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ABSTRACT

This study investigated graduate students' attitudes toward statistics in a class in which the focus of instruction was the use of a computer program that made possible an individualized, self-paced student-centered, activity-based course. The six sections involved in the study were offered in 2001 and 2002. There were 43 participants for whom there were complete data. All were enrolled in advanced statistics. The instrument used was the Statistics Attitude Survey (D. Roberts and E. Bilderback, 1980). Both chi square (21.69, p=0.0002) and Kendall's Coefficient of Concordance W (0.36) indicated that there were differences in the distributions of ranks between pretest and posttest results. Most of these differences occurred as increases in the rankings marked at each end of the scales. That is, after the course, more students felt more strongly that they agreed or disagreed with statements about some aspects of statistics. For example, students agreed more strongly that statistics would be useful to test the superiority of one method over another, and that statistics would be useful in evaluating other people. They disagreed more strongly that one should be good at mathematics before attempting statistics and that it is unreasonable to expect the average professional to master and apply statistics. Comments from open-ended evaluation may help explain the results of the survey. Findings suggest that offering the course using computers may help improve students' attitudes about certain aspects of statistics. An attachment contains the course syllabus and schedule. (Contains 2 figures and 11 references.) (Author/SLD)

Graduate Students' Attitudes in an Activity-Based Statistics Course

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Graduate Students' Attitudes in an Activity-Based Statistics Course

The study investigated graduate students' attitudes toward statistics in a class in which the focus of instruction was the use of a computer program which made possible an individualized, self-paced, student-centered, activity-based course. The six sections involved in this study were offered in the Spring 2001, Fall 2001, and Spring 2002 terms. There were 43 participants for whom there was complete data. All were enrolled in advanced statistics, with two-thirds being white females. The instrument used was the Statistics Attitude Survey (Roberts and Bilderback, 1980). Both chi square (21.69, $p=0.0002$) and Kendall's Coefficient of Concordance W (0.36) indicated that there were differences in the distributions of ranks between the pretest and posttest results. Most of these differences occurred as increases in the rankings marked at each end of the scales. That is, after the course, more students felt more strongly that they agreed or disagreed with statements about some aspects of statistics. For example, students agreed more strongly that "Statistics will be useful to me to test the superiority of one method over another." and "Statistics will be useful to me in my profession when I evaluate other people." On the other hand, they disagreed more strongly that "You should be good at math before attempting statistics" and "It is unreasonable to expect the average professional to master and apply statistics." Comments from open-ended evaluation forms may help explain the results of the survey: "given the freedom to learn at my own pace and style", "class flexibility", "relaxed environment", and "I feel like I have learned a lot about stat and can apply it to my profession as a useful tool." It is concluded, then, that offering the course using computers may help improve students' attitudes about certain aspects of statistics.

Graduate Students' Attitudes in an Activity-Based Statistics Course

Students typically have concerns about taking any statistics class (Chermak and Weiss, 1999; Harrington, 1999; Onwuegbuzie, 2000; Rainville, 2001; Sgoutas-Emch and Johnson, 1998; Zanakis and Valenzi, 1997), and perhaps even more when beginning an advanced statistics class. "Some will experience a great deal of anxiety simply at the sight of the numbers (McKean, 1999)." Their concerns probably affect their attitudes, and might have been based on prior experiences, rumors, or simply fear of the unknown. Whatever the reason, it is often the case that a substantial number of students in most classes will need to be motivated to study statistics. As Gal and Ginsburg (1994) noted, many statistics teachers focus on knowledge, but many of their students may have difficulty based in non-cognitive factors, such as negative attitudes or beliefs which may hinder their learning, at least to the extent to which they will be able to internalize the content and be able to apply what they have learned. Since statistics courses tend to be among the most anxiety-provoking for those college students required to take them, researchers have investigated techniques to help reduce students' anxiety and negative attitudes (Sgoutas-Emch and Johnson, 1998). For example, Sgoutas-Emch and Johnson (1998) tried journal writing by a group of undergraduate students in their statistics course. As far as their performance, attitudes, and anxiety towards the course as compared with a control group was concerned, the journal group showed improved grades, lower anxiety before exams, and lower physiological reactions.

Other approaches to reducing anxiety in the classroom have involved technology. For example, Ellram and Easton (1999) presented a case study on developing and implementing a purchasing class via the Internet. The attitudes of the students were generally quite positive and supportive despite a variety of problems with the technology and other issues. Fortunately for the instructors, the students realized that there would be challenges with technology and did not hold them accountable for these problems. In fact, the instructors stated that they had not experienced such understanding and patience before at either the undergraduate or graduate level.

