TEACHER MADE TEST RELIABILITY: A COMPARISON OF TEST SCORES AND STUDENT STUDY HABITS FROM FRIDAY TO MONDAY IN A HIGH SCHOOL BIOLOGY CLASS IN MONROE COUNTY OHIO

A Thesis
Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in Education of the Graduate School of Marietta College

By
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ABSTRACT

Teacher-made tests make up a great percentage of a student’s grade point average for a high school biology class in Monroe Central High School in Monroe County, Ohio. A logical question to address would be, “Are there variances in teacher made tests?” A comparison of test scores and student study habits from Friday to Monday can answer this question. According to this researcher, if teacher-made tests are accurate measures of achievement, the scores should be consistent for tests given on Friday compared to tests given on Monday. A variation in the scores from Friday to Monday could indicate two types of discrepancies. First, variation in the results could indicate that tests are not accurate measures of achievement because they are not consistent and reliable. Second, variation in the results could indicate a change in student study habits over a weekend, or a prolonged absence from instruction. This research will attempt to evaluate both possibilities.
Dedicated in memory of:

James R. Parr, 1951-1981, my father

Donald F. Parr, 1921-1997, my grandfather

Edna M. Burkhart, 1920-1998, my grandmother

Dedicated in honor of:

Barbara A. Parr, my mother

Albert W. Burkhart, my grandfather

Emma L. Parr, my grandmother
ACKNOWLEDGEMENTS

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I wish to thank my family, Barb Parr, Rebekah Workman, Chris Workman, Janet Parr and Douglas Russell, for their support and understanding throughout this experience.

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I wish to thank my high school teachers, Mrs. Julie Casto, Mrs. Mary Jane Piatt, Mrs. Patricia Phillips, Mr. James Swisher and Dr. Paul Connor, for providing excellent models of educators and for encouraging me to develop my abilities and talents.
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FIELDS OF STUDY

Major Fields: Biology and Education
TABLE OF CONTENTS

Abstract ....................................................................................................................... ii
Dedication ................................................................................................................... iii
Acknowledgements ...................................................................................................... iv
Vita.............................................................................................................................. v
List of Tables ............................................................................................................... vii
List of Figures .............................................................................................................. viii

Chapters:
1. Introduction ........................................................................................................... 1
2. Review of Literature .............................................................................................. 5
3. Method .................................................................................................................. 11
4. Results ................................................................................................................... 15
5. Discussion .............................................................................................................. 19

References: .................................................................................................................. 42
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Table of Specifications</td>
<td>21</td>
</tr>
<tr>
<td>3.1 Table of Specifications for part A</td>
<td>22</td>
</tr>
<tr>
<td>3.2 Table of Specifications for part B</td>
<td>23</td>
</tr>
<tr>
<td>4.1 Descriptive Statistics</td>
<td>24</td>
</tr>
<tr>
<td>4.2 Paired Samples Statistics</td>
<td>24</td>
</tr>
<tr>
<td>4.3 Paired Samples Correlations</td>
<td>24</td>
</tr>
<tr>
<td>4.4 Paired Samples Test</td>
<td>24</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Application for Human Subject Review Board</td>
<td>25</td>
</tr>
<tr>
<td>3.2 Approval from Human Subject Review Board</td>
<td>30</td>
</tr>
<tr>
<td>3.3 Letter for consent from the Administration</td>
<td>31</td>
</tr>
<tr>
<td>3.4 Letter of consent from the Administration</td>
<td>32</td>
</tr>
<tr>
<td>3.5 Letter for parental consent</td>
<td>33</td>
</tr>
<tr>
<td>3.6 Part A of the test</td>
<td>34</td>
</tr>
<tr>
<td>3.7 Part B of the test</td>
<td>38</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

In recent years, the quality of education has focused a great deal of attention on accountability. One of the most frequent ways to measure accountability has been through significant testing such as proficiency tests and the Ohio Graduation Test. Much current research has been devoted to address the reliability and validity of these tests. Conversely, little research has been devoted to the reliability and validity of the teacher-made tests that are supposed to prepare students to excel at these tests. The minimal research devoted to teacher-made tests leave unanswered questions about the overall academic performance of students. Are teacher-made tests reliable? How do the scores of teacher-made tests compare to the scores of standardized tests?

The most direct comparison between classroom performance and achievement tests is to compare the scores of achievement tests to a student’s grade point average or GPA. The average of a student’s scores on teacher-made tests and alternative evaluation practices within the classroom is the student’s grade point average. It is a reflection of the students works in a classroom. Ideally, there would be a strong correlation between a student’s grade point average and the student’s score on standardized tests. Teacher-made tests make up a great percentage of a student’s grade point average. A troubling problem is occurring in light of a recent focus on standardized tests. Recent studies show that a student’s grade point average is not consistent with the same student’s scores on
standardized tests (Notar, et al., 2004). A multitude of research has been devoted to establishing the validity of the standardized scores. This implies the inconsistency lies in the validity of grade point averages and teacher-made tests as a measure of student achievement. However, little research has been devoted to establishing or refuting the validity of teacher-made tests.

Consistency is a necessary factor in establishing validity (Creswell, 2005). Inconsistencies in teacher-made tests should cause alarm for two reasons. First, inconsistencies can indicate that tests are not accurate measures of achievement. Second, inconsistencies can indicate changes in a student’s study habits or a need for students to alter existing study habits. This study attempted to evaluate the consistency of teacher-made tests and to gain an understanding of alternative study skills employed by students following an absence from instruction such as a weekend.

