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ABSTRACT

To determine the effectiveness of a graduate educational assessment course in measurement processes, this study compared test scores from the beginning and from the end of the course. The three sections that were the focus of the study were offered in 2002 and 2003 by the same instructor. The course was offered as a traditional face-to-face class using PowerPoint presentations during all of the lectures. All sections incorporated several quizzes, hands-on activities, and a 50-question multiple choice final examination. There were 44 participants for whom there was complete information, 35 females and 9 males. The assumptions for the dependent t-test and the Wilcoxon test could not be met, so a quantile (sign) test was run to compare the pretest and posttest scores. The assumption that the measurement scale be at least ordinal was met since the data comprised frequency counts, but random selection was not possible since students are not randomly assigned to classes. However, the students did not exhibit any obviously exclusive characteristics. The test indicated that the null hypothesis of no statistically significant difference between the pretest and posttest scores could be rejected at the p=0/.00024 level (13 higher and 0 lower). It is concluded, then, that there were differences relative to the pretest and posttest scores, suggesting that the class was effective for learning the measurement topics introduced. The syllabus is attached. (Contains 2 figures, 2 tables, and 32 references.) (SLD)

# Effectiveness of a Graduate Measurement Course

Pamela M. Broadston

Department of Educational Leadership

University of Arkansas, Little Rock

2801 S. University, Little Rock, AR 72204-1099

Robert L. Kennedy

University of Arkansas, Little Rock

2801 S. University, Little Rock, AR 72204-1099

(rlkennedy@ualr.edu)

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Grand Casino Resort and Spa (Bayview Hotel)

Biloxi, Mississippi

November 5, 2003

Effectiveness of a Graduate Measurement Course

Abstract

To determine the effectiveness of a graduate educational assessment course in measurement processes, this study compared test scores from the beginning and from the end of the course. The three sections that were the focus of this study were offered in the Fall 2002, Spring 2003, and Summer 2003 terms with the same instructor. The course was offered as a traditional face-to-face class using PowerPoint presentations during all of the lectures. All sections incorporated several quizzes, hands-on activities, and a fifty-question multiple-choice final exam. The purpose of the activities was to assess the students' knowledge of the basic components involved in educational assessment, particularly the measurement process. There were 44 participants for whom there was complete information, comprising 35 females (80%) and 9 males (20%). Multiple-choice pretests and posttests on fundamental assessment topics were given. The assumptions for the dependent t-test and for the Wilcoxon test could not be met, so a quantile (sign) test was run to compare the pretest and posttest scores. The assumption that the measurement scale be at least ordinal was met since the data comprised frequency counts, but random selection was not possible since students are not randomly assigned to classes. However, the students did not exhibit any obviously exclusive characteristics. The test indicated that the null hypothesis of no statistically significant difference between the pretest and posttest scores could be rejected at the p=0.00024 level (13 higher and 0 lower). It is concluded, then, that there were differences relative to the pretest and posttest scores, suggesting that the class was effective for learning the measurement topics introduced.

Effectiveness of a Graduate Measurement Course

The study investigated the effectiveness of a graduate educational assessment course in measurement processes. The three sections involved in this study were offered in the Fall 2002, and Spring and Summer 2003 terms. There were 44 participants for whom there was complete data. All participants were students enrolled in the Assessment: Measurement graduate course. The design of the study was a single-sample pretest-posttest. Frequency counts for correct responses were used and the quantile (sign) test indicated that the null hypothesis could be rejected at the p=0.00024 level.

## Activities

The course that is the subject of this study used a traditional face-to-face lecture model. PowerPoint presentations and collaborative group discussions were used to enhance the presentations and to provide a student-centered, activity-based course. This course is a one-hour course in a three-hour block, or sequence, of courses on assessment, comprising 15 hours over a five-week period. The activities for the classes included a critical analysis of a journal article on assessment, 3 quizzes, 2 group activities, and a final exam. These group activities were designed to provide practice for the students regarding the fundamental aspects of assessment and measurement. Participation in class discussions was always encouraged. The most recent syllabus for the course is appended to this paper.