Robertson and Stanforth (1999) surveyed Family and Consumer Science students about their interest in Web-based distance education and found that their computer attitudes were not particularly positive, despite [or perhaps because of] their experience in using computers. For this group of students, primarily young females, computer access did not have an expected positive impact on their computer attitudes. Because of the sample bias, there was limited generalizability of the findings.

Graham and McNeil (1999) described a project using the Internet for disseminating information about social geography. There were some technological difficulties, but students still reacted favorably, overall.

Blake (2000) incorporated e-mail and the World Wide Web to teach an introductory media writing course. Students in this course left with very positive attitudes, rating it highly enjoyable and convenient, and saying that they would recommend the course to their friends.

Zeis, Shah, Regassa, & Ahmadian (2001) reconceptualized their teaching of statistics and found that students were better able to learn statistics when put into a context in which they learn how to collect, organize, and manage their own data before they learn analysis and inference. This approach led students to believe that they could carry out their own research.

In a course based on Web CT technology, an approach rapidly growing in popularity on college campuses, Sanders and Morrison-Shetlar (2001) used Web-enhanced instruction in an introductory biology course for nonmajors. The students' attitudes toward the Web-based instruction were generally positive, with the students being most comfortable with assessment over the Web. However, most preferred receiving a hard copy of the course syllabus rather than having to print one from the Web. They also preferred talking face-to-face as opposed to using chat rooms and had mixed feelings about interacting through the bulletin board and getting class notes from the Web. Nevertheless, they overwhelmingly preferred using Web-enhanced instruction as opposed to not using it.

Bushway and Flower (2002) also used WebCT-based technology to help students learn statistics. However, their focus was on learning enhancements, including Supplemental Instruction, quizzes, and required class attendance for students regarded as at-risk. The additional instruction and the quizzes substantially lowered the failure rate although the required attendance by itself was not effective.

As did Sgoutas-Emch and Johnson (1998), Potthast (1999) worked with groups in teaching basic statistics, but in this case the groups were involved with cooperative learning experiences. Not all of the students valued working in cooperative learning groups, however. Some preferred working alone, believing that other members of the group inhibited their progress. Others, though, found the experiences beneficial.

Zanakis and Valenzi (1997) worked with an undergraduate business statistics class and noted that students were anxious about using the computer to do statistical calculations. The authors suggested modifications to the statistics course to strengthen students' beliefs in statistics and reduce their test anxiety. To do this, they proposed changes which included reduced methodology coverage, newspaper stories exemplifying data abuses, reduced weighting of tests in the course grade, more group work, and more emphasis on short, real-world cases.

Harrington (1999) offered statistics using statistical computer packages and compared traditional versus programmed learning. Students rated this course well, other than difficulty with using the Data Desk statistics program, although they were not required to use it. Harrington had hoped that the students' computer skills would improve, but they did not report an increase in them.

Holcomb and Ruffer (2000) proposed using extended projects involving a single, real multivariate data set to teach statistics. The assignments combined four trends in statistics education: computers, real data, collaborative learning, and writing. The authors administered a questionnaire to students at the end of each term. Almost all of the students agreed that the projects helped them understand statistical concepts and that the projects were helpful in learning how to make graphs and tables. A large majority agreed that consistently using the same data set helped them to see the range of statistical procedures that could be used to analyze data and that working in groups was helpful.

Chermak and Weiss (1999) developed an activity-based course that involved using computers to teach statistics to criminal justice students. The statistics program used was SPSS/PC+ with which some students had difficulty, but most of the students reported that the experience was valuable.

Activities

As with Chermak and Weiss, the course that is the object of this study used a computer program which made it possible to provide an individualized, self-paced, student-centered, activity-based course. The activities for both classes comprised conducting analyses of data given brief scenarios, as well as a final project, dubbed a "dissertation simulation" since it was designed to provide practice to the students in preparation for their dissertations. Other components of their grades included a midterm, a final, and participation in class discussions. The most recent syllabus for the course is appended to this paper. The statistical analysis program used for both courses was NCSS 2001 (Hintze, 2001).