Statement of the Problem

This researcher believes that tests are not accurate measures of achievement because they do not provide consistent results. In an effort to evaluate this belief, this researcher compared the test scores for a test given on Friday and the scores for a similar test given on Monday and attempted to establish a difference in test scores for the two tests. This researcher is also interested in patterns in student study skills. In an effort to establish a pattern in student study skills or to determine the changes in study skills following an absence from instruction, this researcher asked students to respond to the
following two questions: First, how do high school students in Monroe County, Ohio feel about studying on the weekends? Second, what do students do differently to prepare for tests on Mondays?

Hypothesis

This researcher implemented a quantitative-qualitative mixed method study. Quantitatively, this study determined if there is a significant difference between tests given on Friday and tests given on Monday. The hypothesis of this study is that there is a significant difference between test scores for tests given on Monday and tests scores for tests given on Friday in a high school biology class at Monroe Central High School.

Null Hypothesis

The null hypothesis of this study is that there is no significant difference between test scores for test given on Monday and test scores for tests given on Friday in a high school biology class at Monroe Central High School.

Central Phenomenon

Qualitatively, this study was used to determine patterns in study habits. This researcher attempted to establish themes in response to the central phenomenon of this study. The central phenomenon of this study was to evaluate the changes in student study skills to prepare for an assessment following an absence from instruction.
Limitations

This study is not a representative study. The sample population of this study is not a random sampling; it is an opportunistic purposeful sampling. The limitation of this study is that the results are not necessarily transferable to other content areas, grade levels, or geographic locations. Another concern of this study is a test-retest variable. This researcher hoped to eliminate this concern through the use of different tests with similar questions and styles.
Chapter 2
LITERATURE REVIEW

The study habits of Mary Kate and Ashley Olsen were recently reported in the *Rolling Stone* magazine. This magazine reported that the Olsen twins were out on the town partying with celebrities, despite the start of the school year and upcoming assessments (Scaggs, 2004). This is not an unusual practice because the Olsen twins have been engulfed in the celebrity lifestyle. Likewise, this is a usual practice for countless adolescents. The results presented in a report entitled, “High School Survey of Student Engagement” revealed that half of the students involved in the survey spent four hours or less a week doing homework. This same study further revealed that 20% spent one hour or less and 32% spent two hours or less each week preparing for class (Xu, 2005). This was confirmed in a study by Mary Shann. Shann reported that 6.7% of the middle school participants in the study reported doing no homework on a typical day after school and 50.4% reported doing homework for an hour (Shann, 2001). Shann extended this study by assessing the time spent on class work over the weekend. The results for the weekend were less positive than the results from the daily homework discussion. Shann found that 47.8% of the urban middle school students participating in the study reported doing no homework on weekends and 32.1% reported doing one hour of homework over a weekend (Shann, 2001).
In a time period where the quality of education focuses a great deal of attention on accountability, the study habits of students must be included in the research. There are three variables that can affect the validity and reliability of teacher-made tests: the test, the environment and the test taker. To study the reliability of teacher-made tests, the test taker must be considered. Daniel Patrick Foley (1981) states, “the student spends less than an hour with that test, and appreciate it only as a way of getting a grade” (p243). This is consistent with the information found by Russell Cassel (2003), who claimed that a test is only as reliable as the test taker. Cassel has developed a testing method to determine the consistency and reliability of the test taker, a statistical measurement called a confluence score. This score looks at paired items in a test to show that the test taker is consistent in answering questions.

Confluence scores can be used as a way to determine test-taker reliability. Using confluence scores, the teacher would have to design the test so that a percentage of the questions would be asked seeking the same information in an opposite form. The student responses to these questions should be consistent. A student who gets one of these questions right and the other wrong is not a reliable test taker and should not be used to assess the validity of the test itself (Cassel, 2003).

Another variable associated with the validity of teacher-made tests is the testing environment. This includes interruptions during the test and student health and attitude. If the testing environment is distracting or noisy, the test taker will have a difficult time remaining consistent throughout the testing process. Actions should be taken to ensure
that the testing environment is comfortable, adequately lit with limited interruptions (Griswold, 1990).

Another tool that can be useful in ensuring test validity is knowledge of the characteristics of the students. Test anxiety can minimize student understanding of a test question. Also, it may be important to know the students’ mood and health concerns. For example, tests given during an outbreak of the flu or the day before the prom may show decreased scores but may not reflect errors in test development (Griswold, 1990).

The third variable affecting reliability and validity of teacher-made tests are the tests themselves. Teacher-made tests are usually criterion referenced tests that are designed to assess student mastery of a specific body of knowledge. One researcher declares, “most criterion-referenced tests are inadequate because the problems are contrived and the cues are artificial” (Wiggins 1989, p 708).

