S-005

Introduction to Educational Research

Harvard Graduate School of Education

Fall 2015-2016 Tuesday and Thursday, 8:30-10:00am

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Course Description

This course will be an introductory survey of many of the procedures commonly used in educational research. Conceptual, procedural and analysis issues from a wide variety of areas will be covered, ranging from the formal procedures employed by investigators carrying out carefully controlled experiments to the techniques used by researchers involved in exploratory investigations in schools and other real-life settings.

Because the scope of the course is quite broad, it will not be possible to cover all of the details of all of the research methods that are currently being used. Nevertheless, by the end of the course you should have a good awareness of the range of procedures that may be applied to different types of research studies and the guidelines that should be used in selecting a set of appropriate research methods. Thus you should be better able to discuss and critically evaluate the research conducted by others, and you should also be much better prepared to plan and carry out your own research, or to contribute as part of a research team.

Textbooks

There is no single text that is required for the course, but there are several books that will be very useful. I have ordered two main textbooks through the Coop, and these are also available on reserve in Gutman Library.

Johnson, B., and Christensen, L. (2014). <u>Educational Research: Quantitative, Qualitative, and Mixed</u> <u>Approaches, Fifth edition</u>. Thousand Oaks, CA: Sage Publications

Ary, D., Jacobs, L.C., & Sorensen, C. & Walker, D.A. (2014) <u>Introduction to Research in Education</u>, 9th edition. Belmont, CA: Wadsworth.

These books cover most of the basic research methods and issues that we will cover. But you may want to make use of other textbooks as well. Most of the textbooks on research methods are similar in what they cover, and you may already have a text from a previous course. If so, feel free to make use of other texts.

For some topics, one book might be superior, while for other topics a different book might have a better discussion. The Johnson and Christensen book provides a nice integration of lots of different approaches to research. The Ary et al. textbook is also comprehensive, and this text is widely used.

Additional suggested readings.

There are additional suggestions for readings that will help to complement and supplement the materials in the main texts. These books and articles are all on reserve in the library, and you should do at least some reading from these additional sources for each of the key topics we will cover. I will distribute a separate reading list for these suggestions, and I will post these suggestions on the course website.

Handouts

In addition to the texts and suggested readings, there will be several articles from research journals that will form the basis for some of the class discussions and assignments. We will also distribute notes, copies of PowerPoint slides, and other handouts. All of these materials will be distributed in class and/or made available on the course website.

No single book is absolutely required for this course. The best text, or combination of texts, will really depend on the type of research you will be interested in studying. My advice is to read the copies that are on reserve in the library before making a final decision about which book or books to purchase. (Used copies, earlier editions, even other texts that cover the same topics, will be perfectly fine for us in this course.)

Computer software for data analysis

This course will provide an opportunity for students to become familiar with using computer software for conducting data analysis. Several classes will be devoted to demonstrating how to enter information from a research study into the computer and how to carry out some simple analyses. The Stata system will be used, although I will also show you some examples from other statistical packages. Stata is very widely used, and versions are available for both Windows and Mac operating systems. You do not need to purchase a copy of Stata, as it is available on computers throughout HGSE, but if you do wish to install it on your own computer you should contact the folks in the computer center. I encourage you now and I will encourage you again to take advantage of this opportunity to develop your computer and statistical skills by working on projects of interest to you. Many students in the past have found this to be one of the most useful and interesting aspects of the course.

I will provide you with an introductory guide to using the computer for this course, and you may also want to refer to one of the many Stata users' guides. One good one for us to use is:

Acock, A. (2014) A gentle introduction to Stata, Second edition, 5th edition. College Station, TX: Stata Press.

This is on reserve in the library and is available at The COOP and online. (Earlier editions are also perfectly suitable for getting started. There are also lots of on-line resources for learning about Stata.)

No prior experience with statistical software is required or assumed.

Teaching fellows and office hours

We will provide lots of help and feedback to you during the course, and you are encouraged to come and see us during office hours. Once the shopping week is over and I have a better idea about the enrollment, I will be able to arrange for several teaching fellows who will help us out during the semester. We will try to coordinate our office hours so that we will be available to you on several different days and at different times, and we will try our best to accommodate your busy schedules. We will make appointments to work with you individually, and at times we may arrange to meet in small groups. I will also lead some discussion sessions for students who will be carrying out the class assignments (described a bit later on), but these will all take place during the regular class meeting times.

I will prepare a schedule of office hours and get it to you in a week or so.

Course videos

I have made arrangements for the class sessions to be recorded on video, and the videos of the classes will be posted on the course web site. It may take a day or so for the videos to be available, so be patient. The videos can be a valuable resource. Use them wisely.

