Department of Psychology
Summary of Assessment Accomplishments
2007-2008 Academic Year

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Learning Outcomes:

At the completion of baccalaureate degree studies in Psychology, students will:

1. Exhibit broad knowledge about human behavior from a variety of psychological
   perspectives (e.g., biological, cognitive, developmental, social).
2. Have the necessary skills in research and other forms of inquiry in order to develop new
   knowledge about behavior.
3. Be able to communicate their knowledge of psychology to others.
4. Have the necessary skills and content knowledge to be an informed and critical consumer
   of existing knowledge.
5. Be prepared for post-baccalaureate studies in psychology or related disciplines, or for
   entering the workforce in areas related to their training.

Annual Report

1. Learning (or Service) Outcomes assessed this year:

During 2007-08, we focused primarily on Learning Outcomes 2, 4, and 5 by evaluating the
skills that students gained during our statistics and research methods sequence (PSYC 270 and
PSYC 290).

The decision to focus on statistics and research skills was primarily motivated by results of
recent years’ assessment reports. As noted in last year’s report, a large number of different
instructors have taught our statistics and research methods classes in recent years, without a
common syllabus, common textbook, common exams, or common assignments. Thus,
although the general goals of the classes may be met, the specific learning outcomes of these
courses are not necessarily consistent from one section to another.

A second motivation for this focus derived from the introduction of a pilot program in the
Psychology Department in the Fall of 2007. This pilot program allowed a subset of students to
enroll in “linked” sections of PSYC 270 in the Fall semester and PSYC 290 in the Spring
semester. These linked classes were taught by the same instructor and comprised the same
students. The goal of these linked sections was to teach statistics and research methods in an
integrated fashion across the year, rather than teaching these related skill sets in isolation from
one another. The intention was for these linked classes to give students a richer understanding
of both statistics and research methods and the ways in which these topics related to one another than they might otherwise acquire.

The goals of this year’s assessment activities were to (a) gain a clearer understanding of the skills that our students do and do not have by the end of the statistics/methods sequence, (b) examine if students taking the linked version of PSYC 270 and 290 have an advantage over students taking the traditional PSYC 270-290 sequence in either statistics and research methods skills and/or in attitudes toward this material, and (c) observe how previous math preparation might impact students’ level of success in these classes.

2. Assessment Methods and Procedures:

Three measurement tools were used in the current assessment. First, all students taking PSYC 270 (statistics) in the Fall of 2007 completed a Math Skills Inventory (MSI) during the first week of the semester. Second, all students taking PSYC 290 (research methods) in the Spring of 2008 completed a test of Statistics and Research Methods Skills (SRMS). Third, the same group of students completed a survey of Statistics and Research Methods Attitudes (SRMA). All assessments were given in class, but did not count toward class grades. Students included their names or P-numbers on each test and were told that the data would be used in group-level analyses to better understand the math background of our students coming into the statistics/research methods sequence. Each of these tools is described in slightly greater detail below and can be found in the Appendices attached to this report.

Math Skills Inventory (MSI). The MSI was a 65 item test modified from Gravetter and Wallnau (1999), and included math skills ranging from basic calculation through advanced algebra (material covered in Math 122, the pre-requisite for PSYC 270). The 6 sections of the MSI were (1) order of operations in calculation, (2) fractions and decimals, (3) negative numbers, (4) algebra with one unknown, (5) algebra with two unknowns, and (6) advanced algebra.

Statistics and Research Methods Skills (SRMS). The SRMS was a 33 item test constructed for this assessment by adapting relevant items from Psychology GRE subject test study materials. Because the GRE test materials emphasized statistics over research methods, a few additional items were developed on this topic by PSYC 290 faculty who were not teaching the course this year. The final test included 17 items that assessed statistics skills and 16 items that assessed research methods skills.

