AN INSTRUMENT FOR EVALUATING THE QUALITY OF THE STATISTICAL CONSULTING EXPERIENCE

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Introduction

Most of the literature concerned with statistical consulting focuses on the interpersonal aspects of the client-consultant relationship or the mechanics of operating a statistical consulting service. Evaluation of the quality of the consulting service has been a neglected issue. A paper and pencil evaluation instrument has been developed at the University of North Carolina at Greensboro's Statistical Consulting Center. The instrument evaluates three major areas of the consulting experience:

I. Educational Worth/Need,
II. Administration, and
III. Consultant Evaluation.

The Administration and the Worth/Need section contains 18 statements (nine positive and nine negative) in which the client responds to a Likert scale anchored on each end by strongly agree and strongly disagree.

The Consultant Evaluation section is a 25-item semantic differential anchored on the extremes by bipolar adjectives. This section is broken down into five subscales:

(a) Perceived Knowledge and Reasoning,
(b) Communication Skills,
(c) Interpersonal Relations,
(d) Planning and Organization, and
(e) Consulting Style and Philosophy.

The instrument also assesses the level of statistical expertise of the client along with the amount of statistical computing experience. This instrument has been used to justify funding by the university administration and in tenure/promotion decisions. A SAS program is used to reflect questions, calculate subscale composite scores, and produce a standardized report/graph for each consultant.

Evaluation Instrument

The following instrument was devised over a two-year period for purposes of evaluation of individual staff members and the overall consulting experience. Items on the Educational Worth/Need section and the Administration Section were chosen and reviewed by a panel of nine experts (faculty and graduate students in statistics) for content validity and readability. Although most of the items for these sections should apply to a variety of consulting situations, a few may be unique to the operation at UNC-Greensboro. Frequencies for each individual item may be tabulated along with a composite score on each subscale.

The Consultant Evaluation Section consists of 25 bipolar items on five subscales (five items per subscale). Items for this section were selected by a three-stage process. First, a pool of 60 items were devised from a variety of sources including graduate students, faculty and staff, and researchers within the university. These 60 items were reduced to 40, partially based on redundancy, readability, etc. The 40 items were then placed into subscale categories by a panel of 6 statisticians and three graduate students. A random sample of 30 people were then asked individually to sort the items into the subscales (Q sort). Items that did not sort with at least 70% accuracy were dropped. The final inventory has five subscales with five items per subscale.

Demographic information is also surveyed. Along with basic information as to the client's department, rank, etc. two questions attempt to assess the client's level of statistical expertise and computing ability. Appendix A contains the complete questionnaire.

SAS® and SAS/GRAPH® Programs

The following SAS/SAS GRAPH program can produce a full report on all sections of the survey. It reflects questions, calculates subscale composite scores, and produces a standardized report for each individual consultant as well as for the Statistical Consulting Center as a whole. A shortened version of the program is presented in Appendix B (i.e., we have only included program statements to produce reports for two of five consultants and we have omitted statements to produce frequencies tables and means for the center as a whole). A sample of the individual consultant report/graph is presented in Appendix C. The SAS/GRAPH output is a plot of the subscale composite scores for each consultant along with a profile line representing the average score across the entire Statistical Consulting Center. Each consultant receives a SAS/GRAPH plot and a demographic report describing the general makeup of their client population.

Further questions about the survey or the program should be addressed to:

Dr. David A. Ludwig
Department of Mathematics
323 Bryan Building
University of North Carolina at Greensboro
Greensboro, NC 27412

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APPENDIX A

DEMOGRAPHIC INFORMATION

Please circle the one response after each question that you feel best describes you. 