## Design

The design of the study was a quasi-experimental single-sample pretest-posttest. There was no control group in this study due to all of the students being taught by the same instructor, using the same instructional methods and materials. This course is not offered by any other instructor at this time. It is noted by this researcher that this approach is a weak experimental design because of the lack of a control

group in this study due to all of the students being taught by the same instructor, using the same instructional methods and materials. This course is not offered by any other instructor at this time. It is noted by this researcher that this approach is a weak experimental design because of the lack of a control group to support the idea that an intervention is the reason for any differences between pretest scores and posttest scores. In addition, the students who were compared in this study were from intact classes, rather than randomly assigned groups. Therefore, it may be inappropriate to make causal inferences based on the results.

## Subjects

The three sections involved in this study were offered in the Fall 2002, and Spring and Summer 2003 terms. There were 44 participants for whom there was complete data. All participants were students enrolled in the Assessment: Measurement graduate course. All of the students were admitted to various Master's degree programs within the College of Education at the university.

## Instrument and Data Analysis

The pretest instrument was a 15-question multiple choice test developed by the instructor. The same 15 questions were incorporated into the 50-question multiple choice final exam which was used as the post-test instrument. Frequency counts of the number of correct responses were used as scores, and the quantile (sign) test indicated that the null hypothesis of no difference in the mean scores on the pretests and posttests could be rejected at the $p=0.00024$ level. That is, between the pretest and the posttest, 13 of the 15 students had scores that were higher on the posttest and 0 had scores that were lower.

## Discussion

It is concluded, then, that there were differences relative to the pretest and posttest scores, suggesting that the class may have been effective for learning the measurement topics introduced. However, since a limitation of the study is the small sample size, any generalizations of these findings would need to be done with caution. In addition, it was not possible to have a control group since the instructor is the only person teaching this particular course. It is possible, then, that the change could have arisen from some unidentified source other than the instructional approach investigated here. While no other cause is suspected, that possibility remains.

## One-Sample T-Test Report

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| Database | C:\My Documents\MSERA\PamRobMSERAAbs.S0 |
| Variable | Pretest |

**Descriptive Statistics Section**

| Variable | Count | Mean | Standard Deviation | Standard Error | 95% LCL of Mean | 95% UCL of Mean |
|---|---|---|---|---|---|---|
| Pretest | 13 | 20.07692 | 8.139016 | 2.257357 | 15.15856 | 24.99528 |

T for Confidence Limits = 2.1788

**Tests of Assumptions Section**

| Assumption | Value | Probability | Decision(5%) |
|---|---|---|---|
| Skewness Normality | 0.8643 | 0.387433 | Cannot reject normality |
| Kurtosis Normality | 0.1974 | 0.843480 | Cannot reject normality |
| Omnibus Normality | 0.7860 | 0.675040 | Cannot reject normality |
| Correlation Coefficient | | | |

**T-Test For Difference Between Mean and Value Section**

| Alternative Hypothesis | T-Value | Prob Level | Decision (5%) | Power (Alpha=.05) | Power (Alpha=.01) |
|---|---|---|---|---|---|
| Pretest<>0 | 8.8940 | 0.000001 | Reject Ho | 1.000000 | 1.000000 |
| Pretest<0 | 8.8940 | 0.999999 | Accept Ho | 0.000000 | 0.000000 |
| Pretest>0 | 8.8940 | 0.000001 | Reject Ho | 1.000000 | 1.000000 |

**Nonparametric Tests Section**

**Quantile (Sign) Test**

| Hypothesized Value | Quantile | Number Lower | Number Higher | Prob Lower | Prob Higher | Prob Both |
|---|---|---|---|---|---|---|
| 0 | 0.5 | 0 | 13 | 0.000122 | 1.000000 | 0.000244 |

**Wilcoxon Signed-Rank Test for Difference in Medians**

| W Sum Ranks | Mean of W | Std Dev of W | Number of Zeros | Number Sets of Ties | Multiplicity Factor |
|---|---|---|---|---|---|
| 91 | 45.5 | 14.30035 | 0 | 2 | 12 |

| | Exact Probability | | Approximation Without Continuity Correction | | | Approximation With Continuity Correction | | |
|---|---|---|---|---|---|---|---|---|
| Alternative Hypothesis | Prob Level | Decision (5%) | Z-Value | Prob Level | Decision (5%) | Z-Value | Prob Level | Decision (5%) |
| Median<>0 | | | 3.1817 | 0.001464 | Reject Ho | 3.1468 | 0.001651 | Reject Ho |
| Median<0 | | | 3.1817 | 0.999268 | Accept Ho | 3.2167 | 0.999352 | Accept Ho |
| Median>0 | | | 3.1817 | 0.000732 | Reject Ho | 3.1468 | 0.000825 | Reject Ho |