Statistics and Research Methods Attitudes (SRMA). The SRMA was a 28 item test which asked students about their attitudes toward statistics and research methods (e.g., “I enjoy taking statistics and research design classes”). These items were adapted from an existing measure of statistics related attitudes (Mills, 2004). Four subscales (consistent with Mills) emerged in an exploratory factor analysis of this measure: Affect (positive and negative emotions about statistics), Value (the feeling that statistics and research methods are useful), Difficulty, and Cognitive competence (the student’s ability to learn the material). A composite score of overall positive feelings was also created.
To achieve assessment goal (a), we gave the SRMS and the SRMA at the end of the Spring semester to students completing our research methods course (PSYC 290). To accomplish our second assessment goal, we compared scores on the SRMS and SRMA, between 17 students who had completed the PSYC 270/PSYC 290 sequence in a linked format (section L), and 44 students who had completed it in the traditional format (23 students in Section T1 and 21 students in section T2). To accomplish assessment goal (c), we administered the MSI at the beginning of the Fall semester to students (n = 92) who were enrolled in our statistics course (PSYC 270). We then examined the relationships between our outcome variables (scores on the SRMS and SRMA as well as grades in PSYC 270 and PSYC 290) and predictor variables including math placement test score, grade in Math 122, and scores on the MSI.

3. Inferences from Assessment

Skills acquired in PSYC 270 and PSYC 290
On average, students correctly answered 10.1 of the 17 items that assessed statistics skills (60%). Although this seems to be a poor outcome, recall that the majority of these students completed this assessment approximately one full semester after they completed their statistics course (and, in some cases, more). Furthermore, the questions were taken from GRE study materials, a test intended for the highest performing students. Taken in this light, 60% retention of statistics skills is reasonable. On the research methods items, students’ scores were at a similar level (58% correct, on average).

An examination of the items revealed specific strengths and weaknesses of the students’ statistics and research methods skills at the end of PSYC 290. Students were quite successful (i.e., more than 75% of the students answered correctly) on the topics of: measures of central tendency, identifying the design of an experiment, selecting the correct inferential statistic to test a hypothesis, sampling, sample and population parameters, and the logic of hypothesis testing. On the other hand, students performed poorly (i.e., fewer than 50% of the students answered correctly) on the topics of: data transformations, test reliability, drawing conclusions from statistics, interpreting figures, and interpreting interactions. An important next step will be for the department to determine which of these topics is essential to cover in our statistics and research methods sequence and then to convey these standards to all instructors who teach these courses.

Attitudes toward Statistics and Research Methods
Overall, students’ attitudes toward statistics and research methods were neither strongly positive nor strongly negative. Most students tended to have attitudes that fell toward the middle of the 7-point scale. For example, on items that asked about how difficult students felt these topics are, the mean score was a 4.3 which is almost exactly at the midpoint of the scale. Students were slightly more positive about the usefulness of the material (mean of 4.8 which tends slightly toward agreeing that that material is useful) and about their own ability to learn the material (mean of 5.0 which again tends toward believing that one can learn the material).

To understand these scores in context, we compared the item level means obtained from our students with those reported by Mills (2004). The comparison sample was 203 undergraduate students enrolled in an introductory statistics class in the College of Business of a large
southeastern university. For the most part, the means were comparable, with a few notable exceptions which showed more positive attitudes on the part of our students relative to the comparison group. Specifically, our students scored a full standard deviation higher on the item “I use statistics and research design in my everyday life,” and on the item “I am comfortable with all of the steps of the research process from beginning to end.” Our students scored ½ standard deviation higher than the comparison group on the item “I can learn statistics and research design” and the (reverse-coded) item “Statistics and research design conclusions are rarely presented in everyday life.”

These findings suggest that our students are receiving positive messages about the value of these topics and about their ability to learn them. These results should be further evaluated by comparing scores on the attitudinal measure at the beginning of the sequence with scores at the end of the sequence. Generally, psychology students are intimidated by course in statistics and so it would be useful to see if their attitudes became more positive with increased exposure.

Impact of Linked PSYC 270 – PSYC 290

The somewhat low retention of statistics material through the end of the research methods course, suggests that overall, students might not be integrating the material from these two highly related courses. Thus, we next examined whether students performed better on statistics and research methods skills after taking a version of these courses that were linked (taught by the same instructor to the same students over the course of an entire year) versus after taking the traditional version of this class (2 separate classes – one in statistics and one in research methods). To test this, we first compared scores on the SRMS test between three sections of PSYC 290 students (section L was linked, sections T1 and T2 were traditional).