Subjects

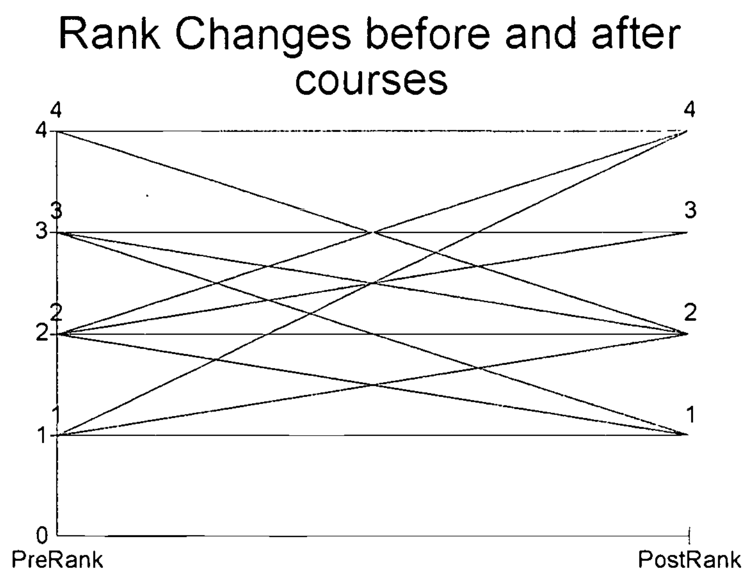
The six sections of advanced statistics involved in this study were offered in the Spring 2001, Fall 2001, and Spring 2002 terms. There were 43 participants for whom there were complete data. All were enrolled in advanced statistics, with two-thirds in each class being white females. All of the students were either admitted to or considering applying for admission to the Higher Education or Educational Administration doctoral programs of the university. All were required to have had at least one prior course in statistics before being admitted to the classes.

Instrument and Data Analysis

The instrument used to measure the students' attitudes toward statistics was the Statistics Attitude Survey (Roberts and Bilderback, 1980). Both chi square (21.69, $p=0.0002$) and Kendall's Coefficient of Concordance W (0.36) indicated that there were differences in the distributions of ranks between the pretest and posttest results. Kendall's W, which measures the agreement between observers of samples, ranges between zero and one. A value of one indicates perfect concordance. A value of zero indicates no agreement or independent samples (Hintze, 2001). The 0.36 indicates that there is little agreement between the distributions of responses, confirming the changes from the pretest to the posttest.

As a measure of effect for chi-square tests for contingency tables, Cohen (1988) has recommended w (not to be confused with Kendall's W) as an index of "the amount of departure from no association" (p. 221). In this case, then, w can be interpreted as a measure of the difference between the distributions of the class' attitudes at the beginnings and ends of the courses.

Cohen defined w as the square root of the ratio of the square of Pearson's contingency coefficient to one minus that square. Pearson's contingency coefficient for this study is 0.087083, so the resulting value of w is 0.0874145, or about 0.09. Cohen's index suggests 0.10 as a small effect, meaning that the observed effect is more or less negligible. However, the measure captures only the net results of the frequency counts, not the movement. That is, if there are changes from ranks of 1 to 2, or from 2 to 3, and so on, then the net result might be a smaller number of 1's, perhaps, and a greater number of 5's, but about the same number of the ranks in between, which would mitigate the amount of change which actually took place.



The chart above illustrates the kinds of changes which occurred for just the first question. For example, the rank of 1 assigned to the first question was left as a 1 by some, but also changed to 2 or 4 by others after the course. Similarly, the rank of 2 became 1, 2, 3, or 4. In other words, although the effect size is small, the statistical significance may be an indicator that some real change did occur as a result of the class' experiences with statistical problems.

Discussion

Most of these differences occurred as increases in the rankings marked at each end of the scales. That is, after the course, more students felt more strongly that they agreed or disagreed with statements about some aspects of statistics. For example, students agreed more strongly that "Statistics will be useful to me to test the superiority of one method over another."; "Statistics will be useful to me in my profession when I evaluate other people."; "Statistics will be useful to me when I describe my professional activities to other people."; and "I find statistics to be very logical and clear." On the other hand, they disagreed more strongly that "You should be good at math before attempting statistics"; "It is unreasonable to expect the average professional to master and apply statistics."; "When I solve a statistics problem, I am often unsure if I have a correct or nearly correct answer."; and "Statistics is the most difficult course I have taken." Comments from open-ended evaluation forms may help explain the results of the survey: "given the freedom to learn at my own pace and style", "class flexibility", "relaxed environment", "liked the structure of class", "final projects", and "I feel like I have learned a lot about stat and can apply it to my profession as a useful tool."

Offering the course using computers may help improve students' attitudes about certain aspects of statistics. 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 in attitudes could have arisen from some unidentified source other than the instructional approach investigated here. While no other cause is suspected, the possibility remains.

Given the relatively small sample size, the brevity of the intervention (15 class meetings) and the difficulty of the course work, even a small increase in the students' self-assessment may be notable. A small gain in positive feelings may result in decreased anxiety allowing better performance on examinations, improved attitude toward the dissertation and further research using quantitative methods, and an increase in the use of statistics in data-based decision-making. It may be reasonable to assume that strongly held positive feelings as indicated by the slight shift on this attitude scale may reflect decreased negative feelings and the development of increased feelings of comfort and competence. Further research is needed to elucidate the relationships between cognitive and affective factors and their effect on the behavioral outcomes of doctoral research students.

