and the response was not relevant or related to the issue. A poor response is one not based on facts, or support. An opinion, comment or statement.

No Response (0 points):
The student did not participate.
Reliability Responsibilities with Examples

CASE STUDY: A group of entrepreneurs have contacted your group to conduct a study that would help them build a new car wash system which would compete successfully in the market. The decision makers are two financiers, one marketing expert, and two gas station operators who will manage the system. They have agreed that in order to compete successfully they must develop a system that eliminates many of the problems prevalent in existing car washes. More than that, the marketing expert feels that including potential clients in the design of the system will offer a unique opportunity to develop market loyalty and provide a useful sales pitch for other potential clients.

I. The Requirements were Identified

a. EXCELLENT RESPONSE: Paraphrased relevant and related instructions. EXAMPLE: Student writes "the group must research the market for complaints, gather suggestions on possible changes, look at the feasibility of those changes, etc.

b. GOOD RESPONSE: Paraphrased some of the relevant instructions; however, not all of the responses related to the instructions. EXAMPLE: Student writes "the group must research the market about complaints, otherwise, they will not be a popular car wash."

c. POOR RESPONSE: Did not paraphrase relevant or related instructions. EXAMPLE: Student wrote- "I don't know" or "It's unclear."

d. NO RESPONSE: Student did not complete a written response.

II. The Requirements were Discussed

a. EXCELLENT RESPONSE: Paraphrased relevant and related instructions. EXAMPLE: Student states "the group must research the market for complaints, gather suggestions on possible changes, look at the feasibility of those changes, etc."

b. GOOD RESPONSE: Paraphrased some of the relevant instructions; however, not all of the responses related to the instructions. EXAMPLE: Student states "the group must research the market about complaints and while we are out, we can do some shopping."
c. **POOR RESPONSE**: Did not paraphrase relevant or related instructions.  **EXAMPLE**: Student states- "I don't know" or It's unclear."

d. **NO RESPONSE**: Student did not verbally participate. Student will rank their requirements, no recording of responses during this component.

III. **Solution & Rationale was Provided**

a. **EXCELLENT RESPONSE**: A solution and support was given that was relevant and related to the case study. The support included the following: Pro/con arguments were included and supported, several options and alternatives were given; facts, data, and reading materials were included to support the case study.  **EXAMPLE**: Student writes one solution would be to get information on marketing surveys to aide in a successful analysis. A full market survey will provide information as to the feasibility of a new car wash system.

b. **GOOD RESPONSE**: A solution was included, but not supported.  **EXAMPLE**: A student states "I don't think it's a good idea to conduct a full market survey" (doesn't provide support).

c. **POOR RESPONSE**: Solution and rationale given were not relevant nor related to the case study.  **EXAMPLE**: Student writes "marketing is an interesting topic to study."

d. **NO RESPONSE**: Student did not complete a written response.

IV. **Solution & Rationale was Discussed**

a. **EXCELLENT RESPONSE**: A solution and rationale was relevant and related to the case study.  **EXAMPLE**: Student states "one solution would be to get information on marketing surveys to aide in a successful analysis.

b. **GOOD RESPONSE**: A solution given but not supported.  **EXAMPLE**: Student states "One solution would be to get information on marketing surveys."
c. **POOR RESPONSE:** The solution and rationale is not relevant or related to the case study.
   **EXAMPLE:** Student states "marketing is an interesting topic to study."

d. **NO RESPONSE:** Student did not verbally participate.

---

**Final Report**

a. **EXCELLENT RESPONSE:** All three components of the final report were completed. Each response recorded was relevant and related to the instructions.

b. **GOOD RESPONSE:** All three components of the final report were completed, but some of the responses (no more than four) were not relevant or related to the instructions or some of the written responses were incomplete.

c. **POOR RESPONSE:** Some of the components of the final report were not completed and five or more of the responses were either not relevant or related to the instructions, or incomplete.

d. **NO RESPONSE:** Student did not complete a written response.
Exam Questions for Reliability Observer

1. How many steps are included in the NGT process?

2. Briefly describe each of the steps in the NGT process.

3. Provide an original example of an excellent response, good response and a poor response (use the same example for all three).
Appendix C

Group Leader's Training Manual
GROUP LEADER ROLE/RESPONSIBILITIES

Responsibilities

a. Assign one group member as recorder. This person will record the group member's verbal responses on the blackboard, and will record the final report for the group.

b. Verbally prompt each group member to share his/her written responses during the discussion phases. A prompt is either asking group members to generate a written response (e.g. "For the next five minutes, I would like each of you to generate two possible solutions."), or asking a specific subject to share his/her written responses with the other group members (e.g. "Angela what could be one possible solution?")