<table>
<thead>
<tr>
<th></th>
<th>% Statistics Q’s Correct</th>
<th>% Research Methods Q’s correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section L</td>
<td>74%</td>
<td>59%</td>
</tr>
<tr>
<td>Section T1</td>
<td>43%</td>
<td>48%</td>
</tr>
<tr>
<td>Section T2</td>
<td>66%</td>
<td>68%</td>
</tr>
</tbody>
</table>

As can be seen in the Table above, there was a wide range of performance on the statistics and research methods skills test across sections. This is a strong indication that the material covered in each section of PSYC 270 and PSYC 290 may not be consistent. Because all of the students will be expected to have a certain degree of skill for their laboratory classes, it is very important that instructors are in agreement about what material should be covered in PSYC 270 and PSYC 290. A one-way ANOVA \( F(2, 60) = 47.8, p < .01 \) on the statistics part of the test revealed that students in the linked section of PSYC 290 did better than students in the other two sections and that students in section T2 did better than students in section T1. On the research methods part of the test, a one-way ANOVA \( F(2, 60) = 8.06, p < .01 \) revealed that students in sections L and T2 did better than students in section T1.

Our interpretation of these findings is that a main advantage of the linked PSYC 270 – PSYC 290 courses is better retention by the students of statistics skills through the end of their research methods course. Because the two subjects are taught in an integrated fashion in the linked section, students do not fall victim to the tendency to compartmentalize information, and
are instead encouraged to continue to incorporate their prior knowledge into the new information they are learning. Of course, since the linked sections are taught by a single instructor, it is possible that this instructor is simply a highly effective teacher and students in classes with this instructor would do better even in the traditional class structure. Continued evaluation as this course is taught by multiple instructors would be needed to determine the impact of the linked classes beyond the effects of a single instructor.

A second conclusion from these findings is that some traditional sections of PSYC 290 do a better job than others of promoting retention of statistics material. Given that the section (T1) that received the lowest score on the statistics questions also received the lowest score on the research methods questions, it is possible that attempting to teach these subjects in isolation, leads to worse understanding of both.

Early informal feedback from students about the linked courses was quite positive. Thus, we were also interested in knowing whether the students who took the linked courses finished the semester with more positive attitudes about statistics and research methods than students who took the traditional version of the courses.

<table>
<thead>
<tr>
<th></th>
<th>Positive Affect</th>
<th>Value</th>
<th>Difficulty</th>
<th>Cognitive Competence</th>
<th>Overall positive feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section L</td>
<td>4.0</td>
<td>5.3</td>
<td>4.0</td>
<td>5.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Section T1</td>
<td>3.9</td>
<td>4.7</td>
<td>4.6</td>
<td>4.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Section T2</td>
<td>3.4</td>
<td>4.6</td>
<td>4.3</td>
<td>5.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>

As can be seen in the Table above, the students in the linked section of PSYC 270 – PSYC 290 reported more positive attitudes toward the material than students in the traditional sections of these classes on every subscale. These differences were significant in a t-test between the linked and traditional students on the subscales of Value and Overall positive feelings ($p < .05$).

**Impact of Previous Math skills**
To understand how previous math skills impact success in mastering statistics and research methods material, we first examined scores on the $M_SA$. Overall, the average score obtained by students on the $M_SA$ was 79% correct. However, examination of the results by sub-section, revealed specific strengths and weaknesses in the math skills of students entered PSYC 270. Students did quite well on sections 1 (order of operations; 85% correct), 3 (negative numbers; 89% correct), 4 (algebra with one unknown; 92% correct), and 5 (algebra with two unknowns; 81% correct). The lowest average scores were obtained on section 2 (fractions and decimals) and on section 6 (advanced algebra) with average percent correct scores of 69% and 47% respectively. The especially low score on algebra skills highlights one reason that students may have difficulty with the material in PSYC 270.

