

An Apprenticeship in Developing Research Projects: A Teaching and Learning Model

by

Craig Leonard Brians
cbrians@vt.edu
Virginia Tech
Blacksburg, VA 24060

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When assigning a research paper in class, many faculty may believe the common hype that today's "Digital Natives" (Perensky 2001) are intuitively able to locate, filter and assemble any needed sources for their literature review. Alternatively, other instructors feel that contemporary students possess impoverished skills insufficient in our abundant information environment. Whichever attitude more closely describes your view of your students' literature research skill levels, with every research assignment we much ask ourselves:

How do I motivate my students to articulate their information needs before (and while) they explore the popular and scholarly literature?

This paper introduces a technique designed to address this question. The "Apprenticeship Model" prepares novice researchers for both initial and long-term achievement while developing term projects. Employing skill-based instruction and a controlled literature research environment, this model is structured to maximize student success through a series of scaffolded exercises.

Before proceeding, I must be acknowledge that this paper emphasizes a "learn by doing" approach to teaching versus a "learn by reading" orientation. Academics and others associated with the "book learning" school of instruction may derogate hands-on, applied student training as being inferior to more abstract, hypothetical learning exercises. My own willingness to test experiential learning may stem from my personal experience as an apprentice – in my high school agriculture courses in the 1970s and at State Center Peace Officer Academy in the 1980s.¹

I. Today's Information Environment

Clearly, today's students face a more complex information environment than did students of previous generations. Novice researchers no longer begin their search for information with a green Readers' Guide or a hard copy of Worldwide Political Science Abstracts, each of which listed references by subject headings. Thus, when they start to investigate a topic for a research paper, today's students (1) see less of the literature's structure and (2) receive fewer cues offering insight into how academics think about the subject.

When students find a potentially promising periodical reference, these days they are unlikely to walk through the library to locate bound volumes of the journal. Before journals moved exclusively online at most research libraries, our strolls through the stacks were rewarded by seeing a physical copy of the periodical – whether a popular periodical printed with numerous colorful ads and many brief articles, or a scholarly journal printed on drab paper with a few ads for books or conferences and numerous references documenting the research undergirding each lengthy article.

Absent the cue-laden environment that an earlier generation of students was exposed to at the preliminary stages of the research process, the question becomes:

How do we guide novice researchers from their initial research idea as they develop a hypothesis or theory that can be studied in the literature, following the ACRL Information Literacy Guidelines? ²

At Virginia Tech, an introductory research methods course addresses this question through a research apprenticeship. ³ In this required political science course, I have constructed a term paper project that offers “bowling bumpers.” A series of research assignments throughout the term build components that guide students toward their eventual 10-12 page research paper. Along the way, students learn the skills needed to

develop and articulate a research question or theory that will guide their examination of the literature, are taught by library instructional faculty, perform original data analyses, and publically present their findings to their peers.

The paper project in this sophomore-level course is most students' first exposure to writing a literature review and conducting original data analysis. As neophyte social science researchers, students bring many fears and concerns to the class. The apprenticeship structure steers them through the early stages of the project; later, students gain confidence in their ability to write their own papers as they progressively gain greater latitude over the direction of their research, with each successive step in the project.

This paper describes the process through which students are directed as they write their research papers. In particular, here we focus on the steps that leading to the literature search. Along this route, each student is assigned a paper topic, develops an explanatory theory that links the assigned concepts, and then brainstorms search terms.

II. An Introductory Research Methods Course Addresses the (unstated) Information Literacy Standard 0.5

Before searching the literature, a student needs to articulate her or his information needs. In this section of Political Science 2024 (Research Methods in Political Science), a technique designed to address this task is taught through a series of assignments.

The Topic

First, each student is assigned a topic. The “topic” is actually two concepts. One of the concepts relates to a demographic variable (e.g., age, educational level, etc.), and

the other concept is attitudinal (e.g., support for government spending on education, view on abortion, etc.). Figure 1 lists a sample of the concepts that are assigned to students.

< Figure 1 about here >

Rather than allowing students to choose, assigning research topics has many advantages, and some potential drawbacks. When I first show the form to students, they may complain about being constrained by having their topic selection limited. However, once they begin reading the literature and attempting to construct their explanatory theories (see below), students typically come to realize that even these specified topics require a great many creative research choices.

On the positive side, assigned topics increase the likelihood that students will have a successful research experience, because the instructor: (1) has ensured that there is academic and scholarly literature on this topic, (2) can choose topics with which he or she has familiarity, and, thus, is more likely to be able to assist students with their research, and (3) knows that the concepts can be measured using variables in the assigned dataset. Additionally, after leaving college, students will find that they are frequently must research topics chosen by their supervisor, or dictated by their organization's (or clients') goals. Working with an specified topic on this project will prepare them for this real world experience.