In-class instant polls

We have a chance to use some fun technology to make some of the class sessions a bit more interactive. We will distribute "clickers" so that you can respond to questions I will present to the class, and we can see the responses right away. We will get your ideas and opinions on some topics, and we will learn something about designing good questions. Some of the questions will ask for your opinions. Other questions may give me feedback on what concepts people are struggling

S-005 Course Description page 4 with. Many of the questions will simply be good fun. The students enjoyed this last year, and I hope you will enjoy this set of teaching tools.

Course requirements

All students will complete some exercises during the semester that will give you some practice with basic research methods and tools.

- 1. Sample size exercise
- 2. Choosing random samples exercise
- (2A: I am considering another short exercise on sample sizes required for comparative studies.)
- 3. Practice using Stata for basic data analysis

In addition, students will have a choice between a) completing several additional formal assignments during the semester, or b) carrying out a small-scale research project.

For those choosing to do the assignments:

1. There will be several (probably three) assignments during the semester as well as a final assignment. All of these will be of the take-home variety. There will be no in-class examinations.

2. Some of the assignments will involve critiques of research studies that have appeared in educational journals. I will provide some guidelines for you to follow in preparing your critiques. We will also have some practice in class before you begin these assignments.

3. The later assignments will give you some practice in actually carrying out some data analysis. I will provide you with lots of guidance here initially, and you will have a chance to try out a number of the statistical analyses that we will be covering during the course. The goal of these assignments is to give you the same kinds of experiences that you would have in carrying out a small-scale research project. Students in the past have found these assignments very valuable.

4. The schedule for these assignment is a bit tentative, but I will give you plenty of advanced notice, and I will also be willing to be somewhat flexible about due dates if there are conflicts with other courses.

5. The final assignment will be handed out in early-December and will be due on **December 11, 2015**.

6. On all of the assignments you will be allowed and encouraged to work together in study groups to discuss the issues raised in the assignments. This type of collaboration has been very helpful for students in the past. We will also make some class time available to discuss the assignments while you are preparing your answers.

7. Final course grades will be based on all of your work on the assignments, with greater weight given to the assignments later in the semester. Signs of hard work and progress over the term will be rewarded.

For those choosing to conduct a research project:

1. It is possible for students to work together in small groups (two or three) on a common project.

2. You may combine your project with work you are doing in another course, or (for doctoral students) work you may be doing for your QP or dissertation. (N.B.: If you combine your work with a project for another course, permission of <u>both</u> instructors is required in advance.)

3. A brief (one-page) description of your project idea will be due in a couple of weeks. You may want to talk to me briefly first about some of your ideas.

4. A more detailed and formal written proposal will be due in mid October. I will provide you with guidelines for preparing this written research proposal.

5. Some of the projects may be presented to the class for discussion.

6. Final research reports will be due on **December 11, 2015**. I will provide a suggested outline for what should be included in this report, although there will be room for variation to accommodate the many different types of research that students will be completing.

7. Your final grade in the course will be based on the quality of your written proposal and the care and thoughtfulness of your final research report. Your grade will <u>not</u> depend on your results or findings -- whether your hypotheses were confirmed, for example, or whether your findings will make you famous. I will be looking primarily at your use and description of your research methods, not your results.

Grading options

All students, whether choosing to do a research project or to complete the assignments, have a choice of taking the course for a letter grade, or choosing the Satisfactory / no credit option.

- 1. Introduction and overview of topics
- 2. Different types of research

Basic principles of research:

- 3. Sampling
- -- how big a sample?
- -- what kind of sampling strategy?
- 4. Research design
 - -- what is the research question?
 - -- what problems should we anticipate?
 - -- can we plan to overcome problems?
- 5. Reliability and validity
 - -- obtaining high quality information
 - -- checking up on the information

Strategies for data collection:

- 6. Tests and measurement
 - -- uses and limitations of tests
 - -- standardized tests
 - -- norm- and criterion-referenced
 - -- other performance measures
- 7. Questionnaires and interviews
 - -- asking good questions
 - -- response formats
 - -- analyzing results
- 9. Observations
 - -- how to record
 - -- what to record
 - -- how to analyze

Strategies for data analysis:

- 10. Using computers for data analysis
- 11. Statistical techniques
- 12. Summarizing and presenting research results

S-005 Class Schedule, Fall 2015

(Note: I have prepared a set of suggested readings as a separate handout. The suggestions for follow-up readings below include suggestions for the main texts.)