1. Your position (Circle One Only)
   1. WMS Faculty
   2. WMS Graduate Student
   3. WMS Administration or Staff

2. Your departmental affiliation (Circle One Only)
   1. Outside users should select "Current/Out" affiliation
   2. Accounting
   3. Anthropology
   4. Art
   5. Biology
   6. Business Administration
   7. Business Information
   8. Chemistry
   9. Child Development/Family Relations
   10. Classical Civilization
   11. Clothing and Textiles
   12. Communication and Theater
   13. Counseling
   14. Decision and Teaching
   15. Economics
   16. Educational Organization and Administration
   17. Educational Psychology
   18. English
   19. Food and Nutrition
   20. Geography
   21. Health and Human
   22. Library Administration
   23. Music
   24. No Affiliation

3. Did you attend the initial class meeting held by the statistics course? (Circle One Only)
   1. Yes
   2. No

4. Which faculty member was your primary consultant? (Circle One Only)
   1. Jane Doe
   2. Jane Smith
   3. John Doe

5. How many hours did you put in the lab for coursework? (Circle One Only)
   1. No lab hours
   2. Up to 25 hours
   3. More than 25 hours

6. Which statement best describes your level of statistical competence? (Circle One Only)
   1. Beginner: My training in statistics has been limited. I have very little knowledge of understanding of statistical methods or their underlying theory. I would not have known where to begin if I had to perform and interpret my own analysis
   2. Novice: I have had a basic introduction to statistics, and I have a rudimentary understanding of statistical methods and their underlying theory. I had to perform and interpret my own analysis
   3. Intermediate: I have had two or three upper level courses in statistics, and I have learned some statistics on my own. I have completed a computer workshop or workshop in which I learned a few things. I feel comfortable with the underlying assumptions of statistical methods and have a rudimentary understanding of statistical methods and their underlying theory.
   4. Advanced: I have advanced qualifications in statistics. I know a statistician and feel I have a thorough understanding of statistical methods and their underlying theory. I am prepared to perform and interpret my own analysis.

7. Which statement best describes the stage of your research when you first consulted with the staff of the CEC? (Circle One Only)
   1. Planning Stage: only a general research idea had been formulated. The study was purely conceptual.
   2. Preliminary Stage: a basic research design had been formulated but at this point no specific plan had been written down or data collected.
   3. Experimental Stage: the experiment or observational study was underway. Data was currently being collected but not complete.
   4. Final Stage: the experiment or observational study was over and all the data has been analyzed.

8. Did you attend the initial class meeting held by the statistics course? (Circle One Only)
   1. Yes
   2. No

9. Which statement best describes your level of statistical competence? (Circle One Only)
   1. Beginner: My training in statistics has been limited. I have very little knowledge of understanding of statistical methods or their underlying theory. I would not have known where to begin if I had to perform and interpret my own analysis.
   2. Novice: I have had a basic introduction to statistics, and I have a rudimentary understanding of statistical methods and their underlying theory. I had to perform and interpret my own analysis.
   3. Intermediate: I have had two or three upper level courses in statistics, and I have learned some statistics on my own. I have completed a computer workshop or workshop in which I learned a few things. I feel comfortable with the underlying assumptions of statistical methods and have a rudimentary understanding of statistical methods and their underlying theory.
   4. Advanced: I have advanced qualifications in statistics. I know a statistician and feel I have a thorough understanding of statistical methods and their underlying theory. I am prepared to perform and interpret my own analysis.

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PART II
GENERAL SATISFACTION
Indicates by checking one of the six boxes the extent to which you agree or disagree with each statement below. The six boxes represent a continuum between strongly agree and strongly disagree. Since near the middle of the continuum represents mild/mild agreement or disagreement.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. It was helpful to be assigned to both a faculty and a student consultant.  
2. My research project would have been difficult to complete or even possible without the help of the SOC.  
3. The assistance I received from the SOC could not be easily obtained from other sources on campus, e.g., colleagues, membership, members of my committee, etc.  
4. The procedure for obtaining help from the SOC was confusing and unclear.  
5. I rarely had to wait more than 1 minute to get a scheduled appointment.  
6. If I felt like I wasted my time coming to the SOC.  
7. The cost of services provided by the SOC was unreasonable high.  
8. When I made a consulting appointment, the consultants in the stat offices were courteous and helpful.  