c. The group leader's responsibility will be to keep group members on task.

d. The group leader is responsible for reading the case study and being prepared to address any questions or concerns of the students. Case studies will include problems or situations that are common for students. For example, in a situation where students are assigned a term paper (i.e., which requires that they complete a literature search, outline and a final draft, the case study would ask group members to devise a strategy for completion of a good final report. The case studies will include terminology, techniques, procedures, examples and instructions which will be selected from current and previous units of the targeted course. If specific steps are needed in order to resolve the problem/situation, then these will be incorporated into the case study as well.
(1) REQUIREMENTS IDENTIFIED:
The group leader will instruct the group members to
silently read a description of the problem to be solved.
The group members will be asked to identify The Most
Important Issue of the case study and submit their response
in written form.

(2) DISCUSSION:
The group leader will prompt each group member to discuss
his/her written response with the group.

(3) RANKING THE REQUIREMENTS:
Group leader will ask individuals to select two issues that
they consider to be important. The group leader will ask
the group members to give the two selected issues rankings.
Each group member's point values will be recorded on the
blackboard next to each issue. The issue with the most
points will be the targeted issue for the group process.

(4) SOLUTION AND RATIONALE:
The group leader will ask the group to individually
generate one step to improve the targeted issue and a
rationale for the selection. Group member's responses must
be submitted in written form.

(5) DISCUSSION:
The group leader will verbally prompt each group member to
discuss his/her written responses.

(6) FINAL REPORT:
The group leader will instruct the group members to
finalize their discussion, and as a group, complete the
Final Report. The final report will be submitted to the
group leader by the recorder for the group. The instructor
will provide written feedback on the final report and any
additional relevant comments.
GUIDELINES FOR POINT DISTRIBUTION

1. IDENTIFY THE REQUIREMENTS:
   A. IF THE RESPONSE IS A SOLUTION INSTEAD OF A REQUIREMENT, IT WILL RECEIVE ONE POINT.
   B. IF THE RESPONSE IS NOT THE REQUIREMENT THEN THE RESPONSE WILL RECEIVE ONE POINT.

2. COMPLETE THE REQUIREMENTS:
   A. IF THE RESPONSE IS WRITTEN UNDER THE SUPPORT SECTION, THEN THE RESPONSE RECEIVES NO POINTS. THEREFORE, THE MAXIMUM POINTS WHICH CAN BE GIVEN IS 1 POINT.
   B. IF THE RESPONSE IS MIXED IN WITH THE SUPPORT THEN IT CAN ONLY RECEIVE 1 POINT.
   C. IF THE REQUIREMENT WHICH THE GROUP DECIDED TO RESOLVE IS GIVEN AS THE RESPONSE, THEN THAT RESPONSE CAN ONLY RECEIVE 1 POINT.

3. FINAL REPORT:
   A. FOR THE FIRST COMPONENT OF THE CASE STUDY, MAKE SURE THAT THE REQUIREMENTS ARE LISTED AND SUPPORTED. IF THE SUPPORT IS MISSING, SUBTRACT ONE POINT.
   B. THERE SHOULD BE SEVERAL RESPONSES LISTED FOR THE GROUP MEMBER'S RESPONSES (i.e., more than three) IF NOT SUBTRACT ONE POINT.
   C. SUPPORT SHOULD BE PROVIDED FOR MOST OF THE RESPONSES LISTED. A FINAL SUMMARY SHOULD BE GIVEN, IF EITHER ONE IS MISSING, SUBTRACT ONE POINT.

4. VERBAL RESPONSES:
   A. IF THE VERBAL RESPONSE IS MISSING SUPPORT (WHY) THEN THE RESPONSE CAN ONLY RECEIVE THE MAXIMUM OF 2 POINTS.
   B. IF THE VERBAL RESPONSE WAS TO IDENTIFY THE REQUIREMENTS AND A SOLUTION WAS GIVEN, THEN THAT RESPONSE CAN ONLY RECEIVE ONE POINT.
   C. IF THE CASE STUDY ASKED FOR TWO SOLUTIONS AND ONLY ONE IS GIVEN, THEN SUBTRACT A POINT.
Exam Questions for the Group Leader

1. Give an original example of a prompt.

2. How many steps are included in the NGT process?

3. Briefly describe the steps in the group process.

4. Briefly describe how the most important issue will be determined by the group.
Appendix D

Subjects' Training Manual
Group Members Role/Responsibilities with Examples

Responsibilities

a. For each group process, one group member will be assigned as the recorder. This person will record the group member's verbal responses on the blackboard, and will record the final report for the group.

b. Each group member will be prompted by the group leader to share his/her written responses during the discussion phases. A prompt is either being asked to generate a written response (e.g. "For the next five minutes, you are to generate one possible solution."), or being asked to discuss your written responses with the other group members (e.g. "Angela what did you list as a possible solution?")

c. All written responses and prompted verbal responses will be recorded as either excellent, good, poor or as "no response." The accumulation of points will result in a letter grade.