Next, we examined, whether various indicators of math skill (math placement test score, grade in Math 122, $M_SA$ score) predicted how well students did on the $SRMS$ test and/or their grade in PSYC 270 and PSYC 290. The equation predicting scores on the $SRMS$ test was significant
[F(3,23) = 3.3, p < .05, R² = .23], with scores on the MSA the only significant univariate predictor (β = .51). The regression predicting grades in PSYC 270 was also significant [F(3,23) = 6.2, p < .05, r² = .40], with math placement test scores (β = .39) and MATH 122 grades (β = .58) both significant predictors. Finally, none of the math skills indicators were significant predictors of PSYC 290 grades.

These results were quite intriguing. First, we were struck by the finding that basic math skills measured at the beginning of the year by the MSA were a significant predictor of performance on the statistics and research methods skills test at the end of the year. This underscores the importance of our students acquiring good math skills prior to undertaking this course sequence. Second, it was noteworthy that grades in PSYC 270 were strongly predicted by grades in MATH 122 (more so than by math skills). This highlights the conclusion that course grades are dependent on multiple factors (including motivation, attendance, and work habits) and not just on basic skills. Finally, it is noteworthy that grades in PSYC 290 were not related to prior math skills. Given that the research methods course involves a considerable amount of writing, it is possible that math skills are less critical than writing skills in determining how well someone does in this course.

4. Actions Taken/Program Improvements

The results of this year’s assessment efforts point to some very clear directions for future actions. These are listed below.

A. Continue the linked 270-290 sequence. The analyses conducted here show that the linked 270-290 sequence results in better student performance as well as increased positive attitudes toward statistics and research design. Although these analyses were based on small amounts of data, the results are extremely encouraging. We have one section of linked 270-290 offered in 2008-2009 and will plan on continuing this as long as possible. Response to this course offering has been strong, with an expected enrollment of 25 students (full).

B. Conduct a longitudinal assessment of attitudes and performance. The slightly more positive attitudes of our students than might be expected based on norms is an encouraging sign and suggests that enrollment in our statistics and methods sequence may have a positive impact on these attitudes. Nonetheless, students’ fearful attitudes toward statistics present a challenge for instructors in statistics courses. A pre-post analysis of such attitudes would provide useful data that could be used to shape opening week, introductory course material designed to assuage students’ fears. Additionally, incoming psychology graduate students could be asked to take the SRMS and SRMA tests. Their results could be compared to those of the undergraduate sample to examine the criterion validity of this measure. Finally, other outcome measures might be considered. For example, an external grader could evaluate the research papers written by students in both linked and traditional sections of PSYC 290 to ascertain the extent to which students gain mastery of the research process.
C. *Continue the Math prerequisites for PSYC 270.* One conclusion from this analysis is that math skills are necessary for successful performance in our statistics course. Our current prerequisite that students must have completed Math 122 or score a 41 on the Placement exam seems justified based on these assessment results. There has been some discussion in the department as to whether a D in Math 122 represents a sufficient math skill level to be prepared for PSYC 270 (currently a D in Math 122 does meet the pre-req). Because there are a very small number of students in this situation (i.e., n = 3 in these analyses), we are not able to answer this question definitively. But as we continue to examine what helps students succeed in this important course sequence, this and other issues will likely receive continued consideration.

D. *Work toward a common understanding of the goals of PSYC 270 and PSYC 290.* As pointed out in last year’s assessment report:

> A quick glance back over the past few years shows that since the Spring of 2005 there have been 10 different instructors for PSYC 270, six of whom were graduate students, and eight different instructors for PSYC 290, six of whom were graduate students or post-docs.

Consistent with this, the current year’s assessment showed that there is a fair amount of disparity among sections of PSYC 270 and PSYC 290 in the material that is learned. Based on these findings, a subset of faculty from the department will meet to discuss a common set of goals for each of these classes. These goals will then be shared with all instructors who teach these courses with the hopes that they will be uniformly adopted.
Section 1
1. $3 + 2 \times 7 = ?$
2. $(3 + 2) \times 7 = ?$
3. $3 + 2^2 - 1 = ?$
4. $(3 + 2)^2 - 1 = ?$
5. $\frac{12}{4} + 2 = ?$
6. $12 \div (4 + 2) = ?$
7. $12 \div (4 + 2)^2 = ?$
8. $2 \times (8 - 2)^2 = ?$
9. $2 \times (8 - 2)^2 = ?$
10. $3 \times 2 + 8 - 1 \times 6 = ?$
11. $3 \times (2 + 8) - 1 \times 6 = ?$
12. $3 \times 2 + (8 - 1) \times 6 = ?$