The limited research on this topic seems to indicate that there are no substantial studies showing the validity and reliability of teacher-made tests. They actually imply that this area of instruction is lacking accountability (Notar et al. 2004). In an article addressing accountability, Ronald Newell (2002) provides a possible reason for an observed divergence between grade point average and test scores. Newell asserts that teacher-made tests usually measure only a limited part of a subject area, they do not cover a broad range of abilities and they rely too heavily on memorized facts and procedures. This means that teacher-made tests often fail to emphasize thinking and the application of knowledge. This can be addressed by creating larger chapter and unit tests. Classroom
tests are often hindered by time allotted for the class, and tests that stretch longer than one class period have been shown to be ineffective. Also, tests have to take into account the attention span of the student being tested. For example, long tests in early elementary school would be unproductive. In general, however, the longer the test the more valid and reliable the test will be (Notar et al. 2004). Long tests do three things to help maintain validity. First, they increase the amount of content that the student must address, ensuring a more accurate picture of student knowledge. Second, long tests counteract the effects of faulty items by providing a greater number of better items. Third, long tests reduce the impact of student guessing (Griswold 1990). Overall, there is greater benefit from longer tests, but test length should not be assessed by the number of questions; rather, it should take into account the difficulty of each item. One study describes test length by assigning time to each type of question. For example:

- A true-false item takes 15 seconds unless the student needs to correct the false questions, then the time increases to 30-45 seconds.
- A seven-item matching exercise takes 60-90 seconds.
- A four-response multiple choice question that is asking knowledge level questions takes 30 seconds; the same type of question asking application questions may take 60 seconds. Problem solving questions can take an additional 30-60 seconds.
- Short-answer questions take 30-45 seconds.
- Essays take 60 seconds for each point (Notar et al. 2004).
Another possible cause of the inconsistencies seen in test taking is the extent to which items on a test match the curriculum. This is always a concern with standardized tests, but it should be a concern to classroom teachers as well. There are several things to consider while trying to ensure the content is valid and reliable. First, test questions cannot be ambiguous. Poorly written questions will prompt students to guess, thus diminishing the reliability of the test. Second, test items need to be at a reasonable difficulty level (Griswold, 1990).

A study conducted by Notar and colleagues reveals a way to ensure content validity of teacher-made tests. These researchers suggest developing a table of specifications for the test. The table is designed to clearly show the scope and focus of the test. This will guarantee the content tested aligns with the content taught. The table is a two-way grid that shows the objective of the instructional material in the columns and the key content that was evaluated in the rows. This allows the tester to identify the learning content at each level of Bloom’s Taxonomy. This can help the tester ensure the level of difficulty is appropriate, there are a variety of question types, all of the content covered was included in the assessment and estimate the length of the test. The obstacle associated with writing a table of specifications for each test is that these tables require considerable time and effort to develop. However, the time and effort expended to develop a table of specification can ensure that the test is valid and reliable (Notar et al. 2003). Table 1 is an example of a table of specifications.
Heiber and Calfee (1989) question the adequacy of typical tests because; “If the instructional goal is to have students apply knowledge in different settings, and to employ what they have learned to create new images then the typical test is an inadequate instrument” (p50). While relatively little research has been devoted to teacher-made test, they play a very large role in education as they are often the basis of a student’s grade point average. Post secondary institutions tend to review a student’s scores on norm referenced tests such as the ACT and the SAT, as well as the student’s grade point average. Frequently, these are various indicators of student performance so an institution is forced to assign value and decide which is more important and reliable (Notar et al. 2004). The reality is that research supports the validity of the norm referenced test while there is not sufficient research to support the grade point average. This is unfortunate because teacher-made tests are given in an environment of comfort with a climate of greater trust than standardized tests (Shepard, 1989). Current research needs to focus more effort on a method that will re-equate grade point average and standardized tests. There are potentially two ways to accomplish this: validate teacher-made tests or provide a valid alternative assessment process. Without this research, students are not able to provide an accurate picture of their academic abilities.
Chapter 3

METHODS

Participants

The test was administered to the sophomore biology classes at Monroe Central High School in Monroe County, Ohio. All the students enrolled in high school biology were invited to participate in the study. However, the scores of students who did not provide parental permission will not be included. Also, students who have an individual educational plan were not expected to complete the exam within the time constraints of the study, therefore, their scores were not be included. The sample population included 64 high school biology students at Monroe Central High School.

This researcher gained consent from the Human Subjects Review Board at Marietta College, a copy of that application is attached as Figure 3.1, a copy of the confirmation is attached as Figure 3.2. This researcher also obtained permission from the administration at Monroe Central High School. The principal provided consent to use Monroe Central as a site for this experiment. A copy of the letter requesting permission is attached as Figure 3.3. Figure 3.4 is a copy of written consent from the school principal. This study included students who are under the age of 18, therefore, this researcher gained parental consent from the parents of every participant in the study. A copy of this consent form is attached as Figure 3.5.
Test Design

To ensure test validity, a test administrator must address the three areas of test inconsistencies. These include test content, test environment, and tester inconsistencies. This researcher attempted to insure the validity of the test content and the environment to guarantee the tester is the only variable in the study.

The test environment was the easiest variable to control. Half of the test was administered on Friday and the other half of the test was administered on the following Monday. The students were grouped into four classes and the test was administered four times each day. The students were group by availability and scheduling conveniences. The students remained in the same groups and the other half of the test was administered on Monday. The students will have 47 minutes to complete each half of the test. This researcher attempted to minimize the interruptions during the tests by advising the administration that the students should not be called out of the testing environment. The researcher also asked the administration to hold announcements, calls or other interruptions until the testing is complete.

This researcher designed the test in two parts, part A and part B. The tests had identical formats with varying questions. Both tests had 9 multiple-choice questions, 4 completion questions and 4 matching questions, 10 short-answer questions and 1 table to complete. Using the time estimations designed by Notar and colleagues (2004), each half of this test lasted approximately 18 minutes. This researcher attempted to guarantee test validity by using a table of specifications. This table made certain that both halves of the
Test are testing the content presented. It also attempted to ensure part A is consistent with part B of the test. This research used the table of specifications to prove that one part of the test is not more difficult than the other part as this would provide another variable in the study. The table of specifications for part A is attached as Table 3.1 and the table of specifications for part B is attached as Table 3.2.