References

Blake, K. R. (2000, Spring). Using the world wide web to teach news writing online. Journalism & Mass Communication Educator, 55(1), 4-13.

Bushway, S. D. & Flower, S. M. (2002, Spring). Helping criminal justice students learn statistics: A quasi-experimental evaluation of learning assistance. Journal of Criminal Justice Education 13(1), 35-56.

Chermak, S. & Weiss, A. (1999, Fall). Activity-based learning of statistics: Using practical applications to improve student's learning. Journal of Criminal Justice Education, 10(2), 361-372.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Ellram, L. M. & Easton, L. (1999, Winter). Purchasing education on the Internet. Journal of Supply Chain Management, 35(1), 11-19.

Gal, I. & Ginsburg, L. (1994). The role of beliefs and attitudes in learning statistics: Towards an assessment framework. Journal of Statistics Education,2(2).

Graham, D. T. & McNeil, J. (1999, July). Using the Internet as part of directed learning in social geography: Developing Web pages as an introduction to local social geography. Journal of Geography in Higher Education, 23(2), 181-194.

Harrington, D. (1999, Fall). Teaching statistics: A comparison of traditional classroom and programmed instruction/distance learning approaches. Journal of Social Work Education, 35(3), 343-352.

Hintze, J. L. (2001). NCSS 2001 Statistical System for Windows. Kaysville, UT: NCSS.

Holcomb, Jr., J. P. & Ruffer, R. L. (2000, February). Using a term-long project sequence in introductory statistics. The American Statistician, 54(1), 49-53.

McKean, J. B. (1999, Fall). A comparison of methods for teaching the interpretation of contingency tables. Journal of Criminal Justice Education, 10(2), 327-337.

Onwuegbuzie, A. J. (2000, December). [Abstract]. Attitudes toward statistics assessments. Assessment and Evaluation in Higher Education, 25(4), 321-339.

Potthast, M. J. (1999, Spring). Outcomes of using small-group cooperative learning experiences in introductory statistics courses. College Student Journal, 33(1).

Rainville, G. (2001, Fall). The logic of inference in criminal justice statistics. Journal of Criminal Justice Education, 12(2), 355-366.

Roberts, D. M. & Bilderback, E. W. (1980). Reliability and validity of a statistics attitude survey. Educational and Psychological Measurement, 40, 235-238.

Robertson, L. J. & Stanforth, N. (1999). College students' computer attitudes and interest in Web based distance education. Journal of Family and Consumer Sciences, 91(3), 60-64.

Sanders, D. W. & Morrison-Shetlar, A. I. (2001, Spring). Student attitudes toward Web-enhanced instruction in an introductory biology course. Journal of Research on Computing in Education, 33(3), 251-262.

Sgoutas-Emch, S. A. & Johnson, C. J. (1998, March). Is journal writing an effective method of reducing anxiety towards statistics? Journal of Instructional Psychology, 25, 49-57.

Zanakis, S. H. & Valenzi, E. R. (1997, September/October). Student anxiety and attitudes in business statistics. Journal of Education for Business, 73, 10-16.

Zeis, C., Shah, A., Regassa, H., & Ahmadian, A. (2001, November/December). Statistical components of an undergraduate business degree: Putting the horse before the cart. Journal of Education for Business, 7(2), 83-88.

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Counts Section

	Ranks					
PrePost2	**1**	**2**	**3**	**4**	**5**	**Total**
0	170	684	222	247	96	1419
1	254	659	186	239	81	1419
Total	424	1343	408	486	177	2838

The number of rows with at least one missing value is 0

Expected Counts Assuming Independence Section

	Ranks					
PrePost2	**1**	**2**	**3**	**4**	**5**	**Total**
0	212.0	671.5	204.0	243.0	88.5	1419.0
1	212.0	671.5	204.0	243.0	88.5	1419.0
Total	424.0	1343.0	408.0	486.0	177.0	2838.0

The number of rows with at least one missing value is 0

Chi-Square Contribution Section

	Ranks					
PrePost2	**1**	**2**	**3**	**4**	**5**	**Total**
0	8.32	0.23	1.59	0.07	0.64	10.85
1	8.32	0.23	1.59	0.07	0.64	10.85
Total	16.64	0.46	3.18	0.14	1.28	21.70

The number of rows with at least one missing value is 0

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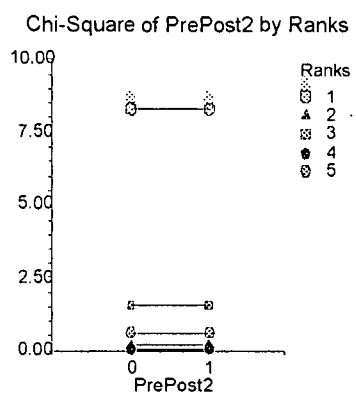
Chi-Square Statistics Section