Section 2
1. The fraction $\frac{3}{4}$ corresponds to a percentage of ________
2. Express 30% as a fraction.
3. Convert $12\frac{1}{40}$ to a decimal.
4. $2\frac{1}{3} + 8\frac{1}{13} = ?$
5. $1.375 + 0.25 = ?$
6. $2\frac{5}{2} \times 1\frac{4}{5} = ?$
7. $1\frac{1}{8} + 2\frac{2}{3} = ?$
8. $3.5 \times 0.4 = ?$
9. $1\frac{5}{3} + 3\frac{4}{5} = ?$
10. $3.75/0.5 = ?$
11. In a group of 80 students, 20% are psychology majors. How many psychology majors are in this group?
12. A company reports that two-fifths of its employees are women. If there are 90 employees, how many are women?

Section 3
1. $3 + (-2) + (-1) + 4 = ?$
2. $6 - (-2) = ?$
3. $-2 - (-4) = ?$
4. $6 + (-1) - 3 (-2) - (-5) = ?$
5. $4 \times (-3) = ?$
6. $-2 \times (-6) = ?$
7. $-3 \times 5 = ?$
8. $-2 \times (-4) \times (-3) = ?$
9. $12 \div (-3) = ?$
10. $-18 \div (-6) = ?$
11. $-16 \div 8 = ?$
12. $-100 \div (-4) = ?$

Section 4
For each equation, find the value of $X$
1. $X + 6 = 13$
2. $X - 14 = 15$
3. $5 = X - 4$
4. $3X = 12$
5. $72 = 3X$
6. $X/5 = 3$
7. $10 = X/8$
8. $3X + 5 = -4$
9. $24 = 2X + 2$
10. $(X+3)/2 = 14$
11. $(X - 5)/3 = 2$
12. $17 = 4X - 11$

Section 5
1. $4^2 = ?$
2. $\sqrt{25 - 9} = ?$
3. If $X = 2$ and $Y = 3$, then $XY^2 = ?$
4. If $X = 2$ and $Y = 3$, then $(X + Y)^2 = ?$
5. If $a = 3$ and $b = 2$, then $a^2 + b^2 = ?$
6. $(-3)^3 = ?$
7. $(-4)^4 = ?$
8. $\sqrt{4 \times 4} = ?$
9. $36 / \sqrt{9} = ?$
10. $(9 + 2)^2 = ?$
11. $5^2 + 2^2 = ?$
12. If $a = 3$ and $b = -1$, then $a^2b^3 = ?$

Section 6
1. University apartments charges $500 per month for a 2 bedroom apartment plus a $400 deposit. Write an equation, $y$, that finds the total cost of renting for $X$ months.

2. Sketch a graph of $y = 5x + 2$

3. Sketch a graph of $y = x^2$

4. Solve $x^2 - 4x + 4 = 0$ using the Quadratic Formula.

5. Solve each of the following for $x$.
   a. $2^x = 128$
   b. $\ln x = 1$
1. Which of the following correlations between two tests provides the most accurate basis for predicting one test from the other?
   a. -0.75  
   b. -0.06  
   c. +0.08  
   d. +0.69

2. Which of the following is true of both split-half and inter-item consistency methods (such as alpha) of determining test reliability?
   a. They estimate the degree to which time sampling causes error variance.
   b. They are based on a single administration of a single test.
   c. They require that the same test be given to two samples.
   d. They are most appropriate for tests that have skewed distributions.

3. For representing the central tendency of the distribution of score, the median is usually preferable to the mean if the
   a. distribution is highly skewed
   b. scores have been measured using a ratio scale
   c. scores were obtained from a large and representative sample
   d. distribution has a single mode

**Questions 4 through 7 are based on the following:**
A French teacher wants to determine which of two textbooks will result in students learning more French vocabulary words. Fortunately, she teaches two sections of introductory French: one that meets MTWRF from 8:30-9:20 AM and another that meets TR from 3:30-5:35 PM. She randomly assigns Book A to her TR class and Book B to her other class. At the end of the semester she gives a standardized French vocabulary test and finds that the class that used Book A scored significantly higher than the one that used Book B.