The test was designed to ensure that any inconsistencies in the test scores are related to the tester. To provide a method that establishes tester inconsistencies, this researcher designed the test using confluence scores. Confluence scores are questions that test the same information in a varying format. This researcher designed the test so both halves of the test investigate the same content in varying forms. For example, part A may have had a multiple choice questions that asks the tester to choose the correct definition while part B may have had a multiple choice question that provides the same definition and asks the tester to chose the correct term. If the participant answers one of these questions correctly but answers the other incorrectly, this indicated the test taker is not consistent. A copy of part A of the test is attached as Figure 3.6 and a copy of part B of the test is attached as Figure 3.7.

Test administration

This test was administered in two parts, half on Friday and the other half on Monday. This researcher attempted to alleviate a testing variable by administering both versions of the test on Friday and again on Monday. To accomplish this, the researcher randomly distributed part A to some participants and part B to the other participants on
Friday. Those students who completed part A on Friday, completed part B on Monday; while the students who completed part B on Friday took part A on Monday. Both versions of the test were administered to all four testing groups on Friday and again on Monday. The scores of both parts of the test were compared to determine if there is a significant difference in test scores for tests given on Friday and tests given on Monday. This method of administration and test design diminished the threat of instrumentation.

**Qualitative Data Collection**

Qualitative data was collected concurrently with the quantitative data. The qualitative data was collected as a survey with two open ended questions. Each version of the test contained one question regarding the students study skills. Test A contained the question, “How do you feel about studying on the weekends?” Test B contained the question, “What do you do differently to prepare for tests on Mondays?” The responses to these questions were evaluated to determine themes.
Chapter 4
RESULTS

Quantitative Data Results

The quantitative data for this study was compiled by comparing the scores of a pretest and posttest. The pretest was given on a Friday to 64 students and the posttest was given on the following Monday to the same 64 students. The scores of the pretest ranged from 9 points out of a possible 57 points to 55 points out of a possible 57 points with a mean score of 35.5781, creating a standard deviation of 11.67660. The scores of the posttest ranged from 9 points out of a possible 57 points to 57 points out of a possible 57 points with a mean score of 35.3750, creating a standard deviation of 12.09289. These results are shown in Table 4.1.

These scores were analyzed using a standard t-test that compared the scores from the pretest administered on Friday to the scores of the posttest administered on Monday. The statistics for this test are provided in Table 4.2. The results of the t-test correlation study are provided in Table 4.3. The analysis indicated a t-score of 0.276 and a significant value or p-score of 0.783 as indicated in Table 4.4. Since the p-score was higher than the associated t-score the null hypothesis was substantiated, indicating that there was no significant difference between test scores for the test given on Monday and test scores for the test given on Friday in a high school biology class at Monroe Central High School.
Qualitative Data Results

Qualitative data was collected through two questions that students answered while taking the test. The first question was, “How do you feel about studying on the weekends?” The responses to this question provided four different themes for development.

The first theme that emerged from the data was the idea that students do not like to study on the weekends but will if they feel that it is necessary or that they are in danger of failing; seventeen of the 64 students surveyed fell into this category. The students responses included the following statements:

“I don’t like to but if I know absolutely nothing I will.”

“I don’t like to, but I’ll do it if my grade is low.”

“I don’t like the idea that much but if I have to I will.”

The second theme that emerged from the data was the student belief that the weekends should be free time for them to plan recreational activities with family and friends. Nineteen of the 64 students surveyed expressed regret at having to study over the weekend because it interferes with family time. Some of their responses include the following statements:

“I feel that it is hard to study on the weekends because they family normally plans to do things on weekends and it is hard to fit in studying…”

“I don’t like to because the weekend is usually my only free time.”

“I don’t like to study on the weekends because that is my break from school.”

“I never do because I feel it is our vacation from doing work.”
Of the 64 students surveyed, 9 students replied that studying over the weekends provides them more time and they study more over the weekends. Their responses included the following statements:

“Studying on the weekend’s is good because you learn what is needed and you don’t have limited time to study.”

“It doesn’t bother me much because I take extra time reading.”

“I like to study on the weekends because I have more time.”

The last theme that emerged from the first question on the survey expressed concern with remembering the information studied. Eight of the 64 students surveyed reported that they do not remember the information they study over the weekend. Some of their responses include the following statements:

“I don’t like it because I can’t remember things as well.”

“Sometimes I think it is stupid because usually I just forget what I studied”

The second question the students were asked to respond to was, “What do you do differently to prepare for tests on Mondays?” The responses were confined to three themes.

The first theme reported by the students was that they did not alter their study habits to accommodate tests given after an absence of instruction. Twenty-three of the 64 students surveyed responded that they prepare for tests given on Monday the same as they prepare for tests during the school week. Some of their responses included:

“I study the same as usual, for about an hour.”
“I don’t really do anything different. I study as much as I do any other time.”

Twenty-one of the students surveyed reported that they studied more over the weekends because it provided more time. Some of their responses included:

“I study the whole weekend, instead of only one day.”
“I take more time to study then I do on school nights when I have lots of homework.”
“I study all weekend and maybe get together to study with a friend.”

The last theme to emerge from the data collected was that students delay studying or do less to prepare for a test on Monday. Some of the student responses are:

“I wait til the last minute if I remember.”
“I cram Sunday night.”
“I study Monday morning.”
“I usually study on my way to school.”