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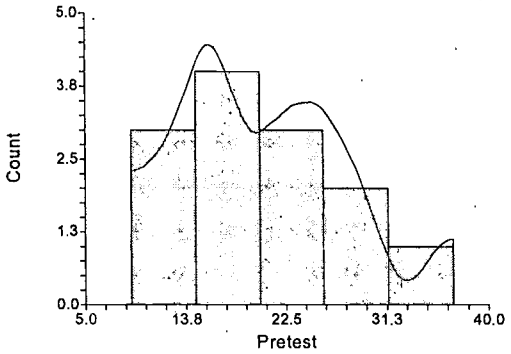
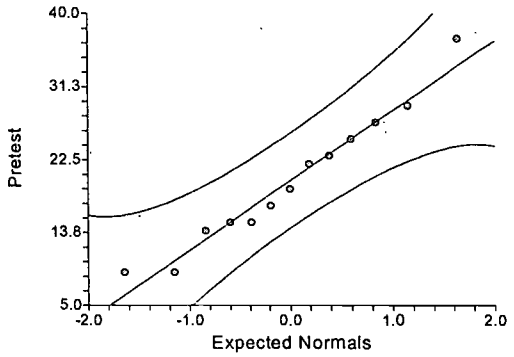
Variable Pretest

## Plots Section

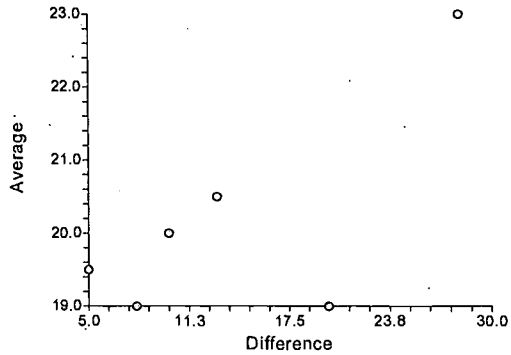
Histogram of Pretest




Normal Probability Plot of Pretest




Average-Difference Plot



## One-Sample T-Test Report

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| Database | C:\My Documents\MSERA\PamRobMSERAAbs.S0 |
| Variable | Postest |

**Descriptive Statistics Section**

| Variable | Count | Mean | Standard Deviation | Standard Error | 95% LCL of Mean | 95% UCL of Mean |
|---|---|---|---|---|---|---|
| Postest | 13 | 34.38462 | 7.006407 | 1.943228 | 30.15069 | 38.61855 |

T for Confidence Limits = 2.1788

**Tests of Assumptions Section**

| Assumption | Value | Probability | Decision(5%) |
|---|---|---|---|
| Skewness Normality | -1.5935 | 0.111047 | Cannot reject normality |
| Kurtosis Normality | 0.1764 | 0.859945 | Cannot reject normality |
| Omnibus Normality | 2.5704 | 0.276596 | Cannot reject normality |
| Correlation Coefficient | | | |

**T-Test For Difference Between Mean and Value Section**

| Alternative Hypothesis | T-Value | Prob Level | Decision (5%) | Power (Alpha=.05) | Power (Alpha=.01) |
|---|---|---|---|---|---|
| Postest<>0 | 17.6946 | 0.000000 | Reject Ho | 1.000000 | 1.000000 |
| Postest<0 | 17.6946 | 1.000000 | Accept Ho | 0.000000 | 0.000000 |
| Postest>0 | 17.6946 | 0.000000 | Reject Ho | 1.000000 | 1.000000 |

**Nonparametric Tests Section**

**Quantile (Sign) Test**

| Hypothesized Value | Quantile | Number Lower | Number Higher | Prob Lower | Prob Higher | Prob Both |
|---|---|---|---|---|---|---|
| 0 | 0.5 | 0 | 13 | 0.000122 | 1.000000 | 0.000244 |