Measurement System

Excellent response. An excellent response has two key components. It must be relevant and related to the case study, and supported by a reason, explanation or an example (e.g., "The most important issue is to identify a technique which can improve a car wash system, because the technique will improve efficiency and incomes."). A response judged to be "excellent will be awarded the maximum number of points possible (3).

Good response. A good response is similar to an excellent response, but it is missing one of the two components, for example, a response which is relevant, but does not relate to the case study. A good response may not be supported by a reason, explanation or an example (i.e., "The most important issue is to identify a technique to improve the car wash system."). Also, a reason, explanation or an example may be given, but the presentation may not be directly focused on the issue (e.g., "The most important issue is to identify a technique to improve the car wash system, because car washing has been a around for the past 50 years."). This response will receive only half (2 points) of the possible points.
Poor response. A poor response is different from an excellent response because it is missing both components. A poor response is not related to the case study and is not supported by reason, explanations or examples (e.g., "Car washing is cool"). This response will receive the minimum number of points possible (1).

No response. A non-participant will receive no points.

NGT FORMAT

(1) REQUIREMENTS IDENTIFIED:
The group leader will instruct the group members to silently read a description of the problem to be solved. The group members will be asked to identify The Most Important Issue of the case study and submit their response in written form.

(2) DISCUSSION:
The group leader will prompt each group member to discuss his/her written response with the group.

(3) RANKING THE REQUIREMENTS:
Group leader will ask individuals to select two issues that they consider to be important. The group leader will ask the group members to give the two selected issues rankings. Each group member's point values will be recorded on the blackboard next to each issue. The issue with the most points will be the targeted issue for the group process.

(4) SOLUTION AND RATIONALE:
The group leader will ask the group to individually generate one step to improve the targeted issue and a rationale for the selection. Group member's responses must be submitted in written form.

(5) DISCUSSION:
The group leader will verbally prompt each group member to discuss his/her written responses.

(6) FINAL REPORT:
The instructor will instruct the group members to finalize their discussion, and as a group, complete the Final Report. The final report will be submitted to the group leader by the recorder for the group. The group leader will provide written feedback on the final report and any additional relevant comments.
Example of NGT

1. READ Case Study
Each group member begins with reading the case study.

Case Study
A group of entrepreneurs have contacted your group to conduct a study that would help them build a new car wash system which would compete successfully in the market. The decision makers are two financiers, one marketing expert, and two gas station operators who will manage the system. They have agreed that in order to compete successfully they must develop a system that eliminates many of the problems prevalent in existing car washes. More than that, the marketing expert feels that including potential clients in the design of the system will offer a unique opportunity to develop market loyalty and provide a useful sales pitch for other potential clients.

2. IDENTIFY THE REQUIREMENTS
Identify the most important issue of the case study. This should be completed in written form and submitted to the group leader.

EXAMPLE:
Eliminating problems that are existing in current car wash systems.

3. GROUP DISCUSSION
Each group member will be prompted by the group leader to share his/her written responses. All responses will be recorded on the blackboard.

EXAMPLE:
"I found the most important issue is to eliminate problems...."

4. SELECTION OF THE MOST IMPORTANT ISSUE
Each group member will be instructed to individually select (which will be listed on the blackboard) two issues which he/she considers to be important. The most important issue should be assigned two points and the next important issue should be assigned one point. The issue which received the most points will be the selected issue for the group process.

EXAMPLE:
 a. Eliminate problems...(2 pts.) most important
 b. Conduct study...(1 pt.) next important
5. COMPLETE THE REQUIREMENTS AND PROVIDE A RATIONALE
Each group member will individually generate two steps to improve the targeted issue. Each group member should submit a written response. Group members are also instructed to provide a written rationale as to why was the choice selected. Rationales can include strengths, pro arguments, cost, feasibility, etc. Written rationales are submitted to the group leader.

EXAMPLE:
Do a survey in the community targeting certain populations. A survey can save the company money because the focus is only directed towards those areas in need of improvements.

6. GROUP DISCUSSION
Each group member will be prompted by the group leader to share his/her written responses. All responses will be recorded on the blackboard.

EXAMPLE:
"I thought that one step to improve would be to conduct a survey...., because it will save money in improving only necessary areas of the car wash."