Chi-Square	21.686230	
Degrees of Freedom	4	
Probability Level	0.000231	Reject Ho
Phi	0.087415	
Cramer's V	0.087415	
Pearson's Contingency Coefficient	0.087083	
Tschuprow's T	0.061812	
Lambda A .. Rows dependent	0.059197	
Lambda B .. Columns dependent	0.000000	
Symmetric Lambda	0.028826	
Kendall's tau-B	-0.035055	
Kendall's tau-B (with correction for ties)	-0.059239	
Kendall's tau-C	-0.043804	
Gamma	-0.099978	

Plots Section



Analysis of Variance Report

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Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Ranks	4	No	S	S+bsA
B: PrePost2	1	Yes	AB	S+sAB+asB
AB	4	No	S	S+sAB
S	320	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Ranks	4	12220.68	3055.171	148.85	0.000000*	
B: PrePost2	1	0	0	0.00	1.000000	0.050000
AB	4	140.3939	35.09848	1.71	0.147467	
S	320	6568.121	20.52538			
Total (Adjusted)	329	18929.2				
Total	330					

* Term significant at alpha = 0.05

Treatment Ranks Section

PrePost2	Number Blocks	Median	Mean of Ranks	Sum of Ranks
0	5	6.727273	1.8	9
1	5	7.242424	1.2	6

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	1.800000	1	0.179712	0.360000
Correction	1.800000	1	0.179712	0.360000

Multiplicity 0

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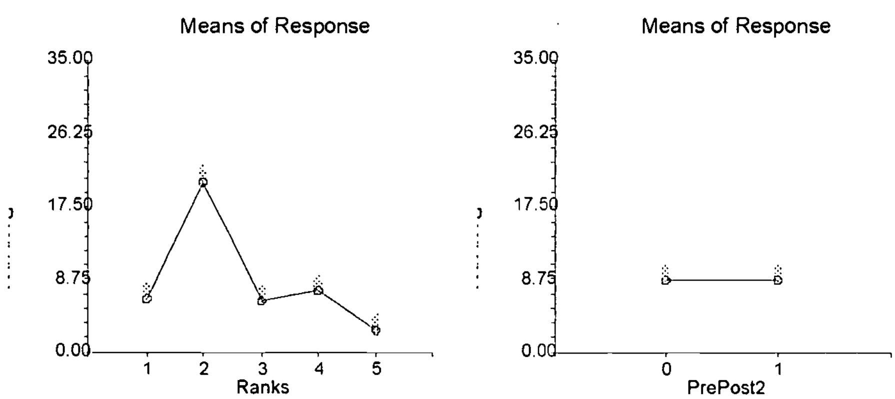
Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	330	8.6		8.6
A: Ranks				
1	66	6.424242	0.5576653	-2.175758
2	66	20.34848	0.5576653	11.74848
3	66	6.181818	0.5576653	-2.418182
4	66	7.363636	0.5576653	-1.236364
5	66	2.681818	0.5576653	-5.918182
B: PrePost2				
0	165	8.6	0.4612137	0
1	165	8.6	0.4612137	0
AB: Ranks,PrePost2				
1,0	33	5.151515	0.7886578	-1.272727
1,1	33	7.69697	0.7886578	1.272727
2,0	33	20.72727	0.7886578	0.3787879
2,1	33	19.9697	0.7886578	-0.3787879
3,0	33	6.727273	0.7886578	0.5454546
3,1	33	5.636364	0.7886578	-0.5454546
4,0	33	7.484848	0.7886578	0.1212121
4,1	33	7.242424	0.7886578	-0.1212121
5,0	33	2.909091	0.7886578	0.2272727
5,1	33	2.454545	0.7886578	-0.2272727

Plots Section



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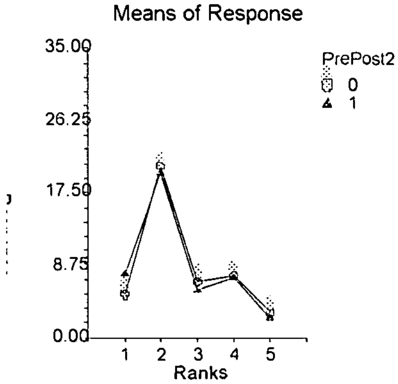

UNIVERSITY OF ARKANSAS AT LITTLE ROCK
College of Education
Department of Educational Leadership
(revised 8/26/02)

I.	Course Prefix and Number	EDFN 8305
II.	Course Title	Advanced Statistics
III.	Credit	3 hours
IV.	Semester and Year	Fall, 2002
V.	Instructor	Rob Kennedy, Ph.D., Professor of Educational Foundations and Higher Education
VI.	Office Location	Dickinson 419B
VII.	Office Hours	By appointment
VIII.	Telephone	501-xxx-xxxx (UALR), 501-xxx-xxxx (home), rlkennedy@ualr.edu (e-mail)

IX. Course Description

Advanced methods of analyzing and interpreting educational data with computer applications; includes statistical concepts, models, estimation, hypothesis tests with continuous, discrete, and categorical data; multiple linear regression, correlation, analysis of variance and covariance.