4. What type of design is this?
   a. A bivariate correlational design
   b. An independent, two-group design
   c. A non-independent (or repeated measures) two-group design
   d. A (Total Days) x 2 (Book) factorial design

5. What is the independent variable here? (Not its operational definition: the variable itself.)
   a. Type of textbook
   b. Knowledge of French vocabulary
   c. Book A and Book B
   d. Performance on a standardized vocabulary test

6. Which of the following statistical tests could NOT be used to show that performance with Book A was better than with Book B?
   a. A t-test
   b. A Pearson correlation
   c. A one-way ANOVA (Analysis of Variance)
   d. A two-way ANOVA

7. It would be unwise to conclude that Book A should be adopted over Book B because
   a. the amount of instruction time per week differed in the two classes
   b. we don’t know how many students were enrolled in the two classes
   c. students in the classes may differ in some way related to school performance
   d. it is unwise to conclude causal effects from correlational findings
Questions 8 and 9 are based on the following:
A researcher examined the relationship between students’ sleeping habits and their academic performance. Eighty randomly selected high school students were asked to estimate the typical number of hours of sleep that they got on school nights and to report their GPAs. The researcher found that there was a reliable correlation of 0.79 between these two variables.

8. Before concluding a causal relationship between sleep duration and school performance, the investigator should most seriously consider which of the following?
   a. Students may underestimate the number of hours that they sleep at night
   b. Students may not know their GPAs
   c. The amount of REM sleep that students get is more important than total sleep
   d. Another factor (e.g., how well organized you are) may account for the correlation

9. Which of the following would provide the most evidence about the validity of students’ estimates of their own sleep duration?
   a. Ask the parents to record how long the students slept and take the average.
   b. Ask the students to rate their confidence in their estimates on a scale of 1 to 7.
   c. Ask the students to make the same kind of estimates two weeks later and correlate these with their original estimates.
   d. Assess whether there is a reliable correlation between the age of the students and the estimates they provide.

10. A TV ad for acne medicine shows pictures of people’s faces before and after applying the medicine for five days. There is vast improvement in the appearance of the people’s faces in the “after” pictures. Naturally, the drug company wants you to conclude that the medicine eliminates acne, but which of the following should make you most reluctant to accept that conclusion?
    a. The ad did not indicate how much medicine should be applied for five days.
    b. Only facial acne was examined; the medicine may not work on back acne.
    c. The acne may have cleared up on its own without the medicine
    d. The people in the ad were paid by the drug company.

11. An investigator found a significant difference in academic performance between participants who used the study skills center and those who did not. Whether this study is a true experiment would depend most critically on which of the following?
    a. Whether the experimenter instructed a randomly selected subset of participants to use the study skills center or let all participants decide themselves
    b. Whether the experimenter conducted the study in a double-blind manner
    c. How large and how consistent the difference was between the two groups
    d. How many participants used the study skills center and how many did not

12. In an experiment, group A performed a task better than group B. The investigator wants to use a t-test to determine whether the mean difference is statistically significant. To do so, the investigator needs to know all of the following EXCEPT
    a. The number of participants in each group
    b. Whether both groups were equally motivated
    c. The amount of variation in performance within each group
    d. The size of the difference in performance between the two groups

13. In validating an intelligence test, one would determine the correlation coefficient between
    a. The test and a criterion measure
    b. Two parallel forms of the test
c. The obtained scores and the true scores on the test
d. Two scores on the same test taken at different times

14. For a particular test with a certain population, the minimum score = zero, the mean = 10, and the standard deviation = 20. Which must be true about the distribution of scores?
   a. Over half the scores are less than 10, but there is at least one score above 20.
   b. The distribution is normal.
   c. The mean is the same as the median
   d. The distribution has at least two modes.