7. FINAL REPORT
The group leader will instruct the group members to discuss the relevant issues so that the Final Report can be completed and submitted. No prompting will occur during this phase. The final report should be submitted by the recorder for the group.
Exam Questions for Group Members

1. How many steps are included in the NGT process?

2. Briefly describe each of the steps in the NGT process.

3. Provide an original example of an excellent response, good response and a poor response (use the same example for all three).
Appendix E

Forms Used in the NGT
NAME:

IDENTIFY THE REQUIREMENTS:

RANK THE REQUIREMENTS:
1. MOST IMPORTANT (2PTS.) _______________________________
2. IMPORTANT (1 PT.) ________________________________

COMPLETE THE REQUIREMENTS OF THE CASE STUDY. SUPPORT YOUR ANSWER.

RESPONSE:

SUPPORT FOR YOUR RESPONSE:
FINAL REPORT

What did the group identify as the major requirements of the case study?

What were the group member's responses to the completion of the case study?

Provide support for all of the listed responses and a final summary.
### Individual Feedback

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Points Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>Final Report</td>
<td></td>
</tr>
</tbody>
</table>

**Total Points** __________  % Earned __________  Grade __________

Instructor's Comments:
### Group Feedback

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Points Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>Final Report</td>
<td></td>
</tr>
<tr>
<td>Total Points</td>
<td>% Earned</td>
</tr>
</tbody>
</table>

**Instructor's Comments:**
### FEEDBACK

<table>
<thead>
<tr>
<th>NAMES</th>
<th>1-Requirement</th>
<th>2-Discussion</th>
<th>3-Solution</th>
<th>4-Rationale</th>
<th>5-Discussion</th>
<th>6-Final Report</th>
<th>Total Points</th>
<th>Percentages</th>
<th>Grades</th>
</tr>
</thead>
</table>

#### RATING SCALE

<table>
<thead>
<tr>
<th>POINTS</th>
<th>PERCENTAGE</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCELLENT</td>
<td>3</td>
<td>92-100 %</td>
</tr>
<tr>
<td>GOOD</td>
<td>2</td>
<td>88-91 %</td>
</tr>
<tr>
<td>POOR</td>
<td>1</td>
<td>83-87 %</td>
</tr>
<tr>
<td>NO</td>
<td>0</td>
<td>78-82 %</td>
</tr>
<tr>
<td>73-77 %</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>68-72 %</td>
<td>C/D</td>
<td></td>
</tr>
<tr>
<td>63-67 %</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>62-Below</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

DATE: ____________________

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Appendix F

Subjects' Individual Performance
Figure 3. Average Points Earned per Session for All Experimental Phases for Subject 1.

Figure 4. Average Points Earned per Session for All Experimental Phases for Subject 2.
Figure 5. Average Points Earned per Session for All Experimental Phases for Subject 3.

Figure 6. Average Points Earned per Session for All Experimental Phases for Subject 4.
Figure 7. Average Points Earned per Session for All Experimental Phases for Subject 5.

Figure 8. Average Points Earned per Session for All Experimental Phases for Subject 6.
Figure 9. Average Points Earned per Session for All Experimental Phases for Subject 7.

Figure 10. Average Points Earned per Session for All Experimental Phases for Subject 8.
Figure 11. Average Points Earned per Session for All Experimental Phases for Subject 9.

Figure 12. Average Points Earned per Session for All Experimental Phases for Subject 10.
Figure 13. Average Points Earned per Session for All Experimental Phases for Subject 11.

Figure 14. Average Points Earned per Session for All Experimental Phases for Subject 12.
Figure 15. Average Points Earned per Session for All Experimental Phases for Subject 13.

Figure 16. Average Points Earned per Session for All Experimental Phases for Subject 14.
Figure 17. Average Points Earned per Session for All Experimental Phases for Subject 15.

Figure 18. Average Points Earned per Session for All Experimental Phases for Subject 16.
Figure 19. Average Points Earned per Session for All Experimental Phases for Subject 17.

Figure 20. Average Points Earned per Session for All Experimental Phases for Subject 18.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Figure 21. Average Points Earned per Session for All Experimental Phases for Subject 19.

Figure 22. Average Points Earned per Session for All Experimental Phases for Subject 20.
Appendix G

Human Subjects Institutional Review Board Approval
Date: January 14, 1991
To: Monica Porter
From: Mary Anne Bunda, Chair
Re: HSIRB Project Number 90-12-21

This letter will serve as confirmation that your research protocol, "The Effects of Individual Feedback and Group Feedback on the Nominal Group Technique" (as revised), has been approved after expedited review by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: William Redmon, Psychology

Approval Termination: January 14, 1992
BIBLIOGRAPHY