< Figure 2 about here >

The sample paper project assignment sheet offers an overview of the project, and notes some of the key components that a well-written paper should contain. The first page of the assignment sheet in Figure 2 offers an overview of the four stages of the paper project: the outline, the paper draft, the final paper, and the group research

presentation. Splitting the project into stages builds research success in at least three ways: (1) students must spread their research and writing over the term (or at least to several points over the term), obviating the possibility of writing the entire paper the night before it is due, (2) smaller chunks reduce student stress when first faced with a major research project, and (3) these stages provide built-in check-points to assess research progress – for both students and the instructor (e.g., when the outline requires an explanatory theory and literature to support each hypothesis, then students are likely to notice if their work lacks citations; similarly, this step allows faculty an opportunity to evaluate the quality and logic of students’ theories and literature research, at the initial stage of the research project).

Using the assignment sheet to list a number of key components that a research paper should contain assists students by offering them a project roadmap, of sorts. Providing a list of possible paper elements does, of course, increase the chance that students will reflexively follow such a structure. In practice, this type of mechanical behavior often occurs with nascent researchers. Far from derogating student work mirroring examples, this model of teaching makes sample work available with this purpose in mind: an apprentice is expected to pattern her or his work on the examples offered by the instructor.

The second page of the sample paper project assignment sheet elaborates each stage of the paper-writing process. Figure 2 details the required aspects of the outline, the paper draft, the final paper, and the group research presentation. Such clear guidance (1) helps insure that students have a checklist of required material to include in each assignment, and (2) form the basis of the grading rubric for each assignment.

Explanatory Theory

To begin their research, students must develop an explanatory theory that incorporates the two concepts they've been given. As defined in this assignment, an explanatory theory is (1) a relationship between two concepts, and (2) an explanation (i.e., "because statement") of that relationship. Students are required to offer (at least one) logical explanation for the relationship between these assigned concepts, but most students are able to find many possible factors that may linking them.

Many students spend more time developing their theories than any other part of the project – the definition of pre-thinking research. Linking the assigned topic with another concept that is present in the provided dataset typically requires (1) considerable creative thought, (2) a clear reading of the codebook, and (3) repeated investigations of the extant literature.

As they construct their theories, students must locate their explanatory concept(s) in the list of variables from a subset of the National Election Study. I post an excerpt of the NES codebook on my website as a PDF. They search the codebook for terms, as they're developing their theory.

A Sample

Third, I post a sample outline – a paper outline written by a student in a previous term (on a topic not assigned during the current year).⁴ This example demonstrates how a particular student (1) developed a theory, (2) investigated it in the literature, and (3) and operationalized it in a data analysis of the NES. Based on student comments, the sample outline may offer a clearer (or at least an alternative) understanding of the outline's structure than does any instructor's project assignment sheet. The sample also provides

concrete evidence that students in previous terms have successfully completed this assignment. Once I began posting the sample outline, complaints dramatically declined from frustrated undergraduate students who felt that conducting original research is “impossible” or “too hard.”

III. Discovery Continues During the Search

After students have been working on their assigned topics for a few days and had an opportunity to think about the subject, I convene the class in a on-campus computer lab with our department’s instructional librarian. In this session, College Librarian for the Social Sciences Bruce Pencek uses concrete literature research tools to teach students to elaborate on the concepts in the theory.

Before beginning to search the free Web or scholarly literature, students are advised to narrow and focus their topic through “pre-thinking.” Using terms from their explanatory theories, students should brainstorm synonyms and write them in columns within the Concept Search Grid shown in Figure 3 (Brians, et al. 2011).

< Figure 3 about here >

Once equipped with a working theory and a list of search terms, a student is ready to begin her or his search. As noted above, each student’s working theory must: (1) list three concepts that are queried in NES variables, (2) state a relationship between two of the concepts, and (3) explain this relationship, using a third concept. The list of potential search terms comes from the brainstorming process, and is written on the search grid.

Next, students Search for literature using online library databases. At this point, it is crucial to teach students to distinguish between scholarly literature and popular

literature. We find few students come to college with this knowledge, and these two types of references are rarely learned in previous introductory courses.

Finally, students learn about the literature research feedback loop. As they move farther into their searching, I encourage students to “rinse and repeat.” Specifically, after each search, students return to brainstorming and the Concept Search Grid to add terms they find in their searches and check-off ones they’ve used. Additionally, I encourage them to continue refining their searches.