15. The F-ratio is the ratio of
   a. between-group to within-group variance estimates
   b. between-group variance estimates to degrees of freedom
   c. within-group variance estimates to degrees of freedom
   d. within-group to between-group variance estimates

16. An analysis of variance (ANOVA) is conducted on the data in a 3 x 3 factorial design (two factors, each with three levels) involving one dependent variable. For this analysis, how many interaction terms are there in total?
   a. One  b. Two  c. Three  d. Six

17. There are 8 scores in a distribution with a mean score of 36 and a variance of 16. What is the standard deviation?
   a. 2.0  b. 4.0  c. 6.0  d. 16.0

**Questions 18 through 20 are based on the following:**
To investigate people’s ability to divide their attention between two tasks, students were asked to listen to a passage of prose and at the same time to view a set of photographs, unrelated to the prose that were projected one by one at a rapid rate. At the end of this presentation, the students were tested for both their memory of the prose and their memory of the photographs. To establish a baseline for this dual-task condition the same students also were tested for their memory when each of the component tasks was presented alone. The following graph shows the results:

![Graph showing interaction between experimental condition (dual-task or baseline) and type of task (prose memory or photograph memory).](image)

18. An analysis indicated that there was an interaction between experimental condition (dual-task or baseline) and type of task (prose memory or photograph memory). According to the graph, this interaction suggests that
   a. Dividing attention entails cost to performance in one task but not in the other
b. Dividing attention is an active process

c. Performing two tasks simultaneously leads to mutual interference

d. The more difficult a task is to perform alone, the more difficult it is to perform when attention is divided

19. In a study of the effectiveness of divided attention, it is most important that the experimental design include
   a. Counterbalancing the order in which participants are tested in the baseline and dual-task conditions
   b. A consistent order in which participants are tested in the baseline and dual-task conditions
   c. An equal number of men and women as participants
   d. A manipulation check to be sure that the participants were actually dividing their attention.

20. The investigator wishes to test the generalizability of the finding. Which of the following procedures would be the LEAST useful for this purpose?
   a. The experiment is repeated with a group of young adults who are not college student, and the original pattern of results is obtained.
   b. The experiment is repeated by a different researcher, yielding the same results.
   c. The original data are analyzed by different researchers, yielding the same results.
   d. The experiment is repeated using new photographs and prose passages.

21. Cross-sectional, longitudinal, and cohort-sequential designs are used in developmental research. Of the three, the cohort-sequential design is uniquely suited to
   a. Studying a particular cohort over a long period of time
   b. Measuring both central tendencies and individual differences within a cohort
   c. Strengthening inferences by replicating longitudinal finding across cohorts
   d. Examining relationships between variables during a single age range in a cohort

22. Test reliability refers to whether a test is
   a. Using items of appropriate difficulty levels
   b. Producing scores that are normally distributed
   c. Measuring what it is intended to measure
   d. Measuring something in a consistent manner

23. Which of the following types of transformation can be made on data with ratio-scale properties without changing the ratio characteristics of the original data?
   a. Adding a constant to all scores
   b. Taking the reciprocal of all scores
   c. Multiplying all scores by a positive constant
   d. Taking the logarithm of all scores

24. A researcher who looks at high school graduation rates five years before and after the No Child Left Behind law was enacted in order to see if the law had an effect on graduation is using a
   a. Single-subject design
   b. Non-equivalent control group design
   c. Matched groups design
   d. Interrupted time series design

25. What can we correctly conclude from the following statistical result: \( r (5) = .80, p > .05 \)?
   a. The \( r \) is greater than the \( p \)-value, so the \( r \) cannot be significant
   b. The odds of getting that \( r \) if the population \( r \) were = 0 are greater than 1 in 20
c. The odds of getting an \( r \) of .80 with 5 degrees of freedom are greater than 1 in 20

d. There is a mistake in the calculation because an \( r \) of that size must be significant

26. In inferential statistics, the alpha level represents the probability that
   a. you will reject the null hypothesis when it is true
   b. you will not reject the null hypothesis when it is false
   c. your results were due to chance if the alternative hypothesis is true
   d. you will retain the null hypothesis if it is true

27. Respondents are asked to indicate, by circling “Yes” or “No,” whether they agree with items on a questionnaire. Consider this item: *I believe that the government should end the war in Iraq and provide amnesty to some illegal immigrants.* What is true about the item?
   a. It is an open-ended item
   b. It is a Likert-type item
   c. It assesses a respondent’s demographics
   d. It is double-barreled

28. The following 7 scores were attained on a quiz worth 30 points total: 12, 14, 16, 18, 20, 30, 30. What are the mean, median, and mode of these scores?