(Turn to the back of this page)

PART III
FACULTY CONSULTATION COLLABORATION
The following section will be used to evaluate the performance of faculty consultants. Requested to those times with reference to your scheduled consulting experiences and specifically to the faculty consultant with whom you worked at the SOC (the faculty whose you indicated as your primary faculty consultant in position 1 on front of this survey).

Items for this part of the survey consist of opposite adjectives which serve an description of your consulting experiences. The adjectives pairs are separated on a continuum represented by six boxes. Check the box on the continuum which best represents your consultant. Boxes near the middle of the continuum represent mild/mild agreement or disagreement between the two adjective descriptors.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Witty  
2. Practical  
3. Modest  
4. Peaceful  
5. Regarded  
6. Planned  
7. Empathetic  
8. Misleading  
9. Wonderful  
10. Cautious  
11. Indecisive  
12. Articulate  
13. Inclusive  
14. Sincere  
15. Illogical  
16. Undeletable  

(For the back of this page)

9. If the computer skills author  
10. The assistants in the math  
11. The assistant provided by the SOC  
12. The consulting sessions were of  
13. My knowledge of statistics and/or  
14. I was not able to get a  
15. It is beneficial to have a tape  
16. I would not recommend the use of  

The following items refer to the drop-in lab and may or may not be applicable for you. Please respond if you used the drop-in lab this semester.

17. The drop-in consulting lab was often crowded, and I could not get adequate help before it closed for the day.  
18. The scheduled times for drop-in consulting were distributed in such a way that I had few problems in using this service.

(For the back of this page)
APPENDIX B

**DATA KISSLING;**

**DATA FARRACCT;**

**PROC PRINT DATA=KIS**

**PROC PRINT DATA=A**

**PROC MEANS MEAN**

**PROC MEANS MEAN**

**PROC MEANS MEAN**

**DATA FALL87:**

**PROC MEANS MEAN**

**PROC MEANS MEAN**

**DATA FALL87:**

**PROC MEANS MEAN**

**PROC MEANS MEAN**

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**DATA FALL87:**

**PROC MEANS MEAN**

**PROC MEANS MEAN**

**DATA FALL87:**

**PROC MEANS MEAN**

**PROC MEANS MEAN**
Now we need to break up output from HRAINS so that we have one observation per sub-scale.

DATA secXj;
SET SCCXI;
KEEP C SCALE C SCOREj;
C SCALE = 1;
C SCORE = X1;
OUTPUT;
C SCALE = 2;
C SCORE = X2;
OUTPUT;
C SCALE = 3;
C SCORE = X3;
OUTPUT;
C SCALE = 4;
C SCORE = X4;
OUTPUT;
C SCALE = 5;
C SCORE = X5;
OUTPUT;
RUN;

DATA KISSLINX;
SET KISSLINX;
KEEP SCALE SCORE;
SCALE = 1;
SCORE = X1;
OUTPUT;
SCALE = 2;
SCORE = X2;
OUTPUT;
SCALE = 3;
SCORE = X3;
OUTPUT;
SCALE = 4;
SCORE = X4;
OUTPUT;
SCALE = 5;
SCORE = X5;
OUTPUT;
RUN;

/* Here, we build a format for the scales. */
PROC FORMAT;
VALUE SCALE 0 "1" 1 "KR" 2 "CS" 3 "IR" 4 "PO" 5 "SP"
RUN;

/* Now that we have the means output in the desired form, we need to merge the individual data with that of the center. */
DATA KISSLINX;
MERGE KISSLINX;
LABEL C_SCORE = "AVERAGE RATING";
LABEL C_SCALE = "SRK-SCALE";
FORMAT C_SCALE SCALE.;
RUN;

DATA VARRACKX;
MERGE VARRACKX;
LABEL C_SCORE = "AVERAGE RATING";
LABEL C_SCALE = "SRK-SCALE";
FORMAT C_SCALE SCALE.;
RUN;