VI. Summary and Conclusion

This paper presents a model for teaching paper writing, as an apprenticeship. This hands-on experience has been tested over a period of more than 15 years by the author. Although many students are initially daunted at the prospect of (1) learning a statistics program and (2) conducting original research in a single term, by the end of the term the student feedback is generally upbeat. Even more optimistic are the comments from students who are on the job market, once they discover the increased value their political science degrees have when coupled with quantitative skills.

This apprenticeship model shows preliminary promise, but we will know more about the broader feasibility of this approach when this teaching approach has been more widely tested. If these teaching techniques are used at other campuses, then additional data points will shed light on its broader applicability.

Notes

¹ This paper's approach that conceptualizes "research as a craft" to be learned at the side of a practitioner is related to Aaron Wildavsky's view, so practically and eloquently presented in his book *Craftways* (1993).

² [→CLB: briefly describe and cite the ACRL guidelines – from my earlier papers on this]

³ Until recently, I taught the department's required undergraduate research methods course each Spring for a decade. Attempting to transform the 120 students who were forced to take this class into researchers has to be, in the words of Ken Janda "the best job in the department" (Janda 2001).

⁴ This same topic is used for in-class research topic brainstorming sessions, as well as literature research demonstrations.

References

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Figure 1:
Sample Research Paper Topic Assignment Sheet

Group	Presentation Date	Last Name	First Name	Factors	Political Attitudes
1	18-Apr			Candidate Choice (for whom to vote?)	Political Efficacy (e.g., have a say in government)
1	18-Apr			Candidate Choice (for whom to vote?)	Government Spending -- child care
1	18-Apr			Candidate Choice (for whom to vote?)	Government Spending -- elderly, Social Security
2	18-Apr			Candidate Choice (for whom to vote?)	Government Spending -- poor, welfare
2	18-Apr			Candidate Choice (for whom to vote?)	Equal role for women
3	21-Apr			Attention to News (about politics)	Trust in Government
3	21-Apr			Attention to News (about politics)	Political Efficacy (e.g., have a say in government)
3	21-Apr			Attention to News (about politics)	Tax cut support
4	21-Apr			Attention to News (about politics)	Government Spending -- child care
4	21-Apr			Attention to News (about politics)	Government Spending -- elderly, Social Security
4	21-Apr			Attention to News (about politics)	Government Spending -- poor, welfare
5	21-Apr			Attention to News (about politics)	Abortion view
5	21-Apr			Attention to News (about politics)	Government Responsibility -- for employment
6	25-Apr			Education (i.e., highest year of school)	Equal role for women
6	25-Apr			Education (i.e., highest year of school)	Abortion view
7	25-Apr			Education (i.e., highest year of school)	Government Spending -- child care
7	25-Apr			Education (i.e., highest year of school)	Government Spending -- elderly, Social Security

Note: Due to limited space, this Figure only shows an excerpt of the topics assigned to the students. This sheet was originally constructed in Excel, and was posted as a PDF of the spreadsheet.

Figure 2: Sample Research Paper Assignment Sheet

Research Methods – Paper Project Guidelines

Craig L. Brians, Ph.D.
Political Science 2024

To complete this project, each student will analyze the relationship between the assigned political attitudes and other political factors. Students will need to develop a theoretical relationship between the variables, study current published research on the issue and do preliminary data analysis for the outline. With feedback from the instructor, students will then write a critical literature review with a revised thesis, make charts/tables, and interpret the data analysis in an 8 page draft. Then this entire paper will be revised and students will do an analysis of statistically significant relationships in a 10-12 page paper, as well as integrate an overview of their work with others' work for an in-class presentation.

This project is comprised of four graded components: 1) a **2-3** page outline of the paper, its underlying library research, and preliminary data analysis (5%), 2) an **8** page draft paper (10%), 3) a **10-12** page final paper incorporating the data analysis (10%), and 4) an in-class oral group presentation (5%).

The 2-3 page **outline** of the paper is due Wednesday, **February 13th**, the 8 page **draft** is due Monday, **March 24th**, with the completed **paper** due at the time of your **group presentation**. Together, these three documents and the presentation will comprise 30 percent of your course grade.