The responses to these qualitative questions can indicate a change in study habits following an absence of instruction or they can necessitate a change in study habits following an absence of instruction.
Chapter 5

DISCUSSION

Quantitative Data Discussion

The quantitative data indicates that there is no significant difference in achievement between a test taken on a Friday and a test taken on the following Monday. This researcher attempted to diminish the threat of test-retest reliability but was not able to eliminate it completely. The familiarity of the test format and the information tested may have altered the results by providing a higher mean score on the posttest.

This can help to establish the validity and reliability of teacher-made tests in the biology classroom in Monroe Central High School. Teacher-made tests are one of the major contributors to the overall grade point averages of students at Monroe Central High School. Establishing validity for teacher-made tests can help to establish the validity of students’ grade point averages as an indicator for achievement.

Qualitative Data Discussion

The themes that emerged from the students’ surveys supported the idea that students demonstrate a variety of learning styles. Some students appreciated the tests on Mondays because it provided them more time to work independently and to study the material. Other students did not like the test on Mondays because they are strained to remember the material during the absence from instruction. The students responses to the qualitative survey reveals interesting information that could be further explored.
One theme that developed shows that students would study over the weekend but only if it was necessary. The students’ responses indicated that necessity is intrinsically determined. These students evaluate their understanding of the content, and studied accordingly. This raises the concern that maybe the students’ evaluation of their understanding is not accurate, providing a false sense of security that diminishes the intrinsic motivation to prepare for tests on Mondays.

Another theme that emerged was that students view the weekend as their time away from school, their time for recreation. This idea may not be different from how many adults view their time away from their source of employment. Students view academic obligations as occupations and appreciate the time away from academics. Students who fell into this category seemed to resent the interruption of their weekend.

Another theme that bears discussion is the idea that emerged when students responded that they do not change their study habits to prepare for a test following an absence of instruction. This raised the question as to whether there is a need for change. More research could be devoted to this question.

Conclusion

Research that helps to establish the validity of teacher-made tests will improve the accountability of education and add credibility to Grade Point Averages as a measure of student achievement. Grade Point Averages are a measure of a students’ performance in a relaxed, controlled environment and steps need to be taken to ensure the credibility of
this measurement. Grade Point Averages should not be diminished in contrast to scores on achievement tests because the Grade Point Average incorporates a variety of assessment methods and can provide a well-rounded view or student abilities. Research that establishes consistency is the necessary first step in establishing the validity of teacher-made tests.
Table 2.1

*Table of Specifications*

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<tr>
<td>9</td>
<td>Comp</td>
<td>70 12%</td>
<td>9/12 Match MC</td>
<td>6(1)</td>
<td>3(2)</td>
<td></td>
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<td>10</td>
<td>Evl</td>
<td>40 7%</td>
<td>5/7 Essay</td>
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Constraints:

- Learning Objective Item type: Know, Comp, Appl, Anal, Syn, Evl
- Type: MC, SA, Essay
- Ques/Pts: Number of questions/Points %
Table 3.1

Table of Specifications for part A

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<tr>
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<td>3</td>
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<td>7/4</td>
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Table 3.2

*Table of Specifications for part B*

Miss Parr  
Biology  
Grade 10  
Period 1, 3, 6, and 7  
Test 10/31/05  
Chemistry of Life  
Test B  
47 minute class periods  
Test is 55 point value  
This is Part B of the two part test

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<td>time (min) %</td>
<td>Ques/pts %</td>
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<td>(5)13</td>
<td>(3)3</td>
<td>(2)4</td>
<td>(3)13</td>
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Table 4.1

**Descriptive Statistics**

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<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td>Friday</td>
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<td>9.00</td>
<td>55.00</td>
<td>35.5781</td>
<td>11.67660</td>
</tr>
<tr>
<td>Monday</td>
<td>64</td>
<td>9.00</td>
<td>57.00</td>
<td>35.3750</td>
<td>12.09289</td>
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<td>Valid N (listwise)</td>
<td>64</td>
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Table 4.2

**Paired Samples Statistics**

<table>
<thead>
<tr>
<th>Pair 1</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>35.5781</td>
<td>64</td>
<td>11.67660</td>
<td>1.45958</td>
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<tr>
<td>Monday</td>
<td>35.3750</td>
<td>64</td>
<td>12.09289</td>
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Table 4.3

**Paired Samples Correlations**

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<th>Pair 1</th>
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<th>Sig.</th>
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<td>.878</td>
<td>.000</td>
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Table 4.4

**Paired Samples Test**

<table>
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<tr>
<th>Pair 1</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
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<tr>
<td>Monday</td>
<td>.20313</td>
<td>5.87753</td>
<td>.73469</td>
<td>-1.26504</td>
<td>.276</td>
<td>63</td>
<td>.783</td>
</tr>
</tbody>
</table>
General Information

- All research (including surveys) involving human subjects should be received by the Human Subjects Committee at least two weeks prior to initiation of the experiments. It is the investigators' responsibility to have submitted the appropriate review form with enough lead time to allow for the review process.

- If questions are not answered or answered insufficiently to the satisfaction of the reviewers, then approval of the project may be delayed. The review committee reserves the right to request other information not explicitly requested on the review form that it regards as necessary to judge the safety of the proposed research.

- The Human Subjects Review Committee’s duty is to protect the welfare of subjects participating in projects and to ensure research is conducted in an ethical and responsible manner. The purpose of this review process is not to judge the scientific legitimacy of the project design, however, the scholarly and educational outcomes of the research must be considered in balance with the risks to participants.