/* Now we make some IND-plot. */
GOPTIONS DEV=TEK4014;
MODIFY;
GPLODG="1P58F13386C8";
GPLODG="1P58F13386C9";
GIPRINT-OFFEND;
GIPRINT=OFFEND;
RUN;

PROC GPLOT DATA=KISSLINX;
PLOT C_SCORE*C_SCALE = 1 ;
SCALE = 2 ;
OVERLAY;
FRAME = 0 TO 6 BY 1
TITLE1 = "UNCG Statistical Consulting Center";
TITLE2 = "1986-87 Evaluation";
TITLE3 = "Dr. Kissling";
TITLE4 = "";
TITLE5 = "Asterisk indicates individual score";
TITLE6 = "Circle indicates SEC composite score";
FOOTNOTE1 = "KR = Perceived Knowledge/Reasoning";
FOOTNOTE2 = "CS = Communication Skills";
FOOTNOTE3 = "IR = Interpersonal Relations";
RUN;

GOPTIONS DEV=TEK4015;
MODIFY;
GPLODG="1P58F13386C8";
GPLODG="1P58F13386C9";
GIPRINT-OFFEND;
GIPRINT=OFFEND;
RUN;

PROC GPLOT DATA=VARRACKX;
PLOT C_SCORE*C_SCALE = 1 ;
SCALE = 2 ;
OVERLAY;
FRAME = 0 TO 6 BY 1
TITLE1 = "UNCG Statistical Consulting Center";
TITLE2 = "1986-87 Evaluation";
TITLE3 = "Dr. Varrack";
TITLE4 = "";
TITLE5 = "Asterisk indicates individual score";
TITLE6 = "Circle indicates SEC composite score";
FOOTNOTE1 = "KR = Perceived Knowledge/Reasoning";
FOOTNOTE2 = "CS = Communication Skills";
FOOTNOTE3 = "IR = Interpersonal Relations";
RUN;

ENDSAS;
APPENDIX C

UNCG Statistical Consulting Center
1986-87 Evaluation
For Dr. Grace Kissling

University Departmental Affiliation

<table>
<thead>
<tr>
<th>DEPT</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Dev/Family</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Counseling</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Food/Nutrition</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Housing/Int Dsgn</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Nursing</td>
<td>5</td>
<td>33.3</td>
</tr>
<tr>
<td>Psychology</td>
<td>5</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Client's Position

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<tr>
<th>POSITION</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
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<tbody>
<tr>
<td>Graduate Student</td>
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Stage of Research When First Consult SCC

<table>
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<tr>
<th>STAGE</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Stage</td>
<td>6</td>
<td>46.0</td>
</tr>
<tr>
<td>Beginning Stage</td>
<td>4</td>
<td>26.7</td>
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<tr>
<td>Upper Stage</td>
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<td>26.7</td>
</tr>
<tr>
<td>Final Stage</td>
<td>3</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Prior Level of Statistical Expertise

<table>
<thead>
<tr>
<th>STATLEV</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>4</td>
<td>26.7</td>
</tr>
<tr>
<td>Beginner</td>
<td>4</td>
<td>26.7</td>
</tr>
<tr>
<td>Intermediate</td>
<td>5</td>
<td>33.3</td>
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</table>

Prior Computer Ability

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<thead>
<tr>
<th>CMPLAV</th>
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<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
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<td>33.3</td>
</tr>
<tr>
<td>Beginner</td>
<td>5</td>
<td>33.3</td>
</tr>
<tr>
<td>Intermediate</td>
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<td>26.7</td>
</tr>
<tr>
<td>Advanced</td>
<td>1</td>
<td>6.7</td>
</tr>
</tbody>
</table>

UNCG Statistical Consulting Center
1986-87 Evaluation
Dr. Kissling

Asterisk indicates individual score
Circle indicates SCC composite score

![Graph showing sub-scales]

Sub-scale

KR = Perceived Knowledge/Reasoning
CS = Communication Skills
IR = Interpersonal Relations
PO = Planning/Organization
SP = Consultant Style/Philosophy

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