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

Communication: Students will use the expertise that they gain from Educational Foundations courses to communicate with a wide variety of audiences. They will know how to translate and evaluate current research trends and assessment practices in education. Based on their skills, these students will effectively advocate for best practices in educational improvement and thoughtful change in other work settings.

Specialized Expertise: Students will gain essential tools of their discipline in order to positively effect and measure change in students, schools, and organizations. They will gain knowledge of learning, diverse learning styles and instructional needs, lifespan growth and development, educational and psychological principles, assessment, and research.

Professional Development: Students will view themselves as professionals who are committeed to lifelong learning. They will strive to incorporate the latest in educational research, assessment, and technology into their work settings. They will be committed to data-based problem solving, to the value of inquiry in their disciplines, and to continually updating their knowledge toward teaching and learning.

X. Course Objectives

The objective is for you to become equipped to plan and implement the statistical aspects of research projects, including the dissertation. More specifically, you will be given exercises to help you:

Given a research problem and data, select an appropriate statistical analysis, conduct the analysis, and interpret the findings. (Communication, Specialized Expertise)

Comprehend and evaluate written reports of research in education and related areas of inquiry. (Arkansas Licensure Principles 1.1.1, 1.2.2, 1.3.1, 1.3.2, 1.3.4, 1.3.5, 3.1.3, 3.1.4, 5.1.1, 5.1.2, 5.2.1, 5.3.1, 5.3.2, Specialized Expertise, Professional Development)

Analyze information through reviewing research literature. (Arkansas Licensure Principles 1.1.1, 1.2.2, 1.3.1, 1.3.2, 1.3.4, 1.3.5, 3.1.3, 3.1.4, 5.1.1, 5.1.2, 5.2.1, 5.3.1, 5.3.2, Specialized Expertise, Professional Development)

Become familiar with the fundamentals of statistical analysis by identifying research questions and planning the statistical aspects of research projects. (Arkansas Licensure Principles 1.1.1, 1.2.2, 1.3.1, 1.3.2, 1.3.4, 1.3.5, 3.1.3, 3.1.4, 5.1.1, 5.1.2, 5.2.1, 5.3.1, 5.3.2, Specialized Expertise, Professional Development)

Become familiar with the fundamentals of being consumers of statistics through such procedures as locating research materials; reading them for knowledge, understanding, application, analysis, and synthesis; and evaluating them on the basis of their development, execution, and delivery. (Arkansas Licensure Principles 1.1.1, 1.2.2, 1.3.1, 1.3.2, 1.3.4, 1.3.5, 2.1.6, 2.2.5, 2.3.8, 3.1.3, 3.1.4, 5.1.1, 5.1.2, 5.2.1, 5.3.1, 5.3.2, Communication, Specialized Expertise, Professional Development)

Develop leadership and statistical skills through learning independently and making decisions based on this research. (Arkansas Licensure Principles 1.1.1, 1.2.2, 1.3.1, 1.3.2, 1.3.4, 1.3.5, 2.1.6, 2.2.5, 2.3.8, 3.1.3, 3.1.4, 5.1.1, 5.1.2, 5.2.1, 5.3.1, 5.3.2, Communication, Specialized Expertise, Professional Development)

XI. Texts, Readings, and Instructional Resources

Required Text (latest versions)

Hintze, J. L. (2001). NCSS 2001: Quick Start & Self Help, User's guide-I and II. Kaysville, UT: Number Cruncher Statistical Systems. The NCSS 2001 program requirements, according to Hintze: "Runs under Windows 95, 98, ME, 2000 or NT 4 compatible Pentium-class computers with 32 megs of RAM. Requires 30 megs of hard disk space." The program is available only for Windows.

XII. Assignments, Evaluation Procedures, and Grading Policy

Course Requirements

Students who demonstrate a commitment to the course through participation, reading, studying, and otherwise applying themselves to the course will benefit in direct proportion to that effort. If you view your coursework as an extracurricular activity that you pursue if you have some extra time, then expect to feel as though you learned little or nothing upon completing the class. If the course is to be a worthwhile experience for you, then you need to invest in it. In other words, "You get out of it what you put into it."