Below is a brief description of some of the components that your paper should include:

- A. **Intro:**
 - 1. Overview of paper
 - 2. State the basic theorized relationship between your variables, including a logical association between the concepts in the theory (i.e., the "because" component)?
- B. **Describe the theory in more detail and propose several hypotheses, noting the relevant literature**
 - 1. What is your proposed relationship between key concepts?
 - 2. State at least three (3) testable hypotheses, organizing your literature around them.
 - 3. What does the academic literature say about the relationships between each of your concepts? Do the descriptions in recent newspapers or newsmagazines differ from academic analyses? Why might this be so?
- C. **What variables are being used to operationalize the hypothesis testing?**
 - 1. Which variables from the provided NES dataset will you use to test the hypotheses? Why do these variables provide a good test of the hypotheses?
 - 2. What type of findings from the data analysis would support each of your hypotheses, and what findings would undermine your hypotheses?
- D. **Present Data Analysis (Findings)**
 - 1. What type of analysis is most appropriate for your hypotheses and variables: Difference of means? Crosstabulation? Regression?
 - 2. Hint: justify your analytic choices with the variables' level of measurement and logical associations between your variables.
 - 3. Present tables at the end of the paper, and describe the key findings in the text.
- E. **Conclusion and Implications**
 - 1. Do your findings agree with previous research or common perceptions in the press? Why or why not?
 - 2. After conducting this research, what do we now know that we didn't know before?
- F. **References:**
 - 1. You need to cite at least 10 references. At least two must come from a (peer-reviewed) scholarly journal, while the balance may come from recent newsmagazines or newspapers.
 - 2. Each reference cited in the text must appear in the reference list, and vice-versa.

→ This list of paper components is not exhaustive; these are some initial ideas to get you started.

Figure 2: Sample Research Paper Assignment Sheet (continued)

This project will be based upon (1) your development of a thesis and testable hypotheses, (2) your research elaborating on the subject using current popular publications and academic work (e.g., news weeklies, newspaper articles, scholarly journal articles, etc.), (3) presentation of the data analysis of variables you're using from a provided data set, and (4) your critical interpretation of the data analysis in light of the theory and hypotheses. The project relies on empirical evidence, rather than personal opinions.

Outline:

The outline for your paper is just that: a 2-3 page long outline of the points you plan to make in the paper. In outline format, this document must include (1) your theory (based on the assigned variables) with a logical explanation of the relationship between the concepts, (2) a brief description of your testable hypotheses, (3) paraphrase the literature related to your hypotheses, with citations in the outline to the academic and popular evidence you have located regarding the concepts' relationship(s), (4) preliminary data analysis (using SPSS) of each hypothesis, (5) and at least 10 references (with a minimum of two from scholarly journals), and (6) a Bibliography page. Each point or contention offered in the outline must be cited to a specific reference. Serious effort should be expended, as the quality of an outline strongly affects the quality of the final paper, and it counts for *5 percent of the course grade*.

Draft:

The 8 double-spaced page paper draft elaborates on the outline by more clearly articulating all of the points contained in the outline, describing and citing the literature in complete sentences paraphrasing the sources (avoiding direct quotes), and provides data analysis and interpretation. The original, graded outline must be turned-in with the draft. The draft offers an opportunity to refine the presentation of the theory, library research and initially present the data analysis, and deserves close attention as it accounts for *10 percent of the course grade*.

Final Paper:

The final paper will, over the course of 10-12 double-spaced pages, refine each of your draft's headings and provide considerably more detail as well as present a refined data analysis and interpret these findings in the body of the paper. The tables describing your variable's relationships must use techniques (e.g., crosstabulations, difference of means, etc.) appropriate to the variables' level of measurement. The final paper will assess each Null Hypothesis with tests of statistical significance (e.g., χ^2), as well as measuring strength of association.

The final paper must, of course, have correct spelling, proper grammar, and other necessities of writing. Additionally, you must utilize proper citation format. This Lab Manual's Appendix A offers numerous examples of proper citation format (per *APSA* and the *Chicago Manual of Style*) for books, edited books, journal articles, and newspaper articles.

The original, graded outline and draft must accompany your final paper when it is turned-in. You may also turn-in a revised outline to better reflect your final paper. The paper must have page numbers printed on each page and have a title page. A staple in the upper left corner will suffice; no folders or binders should be used.

Do exercise some care in the substantive material you include in the final paper, as well as its form, since it counts for *10 percent of your course grade*.

Group Presentation:

The group presentation will include 3 minutes per group member (and 1 minute of question-and-answers for each group member) and be scheduled during class time on a date assigned by your instructor. Since this presentation counts for *5 percent* of your course grade, you should structure a concise, yet thorough, presentation. Each student must integrate her or his theories, hypotheses, and data analysis with others' in the group to form this in-class presentation. Preparing a separate outline to guide their presentation is helpful for many students.

Figure 3:
Concept Search Grid

	Theoretical Concept:		Theoretical Concept:
<i>Search</i>	Related Terms:	(Link and/or)	Related Terms:
1			
2			
3			
4			
5			
6			
7			

Source: This grid is reprinted from *Empirical Political Analysis*, 8th edition (Brians, Willnat, Manheim and Rich 2011, 49).