Class	Date	Topics	Suggested follow-up reading	Exercises or Assignments
1	Sept 3	Types of research. Descriptive and intervention studies. Experiments and quasi- experiments.	Johnson & Christensen, Ch 1 and ch 2 AJSW, pp 24-38.	Please complete and submit the background questionnaire for S-005. (Will be available on course website.)
2	Sept 8	Introduction to sampling. Populations and samples. Advantages and limitations. A formula for sample size.		Braverman article (Class handout)
3	Sept 10	More on sample size. Using a website to handle the calculations. Sample sizes for descriptive surveys. Sample sizes for estimating proportions. Sample sizes for estimating a mean.	Johnson & Christensen: pp 247-262	Sampling exercise #1 will be distributed
4	Sept 15	Introduction to types of sampling procedures: simple random sampling, stratified random sampling, systematic sampling, multi-stage sampling.	Johnson & Christensen, pp. 263-274 AJSW pp 161-175	If you are thinking of doing a research project for the course, please send us a one-paragraph description of your project idea.
5	Sept 17	A sampling simulation demonstration. Some non-probability sampling methods quota sampling, convenience samples, expert judgment, availability. Choosing a random sample using a table of random numbers, using a web-site to help select.		Sampling exercise #1 is due. Sampling exercise #2 will be distributed
6	Sept 22	Examples of stratified sampling. Stages in sampling and the problem of non-response.	Handout	Winter & McClelland article (Class handout)
7	Sept 24	Issues in designing intervention studies. The "threats to validity."	Johnson & Christensen, pp. 278-313 AJSW ch 12	Sampling exercise #2 due today
8	Sept 29	A discussion of the Winter & McClelland article on the effects of a liberal arts education		Be sure to read the Winter & McClelland article. We will discuss this in class. Assignment #1 available.

Class	Date	Topics	Suggested follow-up reading	Exercises or Assignments
9	Oct 1	Results of the class exercise on choosing samples. Some notation (diagrams) for looking at research designs. Further discussion of threats to validity in intervention studies	class handouts	
10	Oct 6	Guidelines for the protection of human subjects. Some principles of ethical research. Informed consent and the right to withdraw.	J&C pp 124-141 AJSW pp473-477 and 622-634	We'll briefly discuss Assignment #1, so raise any questions you have.
11	Oct 8	Examples of consent forms. Submitting a proposal for research involving human subjects – the CUHS guidelines.	handouts	Assignment #1 due
12	Oct 13	Sample size for intervention studies. Statistical power. Effect sizes. Meta- analysis.	handouts	
13	Oct 15	Approaches to data collection: questionnaires, interviews, observations, tests, etc. Some principles for designing questions.	J&C: 223-245 AJSW: 406-414	
14	Oct 20	Guidelines for developing questionnaires and interviews. Examples of question formats.	J&C: 191-220 AJSW: 417-431	Research project proposals due
15	Oct 22	Examples of questionnaires and interviews.	handouts	Assignment #2 available
16	Oct 27	Thinking about data quality. Reliability and validity. Sources of inconsistency in measurement. How these apply to different types of data-collection procedures.	J&C: 165-179 AJSW: 258-275	
17	Oct 29	Checking on reliability. Test-retest, alternate forms, split-half, item analysis techniques. A brief discussion of the material for Assignment 2.		
18	Nov 3	Checking reliability. Looking at the Bayley Scales of Infant Development and how they checked on reliability. Inter-rater agreement. Internal consistency reliability.		
		Checking on validity: content validity, concurrent validity, predictive validity, construct validity. The MSCA example. The two types of errors arising from imperfect measures. The screening test example.		

Class	Date	Topics	Suggested follow-up reading	Exercises or Assignments
19	Nov 5	Examples for rating open-ended responses: writing samples, electricity concepts, interviews about "attachment in adolescence"	handouts	Assignment #2 due
20	Nov 10	Intro to Stata! Entering data and some basic commands. Analyzing data in contingency tables. Looking at percentages. Using the chi-square test.	Stata handouts	Getting started with Stata (Class handout) Assignment #3 available
21	Nov 12	More examples of categorical data analysis. Reading the row and column percentages. Using the chi-square test. Creating a table to show the results of a study, and writing a paragraph to explain the table.		
22	Nov 17	Stem and leaf displays for looking at a distribution of scores. Box plots! Using a t-test to compare the means of two groups.		
23	Nov 19	Correlation coefficients. Looking at plots and reading the correlation matrix. The probability value and "significant" correlations.		Assignment #3 due
24	Nov 24	Reporting correlation results in a journal article. Showing the results in a table and writing the summary paragraphs. Introduction to regression. The regression coefficients the slope and the intercept. Interpreting the slope. Looking at r and r- square.		
	Nov 26	Holiday today. No class.		Enjoy the holiday!
25	Dec 1	Multiple regression examples. Predicting annual incomes. Interpreting the coefficients. Controlling for other variables. Looking at r- square.		Note: Final assignments and final research projects due on Friday, December 11, 2015.