- Investigators must obtain ‘Informed Consent’ for all subjects involved in the research project or justify why this is not appropriate, feasible, or practical.

- The completed, typed proposal must be sent to the Chair of the Human Subjects Committee.
Marietta College

Human Subjects Review

Long Review Form

1. Name of researcher(s): Anita M. Parr

2. Principle investigator’s phone number: 740-567-3817  E-mail: amp001@marietta.edu

3. Course name and number (if applicable): Educ 640/690

4. Instructor’s name (if applicable): Dr. Bill Bauer

5. Title of Project: The variability in written assessment scores for test given on Friday compared to tests given on Monday in a high school science class in Monroe County, Ohio.

6. Semester:Fl2005/Sp 2006  Proposed start date: 11/01/05 Projected end date:02/01/06

7. Type of research?  _____Faculty  _____Student honor’s project  _____Graduate student project  _____Undergraduate student project  _____Class project  _____Other

8. Have previous research or pilot studies indicated any significant dangers or risks in the procedure being used?

_____Yes  _____X__No
9. Does this research involve active deception (i.e. misleading or false information) of subjects?  

_____Yes  _X___No

If you answered 'YES' to the above question, answer the (3) statements below.

9A - Explain the rationale for the deception.

9B - Explain how and when the subjects will be informed of the deception.

9C - Describe the expected reaction or consequences (immediate or long-term) that the deception may have on subjects. Include potential negative reactions.

10. Will any data from this investigation be confidential?  

__X__Yes  _____No

If you answered ‘YES’ to the above question, answer the (3) questions below.

10A - Who will have access to confidential information? The students participating, the parents of students participating, the principal of the school and supporting teachers such as the special education teacher and myself.

10B - How will confidential information be stored and protected? The confidential information will be stored in a locked filing cabinet in my classroom.

10C - What will happen to confidential information after the study? It will be destroyed.

11. Briefly describe the general purpose of the research. To determine if the day of the week can affect student performance on written assessments.
12. Describe the types of procedures and tests to be used in the investigation. I will design a test, then split it in half to ensure that both halves of the test are similar in content and complexity. I will administer half of the test on Friday and the other half of the test on Monday. I will then compare the scores. I will also ask the students about their study habits during the week and on the weekend.

13. Describe the method of data collection. Data will be collected in the form of a written examination. The scores of the exam will be the quantitative data while the responses regarding their study habits during the week and on the weekend will be qualitative data.

14. Explain the time frame of the study. I am not sure what calendar days the test will fall on between November and February. The study will only cover one test during this year. The time frame will be taken on a Friday until the Monday of the next week.

15. Describe how informed consent will be obtained or justify why it will not be. Informed consent will be obtained from the parents of my students in a written form that will be kept on file with the data collected.

16. Describe how subjects will be recruited, any special requirements of the subjects, and criteria used for inclusion or exclusion of subjects. All of the tenth grade students at Monroe Central High School will be invited to participate. Students who do not provide written approval will not be included in the study.

17. Identify and describe the potential hazards (physical, psychological, ethical, social, economic, legal, etc.) of this type of study you have found in previous research. Site sources in APA style.

18. Assess and describe the potential hazards (physical, psychological, ethical, social, economic, legal, etc.) involved with your study and estimate their likelihood and seriousness. The only potential hazards are academic and they will be minimized because I will only count the highest of the two grades.

19. Describe any procedures that will be employed to minimize potential hazards and give an assessment of their potential effectiveness.
20. Identify the audience(s) to be reached in the report of the study. Dr. Bauer will be my audience as well as other educators who may be concerned that test scores drop when a test is administered after a break from instruction.

21. Identify the presentation method(s) to be used. This will be a thesis project and will be presented in this format.

22. Indicate how and when subjects will be informed of the purpose of the research and how feedback will be provided. The subjects will be informed of the purpose of the research before the project begins. They will receive feedback about a week after the test has been administered when they review their test scores.

23. Describe what you know about the ethical guidelines for treating human subjects within this field or discipline.
Site sources in APA style.


25. Attach the following: (if applicable)
   A. Informed consent form (in duplicate).
   B. Letters of permissions.
   C. Tests/surveys/ questionnaires.
   D. Additional items relevant to the study.
Figure 3.2

Marietta College
Human Subjects Review

General Information

- All research (including surveys) involving human subjects should be received by the Human Subjects Committee at least two weeks prior to initiation of the experiments. It is the investigators' responsibility to have submitted the appropriate review form with enough lead time to allow for the review process.

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- Investigators must obtain 'Informed Consent' for all subjects involved in the research project or justify why this is not appropriate, feasible, or practical.

- The completed, typed proposal must be sent to the Chair of the Human Subjects Committee.

Researcher: Anita Parr
Advisor: Dr. Bill Bauer

This reviewed application has been: [x] Approved  [ ] Denied  Date: 3-3-06
HSR member name: Jennifer McCabe  Signature: Jennifer McCabe
Reason(s) for denial:

Liane Gary-Sanner  [Signature]
Dear Mr. Marc Ring:

I am in the process of completing my Masters of Arts degree in education at Marietta College. The final project of this degree is a research thesis. I am writing to request written permission to use my classes at Monroe Central for this research problem.

I am attempting to prove that absence from instruction has a direct effect on test scores. I am going to do this by proving there is a difference in achievement scores for tests given on Friday compared to tests given on Monday. I would like to use the sophomore biology class for my research. I intend to employ a method that will require dividing a chapter test in half and administering half on Friday and half on Monday. The only potential hazard in this research project is a decrease in academic performance for the test. To minimize this hazard, I will only count the highest of the two grades toward the students nine-week grade. I will obtain written permission from parents to include their children in this study. I will have everyone take both tests but will only include the scores for the students who have provided consent. I would like to do this project within the next two months.