Evaluation Techniques/Concepts Used for Grading

Participation (10%)
Dissertation Simulation (15%)
Mid-term Examination (35%)
Final Examination (35%)
Bibliographic Annotation (5%)

Participation (10%)

For almost all statistical techniques there will be annotated examples in the NCSS text that is located on the CD under Help in the NCSS program. In addition, there are files distributed at the beginning of class that provide explanations and interpretations. You should complete these examples for practice and for information. You will also be given regular exercises to do in class or at home for practice as part of your participation. You will receive a scenario and data. Then you will need to determine the problem statement, determine a statistical technique to use to analyze the data, do the analysis, and explain and interpret your findings. You will probably find it helpful to read articles in the literature which use the techniques you have selected. In these papers you can see what information is provided to gain some insight into what information to include in your reports.

It is important for you to further participate by signing up for the electronic class (See ASignUp.pdf) so that you can benefit from the additional information available that way. Also, if I need to share updates with you about class closings, for inclement weather or other reason, then you will be able to get that information quickly, so please check your email regularly. Additionally, I will send out the passwords to the exercise files on a weekly basis and will use the class discussion list to do this.

<u>Dissertation Simulation (15%)</u>

For the dissertation simulation you will need to (1) develop a problem statement(s), (2) find or construct an appropriate instrument(s), (3) collect the data, (4) run the statistics, (5) interpret your findings, and (6) prepare and (7) present to the class the outcome. There are faculty and staff, for example, who would probably be happy to have you analyze data that they have collected, if you are interested. Check with your instructor or others. Another source of information is the School Report Card, which is available by request from the Arkansas Department of Education in a spreadsheet format importable by NCSS. Individual district data is available from their web site. See DissSim.pdf.

<u>Mid-term Exam (35%)</u>

The mid-term exam will be hands-on and will consist of problems similar to the homework and/or classroom exercises and will be open book and open notes. The content will include the material covered up to the time of the exam. You will be given a scenario and data and will be expected to "take it from there". You will need to specify the problem statement, determine the technique(s) needed to address the problem(s), enter the data, run the stats, interpret the results, and report your findings.

<u>Final Exam (35%)</u>

The final exam will be hands-on and will be similar in format to the mid-term as well as open book and open notes. The content will include material covered up to the time of the exam, on the dissertation simulations, and possibly techniques that will require some web research to discover. Again, you will be given a problem statement and data and will be expected to "take it from there". You will need to determine the technique(s) needed to address the problem statement, enter the data, run the stats, interpret the results, and report your findings.

<u>Bibliographic Annotation (5%)</u>

The specifications for the Bibliographic Annotation are described in the file BibAnnot.pdf. Bibliographic annotations allow students to share with other researchers (future Advanced Statistics students) similar to the manner in which researchers share information through formal publications. The student should investigate sources found useful in developing understanding for the course, that is, statistics-type resources as opposed to resources related specifically to the topic being investigated with the dissertation simulation.

Grading scale:

A:	90-100
B:	80-89
C:	70-79
D:	60-69
F:	0-59

XIII. Class Policies

Again, "You get out of it what you put into it." These words have real meaning in this class in which the discussion (in class or on line) contributes to the learning of each individual. It is important that each person be prepared to contribute to these discussions. Practicing with the applications is necessary for developing your skill with, and understanding of, statistics. Just as playing a piano requires much practice to hone ability and interpretation, so does the skill of using statistics. If you want to know the hows and whys of statistics, then you need to dig into the subject. Create your own problems and investigate them. Merely doing the assignments will enable you to get through the course, but true understanding will always require greater commitment. As an advanced student of education, you must decide if you wish to add to your credentials the word "leader". Doctoral students, in particular, should be leaders. The degree signifies to others that you can lead them to solutions to problems, and this course provides you an opportunity to be a problem solver.

If you have not taken basic statistics recently or are otherwise inadequately prepared for an advanced statistics class, then it is your responsibility to do additional study to avoid slowing down the class. The purpose of having basic statistics as a prerequisite for the class is so that we may investigate additional or more advanced topics, or in more depth. If you are unfamiliar with terminology or with using a computer for data analysis, then it is unfair to those who came prepared with the necessary background, for you to hold up the class for explanations of terms or concepts which you can easily find in the Help menu of the NCSS program, in books readily available from the library, or from the internet. Remember that you are a doctoral student, a leader! Demonstrate your leadership by doing your own research to increase your understanding. Information is readily and easily available to those who will make the effort to avail themselves of it. You may even learn serendipitously about a topic or concept that you will need at another time.