**Wilcoxon Signed-Rank Test for Difference in Medians**

| W Sum Ranks | Mean of W | Std Dev of W | Number of Zeros | Number Sets of Ties | Multiplicity Factor |
|---|---|---|---|---|---|
| 91 | 45.5 | 14.30472 | 0 | 1 | 6 |

| | Exact Probability | | Approximation Without Continuity Correction | | | Approximation With Continuity Correction | | |
|---|---|---|---|---|---|---|---|---|
| Alternative Hypothesis | Prob Level | Decision (5%) | Z-Value | Prob Level | Decision (5%) | Z-Value | Prob Level | Decision (5%) |
| Median<>0 | | | 3.1808 | 0.001469 | Reject Ho | 3.1458 | 0.001656 | Reject Ho |
| Median<0 | | | 3.1808 | 0.999266 | Accept Ho | 3.2157 | 0.999349 | Accept Ho |
| Median>0 | | | 3.1808 | 0.000734 | Reject Ho | 3.1458 | 0.000828 | Reject Ho |

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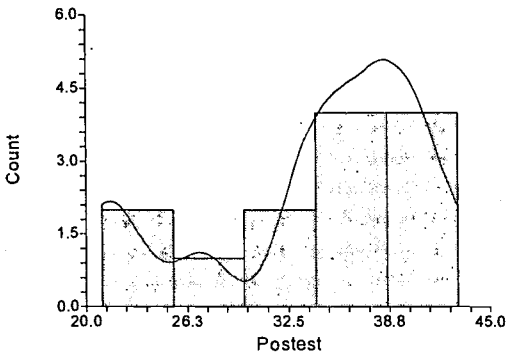
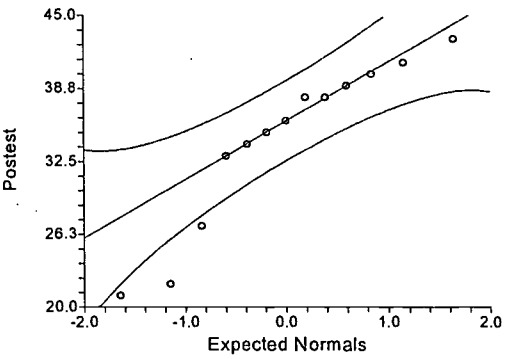
| Database | C:\My Documents\MSERA\PamRobMSERAAbs.S0 |
| Variable | Postest |

## Plots Section

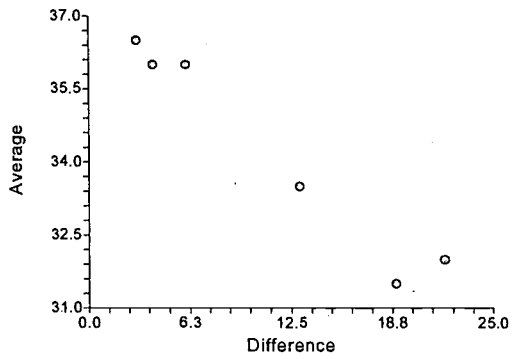
Histogram of Postest




Normal Probability Plot of Postest




Average-Difference Plot



University of Arkansas at Little Rock
College of Education
Course Outline/Syllabus
Department of Educational Leadership

| | | |
|---|---|---|
| I. | Course Prefix and Number | EDFN 7171 |
| II. | Course Title | Educational Assessment: Measurement Process |
| III. | Credit | 1 hour |
| IV. | Semester and Year | Summer 2003 |
| V. | Instructor: | Pamela Broadston, M.Ed. |
| VI. | Office Location | 419J Dickinson |
| VII. | Office Hours | By appointment |
| VIII. | Telephone and E-mail: | xxx-xxxx<br>xxx@ualr.edu |

IX. Course Description

This course is part of a three-course sequence (EDFN 7171, 7172, 7173) treating advanced topics in assessment and evaluation. The focus is on the role of measurement in education and human service agencies. It also deals with the psychometric properties of norm-referenced and criterion-referenced tests.

The Conceptual Framework for programs in the College of Education is Leadership in Learning through the Specialized Expertise (SE), Communication (C), and Professional Development (PD).

This course is designed to prepare teachers to meet the Principles of Licensure adopted by the Arkansas Department of Education.

Principle #1: The teacher understands the central concepts, tools of inquiry, and structures of the discipline (s) he or she teachers, can create learning experiences that make these aspects of subject matter meaningful for students can link the discipline(s) to other subjects.

Principle #2: The teacher plans curriculum appropriate to the students, to the content, and to the course objectives.

Principle #3: The teacher plans instruction based upon human growth and development, learning theory, and the needs of students.

Principle #4: The teacher exhibits human relations skills which support the development of human potential.

Principle #5: The teacher works collaboratively with school colleagues, parents/guardians, and the community to support students' learning and well being.