Thank you for your time and attention.

Sincerely,

Anita M. Parr
Monroe Central High School
Figure 3.4

MONROE CENTRAL HIGH SCHOOL.

MEMO

To:   
From:  Marc Ring
Date:  9.7.9

Re: 

Anita,

* Can you give me a good copy of your thesis project request and letter to parents? I will send to the Board. Just so you know.

The project is "approved" and looks good. Let me know of the results. Good luck!

Marc
Dear Parent or Guardian:

I am in the process of completing my Masters of Arts degree in education at Marietta College. The final project of this degree is a research thesis. I am writing to request written permission to use my classes at Monroe Central for this research problem.

I am attempting to prove that absence from instruction has a direct effect on test scores. I am going to do this by proving there is a difference in achievement scores for tests given on Friday compared to tests given on Monday. I would like to use the sophomore biology class for my research. I intend to employ a method that will require dividing a chapter test in half and administering half on Friday and half on Monday. The only potential hazard in this research project is a decrease in academic performance for the test. To minimize this hazard, I will only count the highest of the two grades toward the students nine-week grade. I will obtain written permission from parents to include their children in this study. I will have everyone take both tests but will only include the scores from the students who have provided consent. I would like to do this project within the next two months.

Thank you for your time and attention.

Sincerely,

Anita M. Parr

_____ Use my students test scores for this research project.

_____ Do not use my students test scores for this research project.

______________________________________________
Parent or Guardian Signature

______________________________________________
Student Signature
Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

____ 1. How many electrons can a carbon atom share? (Atomic number 6, Atomic Mass of 12)
   a. one  
   b. two  
   c. three 
   d. four

____ 2. _____ represents a formula for a chemical compound.
   a. H  
   b. C  
   c. P 
   d. H₂O

____ 3. The nucleus of an atom contains _____.
   a. protons and neutrons  
   b. neutrons and electrons  
   c. protons and electrons 
   d. protons, neutrons, and electrons

____ 4. Water dissolves many ionic and molecular compounds because of its _____.
   a. ionic bonding  
   b. polarity  
   c. covalent bonding  
   d. hydrogen bonding

____ 5. A chlorine atom becomes a negative chloride ion when it _____.
   a. gains an electron  
   b. loses an electron  
   c. gains a neutron  
   d. loses a proton

____ 6. A very strong base might have a pH of _____.
   a. 3  
   b. 5  
   c. 9 
   d. 13

____ 7. The total number of atoms in a molecule of sucrose, C₁₂H₂₂O₁₁, is _____.
   a. 11  
   b. 12 
   c. 22  
   d. 45

____ 8. An atom of fluorine has nine electrons. Its second energy level has _____.
   a. two electrons  
   b. eight electrons  
   c. seven electrons  
   d. nine electrons

____ 9. Brownian motion is evidence of _____.
   a. polar ions  
   b. random motion of molecules  
   c. chemical energy  
   d. microorganisms

Completion: Two points each

Complete each sentence or statement.

10. Any substance that forms hydrogen ions in water is a(n) _______________.
11. Two atoms that share electrons are held together by _______________ bonds.
12. Atoms of two or more elements chemically combined are _______________.
13. Atoms of the same element with different numbers of neutrons are _______________.

Test Reliability 35
Matching

Match each item with the correct statement below.

- a. cellulose
- b. polar molecule
- c. nucleus
- d. peptide bond
- e. polymer
- f. solution
- g. enzyme
- h. metabolism

14. molecule with unequal distribution of charge
15. all the chemical changes that occur within an organism
16. mixture in which one substance is distributed evenly in another
17. center of an atom

Short Answer

18. Draw the atomic structure of a carbon atom, including the electron energy levels. The atomic number for Carbon is 6, it's atomic mass is 12. (4 points)

19. Why is the polar property of water important? (2 points)

20. In the chemical reaction $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{sunlight} \rightarrow \text{C}_6\text{H}_12\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$, 6 molecules of carbon dioxide are represented by a large number called a/n _______________.

21. In Figure 6-1, which atom forms an ion by the loss of electrons? (2 points)

22. Which compound shown in Figure 6-1 is formed by covalent bonding? Explain. (4 points)

Table 6-1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color at lower pH values</th>
<th>pH range of color transition</th>
<th>Color at higher pH values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl red</td>
<td>Red</td>
<td>4.4–6.0</td>
<td>Yellow</td>
</tr>
<tr>
<td>Litmus</td>
<td>Red</td>
<td>5.5–8.0</td>
<td>Blue</td>
</tr>
<tr>
<td>Bromothymol blue</td>
<td>Yellow</td>
<td>6.0–7.6</td>
<td>Blue</td>
</tr>
<tr>
<td>Phenol red</td>
<td>Yellow</td>
<td>6.8–8.4</td>
<td>Red</td>
</tr>
<tr>
<td>Phenolphthalein</td>
<td>Colorless</td>
<td>8.3–10.0</td>
<td>Red</td>
</tr>
</tbody>
</table>
23. If you exhale carbon dioxide ($CO_2$) into a solution of bromothymol blue, the solution turns from blue to yellow. Does $CO_2$ dissolve in water to form an acid or a base? Use Table 6-1 of acid-base indicators to answer. (4 points)