In addition, as part of the materials distributed the first night of class, you have the *Stat Lite* book which I have spent several years developing with the help of many previous classes, and reference materials from the basic statistics classes I taught. The book and materials provide you with the opportunity to take basic statistics in the comfort of your own home. You can prepare yourself and gain confidence in your ability at the same time, and then be a fully contributing member of the class.

The weekly exercises will involve subject matter which will not necessarily be of great interest to you. For example, the topics include cereal, auto pollution, teacher salaries, magazine ads, enrollment forecasts, hot dogs, and reading test scores, among many others. A leader will appreciate the fact that the scenarios provide an opportunity for greater understanding of the statistical techniques, as well as providing a chance for greater transfer of that understanding. Few studies are available which offer both published papers and the data on which the study was based, and that have been released for teaching purposes. As a result, it seemed preferable to me to use this variety of topics and have case studies than to have contrived studies generally of interest to no one.

The scenarios are "messy" in that they are realistic. I was part of a group which heard Dr. Grant Wiggins, a noted evaluation specialist, speak at the University of Kentucky a few years ago and he encouraged us to use messy data since that's the way life really is. His suggestion makes sense. No one in life gives you four or five nicely prepared choices and a clearly articulated problem and says pick an answer. Instead, you encounter a situation and have to determine what the problem is and then what to do about it. This is precisely what you do with your dissertation. You sort through a topical area and then focus on a problem. Consequently, the scenarios usually do not make the problem crystal clear, but instead require you to analyze the situation and determine what the likely problem is which must be solved. Then you determine a suitable statistical analysis to address that problem. This is a "thinking" exercise. It's not easy, but then, being a leader isn't easy either.

Since immediate reinforcement is suitable only for simple learning of factual knowledge, the solutions that were provided to you the first night on disk will not be accessible immediately. Solutions to higher order thinking skills type problems are more optimally revealed after a number of days of thought and reflection. Therefore, I will wait a few days after you access the exercises for the week before I distribute the passwords to ensure that you have time to reflect on your answers. As soon as you know the answer you no longer have an incentive to think about the problem, so having to wait will allow you to have more time to develop those higher order thinking skills. Asking for "hints" is tantamount to asking for the answer since hints tend to close doors on at least some approaches to solving problems. You will receive the solutions soon enough. Spend the few days developing your analytical skills.

It is natural to wish to converse during class. However, if you must speak, please do so quietly to avoid distracting the other students who are paying for the instruction they are trying to hear. If conversing with your friends about unrelated topics is more important to you than listening to this instruction, then please step into the hallway to have the necessary discussion. Additionally, note that because the lab in which we will be working contains a large amount of very expensive equipment, please do not bring in food or drink. This practice can be messy and distract other students. If you need to eat during class time, then you are welcome to visit the break lounge near the elevators.

If you must be available for communication, please show other class members the courtesy of setting your cellular phone, pager, beeper, or other device on vibrate so that it does not annoy or distract the other students in the class should it activate. If you do need to take the call, please step out into the hallway to converse.

XIV. Class Schedule

Aug. 28/29	Introduction, overview, picture, survey
Sep. 4/5	Review
Sep. 11/12	Review/Demonstration of scenario exercises (911122DQ and 911122DA, 911122Q) The code numbers refer to the date (911122 is September 11 and 12, 2002.) and type of file (Q is Question and A is Answer.). The DQ and DA refer to Demo Questions and Demo Answers. The passwords and data will be distributed weekly.
Sep. 18/19	Scenario exercises (911122A, 918192Q)
Sep. 25/26	Scenario exercises (918192A, 925262Q)
Oct. 2/3	Scenario exercises (925262A, 1002032Q)
Oct. 9/10	Scenario exercises (1002032A, 1009102Q)
Oct. 16/17	Scenario exercises (1009102A, 1016172Q)
Oct. 23/24	Scenario exercises (1016172A, 1023242Q) Sign up for dissertation simulations. For information, see DissSim.pdf.
Oct. 30/31	Mid-term exam. Evaluation. Sign up for dissertation simulations.
Nov. 6/7	MSERA No class.
Nov. 13/14	Scenario exercises (1023242A, 1113142Q) Presentations of dissertation simulations
Nov. 20/21	Scenario exercises (1113142A, 1120212Q) Presentations of dissertation simulations
Nov. 27/28	Thanksgiving Holiday. No class.
Dec. 4/5	Scenario exercises (1120212A) Presentations of dissertation simulations.
Dec. 12	4:00 pm - 6:00 pm. Final Exam over dissertation simulations. Evaluations, survey
	or
Dec. 16	6:00 pm - 8:00 pm. Final Exam over dissertation simulations. Evaluations, survey

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