XI. Course Objectives

1. Students will discuss how the assessment process may be used to verify and specify student performance problems, identify the kinds of assessment data that are necessary for particular decisions in educational settings, and evaluate how perspectives toward special populations can influence the interpretation and use of assessment data. (SE, P1; 1.2.2, 1.2.3, 1.2.4)

2. When presented with test scores for hypothetical children, students will interpret these children's performances when they are expressed as grade/age equivalents, percentile ranks, and standard scores, taking into account the impact that the standard error of measurement has on these derived scores. (SE, C, P1, P4; Communicator 3.2.1)

3. When given demographic data about a particular child–such as socioeconomic status, ethnic origin, handicapping condition, and geographic location–students will review sections in test manuals on standardization and determine whether the child should be evaluated using these tests. (SE, PD, P1; Instructor 1.2.2, 1.2.3, 1.2.4)

4. Ater completing readings and participating in class discussions regarding technical adequacy of tests, student will evaluate the technical adequacy of assessment information on interpretations and decisions pertaining to groups and individuals. (SE, PD, P1; Instructor 1.2.3, Communicator 3.2.1)

## XI. Methods/Instructional Strategies, including Text, Readings and Instructional Resources

The primary methods for this course will be lecture and group discussion.

Text:
Kubiszyn, T., & Borich, G. (2003). *Educational testing and measurement: Classroom application and practice.* (7th ed.). New York: John Wiley & Sons, Inc.

## XII. Assignments, Evaluation Procedures, and Grading Polices

Assignments
All class members will be expected to come to class having read the assignment so they can participate intelligently in class discussions. Students will be required to take one exam, complete three quizzes/activities, complete one critical analysis and participate in classroom discussions.

Evaluation Procedures
The following grading model will be used:

| | |
|---|---|
| 1 exam at 50 points | 50 |
| 3 quizzes/activities at 15 points each | 45 |
| 1 critical analysis 25 points | 25 |
| **Total points possible** | **120** |

Grading Policy
Grades will be assigned on the following basis:

| | |
|---|---|
| 90% - 100% | A |
| 80% - 89% | B |
| 70% - 79% | C |
| 69% and below | F |

## XIII. Class Policies

Attendance
Students will be expected to attend all scheduled sessions of the course. Missing one session is often equivalent to missing an entire unit of instruction. The course is very cumulative, and losing an entire unit would almost certainly result in a serious loss of continuity for the student. Documented illness, family emergency, official conflicts, and the like will be treated as excused absences, but it is ultimately the student's responsibility to maintain his/her standing in the course. The student should make every attempt to contact the instructor **prior** to being absent. **Make-up exams, quizzes, and projects will be given only if accompanied by a valid DOCUMENTED excuse. Projects will be accepted after the due date only if accompanied by a valid DOCUMENTED excuse.** The student is responsible for contacting the instructor in the event of a missed exam, quiz/class activity, and/or project **prior** to the next attended class session.

Class Participation: Each student is expected to read assigned material prior to class, to participate in class discussions, and to complete assignments in a timely manner.

Cell Phones/Pagers: Please turn off during class. If you are concerned that emergency calls may occur, please discuss with instructor.

**Academic Dishonesty:** Please refer to the UALR Student Handbook for definitions of academic dishonesty. The handbook is available online: http://www.ualr.edu/handbook/STUDENT_HANDBOOK_2002_2003.HTM
Any instance of academic dishonesty will result in the student receiving a grade of F for the exam or assignment. The offense will be reported to the Dean of Students as per UALR policy.

XIV. Class Schedule/Topical Outline - Items in the Schedule are subject to change

| Dates | Topics | Chapters |
|---|---|---|
| May 27 | Review of Syllabus | |
| | Introduction to Testing and Measurement | 1, 3 |
| | High Stakes Testing | 2 |
| May 29 | **Quiz** | |
| | Norm-referenced & Criterion-referenced Tests | 4 |
| | Basic Statistics | 12 |
| June 3 | **Quiz / activity** | |
| | Variability, Normal Distribution, & Converted Scores | 13 |
| | Correlation | 14 |
| | **Critical Analysis Due** | |
| June 6 | **Quiz / activity** | |
| | Validity & Reliability | 15, 16 |
| | Accuracy and Error | 17 |
| June 10 | **Exam (50 multiple choice questions)** | |

XV. Bibliography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