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>18</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>b.</td>
<td>18</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>c.</td>
<td>20</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>d.</td>
<td>20</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>e.</td>
<td>20</td>
<td>30</td>
<td>18</td>
</tr>
</tbody>
</table>

29. Which of the following sampling methods is the best way to select a group of people for a study if you are interested in making statements about the larger population?
   a. Convenience sampling
   b. Quota sampling
   c. Purposive sampling
   d. Random sampling

30. To determine whether noise affects the ability to solve math problems, a researcher has one group solve math problems of varying levels of difficulty in a quiet room and another group solve the same math problems in a noisy room. The group solving problems in the noisy room completes 15 problems in one hour and the group solving problems in the quiet room completes 22 problems in one hour. In this experiment, the independent variable is _______ and the dependent variable is _______.
   a. The number of problems solved; the difficulty of the problems
   b. The number of problems solved; the noise level in the room
   c. The noise level in the room; the number of problems solved
   d. The noise level in the room; the difficulty of the problems

31. Which of the following terms best describes an interaction effect?
   a. The effect of one independent variable (on a DV) depends on the level of another independent variable
   b. Eliminating any differential influence of extraneous variables
   c. Sequencing effect that occurs from the order in which the treatment conditions are administered
   d. The effect of two independent variables on the dependent variable

32. Which of the following symbols represents a population parameter?
33. When p<.05 is reported in a journal article that you read for an observed relationship, it usually means that the author has
   a. rejected the null hypothesis
   b. accepted the alternative hypothesis
   c. conducted a true experiment
   d. performed both descriptive and inferential statistics.

<table>
<thead>
<tr>
<th>1. I like statistics and research methods.</th>
<th>Strongly Disagree</th>
<th>Neither Disagree nor Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. I feel insecure when I have to do statistics problems or design research.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I have trouble understanding statistics and research design because of how I think.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Statistics formulas and research designs are easy to understand.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Statistics and research design are worthless.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Statistics and research design are complicated subjects.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Statistics and research design should be a required part of my professional training.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have no idea what is going on in statistics or research design.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Statistics and research design are not useful to the typical professional.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I get frustrated going over statistics tests and research design in class.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Statistical and research design thinking are not applicable in my life outside my job.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I use statistics and research design in my everyday life.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I am under stress during statistics and research design classes.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I enjoy taking statistics and research design courses.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Statistics and research design conclusions are rarely presented in everyday life.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Statistics and research design are subjects quickly learned by most people.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Learning statistics and research design requires a great deal of discipline.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I will have no application for statistics or research design in my profession.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix C – Statistics and Research Methods Attitudes (SRMA)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>19.</td>
<td>I make a lot of math errors in statistics and research design.</td>
<td>1</td>
</tr>
<tr>
<td>20.</td>
<td>I am scared by statistics and research design.</td>
<td>1</td>
</tr>
<tr>
<td>21.</td>
<td>Statistics and research design involve massive computations.</td>
<td>1</td>
</tr>
<tr>
<td>22.</td>
<td>I can learn statistics and research design.</td>
<td>1</td>
</tr>
<tr>
<td>23.</td>
<td>I understand statistics and research design equations.</td>
<td>1</td>
</tr>
<tr>
<td>24.</td>
<td>Statistics and research design are irrelevant in my life.</td>
<td>1</td>
</tr>
<tr>
<td>25.</td>
<td>Statistics and research design are highly technical.</td>
<td>1</td>
</tr>
<tr>
<td>26.</td>
<td>I find it difficult to understand statistics and research design concepts.</td>
<td>1</td>
</tr>
<tr>
<td>27.</td>
<td>Most people have to learn a new way of thinking to do statistics and research design.</td>
<td>1</td>
</tr>
<tr>
<td>28.</td>
<td>I am comfortable with all the steps of the research process from beginning to end.</td>
<td>1</td>
</tr>
</tbody>
</table>