24. Imagine that a bottle of perfume is opened at the back of a classroom. Explain how your teacher can detect the odor on the other side of the room within a few minutes. (2 points)

25. How do you feel about studying on the weekends?

**Problem**

26. Balance the following equation: (3 points)
   Charges: Na $^+$1, Cl $^-1$
   Na $^+$Cl $->$ NaCl

27. Balance the following equation: (6 points)
   Charges: Al $^+$3 O $^-2$
   Al $^+$O $->$ AlO

**Case**

28. (5 points)

<table>
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<th></th>
<th>Proton</th>
<th>Electron</th>
<th>Neutron</th>
</tr>
</thead>
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<tr>
<td>Positive Charge</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No Charge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Charge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a Mass of 1 AMU</td>
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<td></td>
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</table>
Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. How many electrons can an oxygen atom share? (Atomic number 8, Atomic Mass of 16)
   a. one  c. three
   b. two  d. four

____ 2. Which of following is NOT a compound.
   a. H  c. PO₄
   b. CO₂  d. H₂O

____ 3. Which of the following is not located in the nucleus?
   a. Protons  c. electrons
   b. Neutrons  d. Both A and B

____ 4. Because of its polarity, water can_____.
   a. maintain a high heat capacity  c. dissolve many substances
   b. Insulate and protect living things  d. "eat through" metals

____ 5. A sodium atom becomes a positive sodium ion when it_____.
   a. gains an electron  c. gains a neutron
   b. loses an electron  d. loses a proton

____ 6. A very strong acid might have a pH of_____.
   a. 3  c. 9
   b. 5  d. 13

____ 7. The total number of atoms in a molecule of lactose, C₁₂H₂₂O₁₁, is_____.
   a. 11  c. 22
   b. 12  d. 45

____ 8. An atom of nitrogen has seven electrons. Its second energy level has_____.
   a. two electrons  c. seven electrons
   b. five electrons  d. nine electrons

____ 9. The random movement of particles is called_____.
   a. brownian movement  c. acidity
   b. polarity  d. "life force"

Completion: Two points each
Complete each sentence or statement.

10. Molecule with an unequal distribution of charge is a__________________.

11. All of the chemical reactions that occur in an organisms is called__________________.

12. Mixture in which one substance is equally distributed in another substance is called a__________________.
13. The Center of an atom is called the _____________.

Matching

*Match each item with the correct statement below.*

- a. acid
- b. polar molecule
- c. nucleus
- d. isotope
- e. covalent
- f. solution
- g. compound
- h. metabolism

14. A substance that forms hydrogen ions in solution
15. Atoms of the same element with a different number of neutrons
16. Atoms of two or more elements that are chemically combined
17. Two atoms that share electrons are held together by __ bonds.

Short Answer

18. Draw the atomic structure of a nitrogen atom, including the electron energy levels. The atomic number for nitrogen is 7, its atomic mass is 14. (4 points)

19. In the chemical reaction \(6\text{CO}_2 + 12\text{H}_2\text{O} + \text{sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}\), there are 12 atoms of oxygen in \(6\text{O}_2\) the small number that shows the number of atoms is called a/n _____________.

Figure 6-1
Figure 3.7 (Continued)

20. In Figure 6-1, which atom forms an ion by gaining electrons? (2 points)

21. Which compound shown in Figure 6-1 is formed by ionic bonding? Explain. (4 points)

22. Imagine that the class next door is having a pizza party. Explain how you can detect the odor in the hall within a few minutes. (2 points)

23. Explain how isotopes can be utilized in medicine. (2 points)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color at lower pH values</th>
<th>pH range of color transition</th>
<th>Color at higher pH values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl red</td>
<td>Red</td>
<td>4.4–6.0</td>
<td>Yellow</td>
</tr>
<tr>
<td>Litmus</td>
<td>Red</td>
<td>5.5–8.0</td>
<td>Blue</td>
</tr>
<tr>
<td>Bromothymol blue</td>
<td>Yellow</td>
<td>6.0–7.6</td>
<td>Blue</td>
</tr>
<tr>
<td>Phenol red</td>
<td>Yellow</td>
<td>6.8–8.4</td>
<td>Red</td>
</tr>
<tr>
<td>Phenolphthalein</td>
<td>Colorless</td>
<td>8.3–10.0</td>
<td>Red</td>
</tr>
</tbody>
</table>

24. Refer to Table 6-1 of acid-base indicators. A small volume of dilute hydrochloric acid is placed in a beaker, and two drops of phenolphthalein are added. The solution remains colorless. A dilute solution of sodium hydroxide is then added drop by drop until a color change occurs. In what pH range does the color change occur? Describe the color change that occurs. (4 points)

25. What do you do differently to prepare for tests on Mondays?

**Problem: Diatomic elements are H, O, N, Cl, Fl, Br, I**

26. Balance the following equation: (3 points)
   Charges: Li +1, Br -1
   \[ \text{Li} + \text{Br} \rightarrow \text{LiBr} \]

27. Balance the following equation: (6 points)
   Charges: B+3 S -2
   \[ \text{B} + \text{S} \rightarrow \text{BS} \]
Figure 3.7 (Continued)

Case

28.

<table>
<thead>
<tr>
<th>(5 points)</th>
<th>Proton</th>
<th>Electron</th>
<th>Neutron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is considered massless</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are found in the nucleus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are found around the nucleus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are different in isotopes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cassell, R. (2003). Confluence is a primary measure of test validity and it includes the creditability of test taker. *College Student Journal*. 37, 348-353.


