

Assessing the Efficacy of Class-Based Undergraduate Research Experiences (CUREs) in
Political Science

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ABSTRACT

The American Association of Colleges and Universities (AACU) consider research experiences as important "high impact" education practices that are integral to a high-quality undergraduate education. Research experiences allow undergraduates to be actively involved with exploring contested questions, making empirical observations, and utilizing cutting-edge data analysis software and techniques to answer important empirical questions. Standard undergraduate research activities typically pair a single student with a faculty mentor how introduces students to high-level reasoning skills. However, this apprenticeship model suffers from providing those research opportunities to only a select few students. In order to bring undergraduate research opportunities to a larger number of students and to a more diverse array of students, many disciplines in the natural sciences have begun integrating Course-based Undergraduate Research Experiences (CUREs) into their courses. Unfortunately, these types of course-based undergraduate research experiences are far less common in the social sciences and seemingly non-existent in the discipline of political science. This project seeks to explore the efficacy of CUREs based experiences in an upper-level political science course. Specifically, research-based activities were integrated into a course on the U.S. Supreme Court to allow students to build research skills while gaining content-specific knowledge about the Court. I measure students' attitudes and comfort level toward components of the empirical social science research process through pre- and post-class surveys to assess the efficacy of CUREs assignments and associated learning outcomes. Results indicate that students' skill and comfort levels significantly improved from pre- to post-class surveys. These findings support the conclusion that embedding CUREs-based course content in upper-level political science courses can be an effective way of improving student success with the social science research process.

Introduction

Those teaching in the political science discipline often find that many of our undergraduate students avoid anything related to mathematics, statistics, or the natural sciences. In advising session after advising session, students seek out the “easiest” general education science courses or those that involve the least amount of math possible. And if you’ve ever taught an introductory research methods course in political science, you’ve probably experienced first-hand the discomfort and anxiety that manifests in some students when grappling with the application of the scientific method to the study of politics. Despite the affinity of many political science undergraduates to avoid scientific and mathematical principles, today’s discipline of political science relies heavily on the empirical study of political phenomenon and the scientific principle of empirical falsification to test the theories that are central to building knowledge. For undergraduates to become informed consumers and practitioners of political science knowledge, their understanding and engagement of the social scientific research process is central to their success.

The American Association of Colleges and Universities (AACU) considers research experiences to be important “high impact” educational practices that are integral to a high-quality undergraduate education. Research experiences allow undergraduates to be actively involved with exploring contested questions, making empirical observations, and utilizing cutting-edge data analysis software and techniques to answer important empirical questions. Standard undergraduate research activities typically pair a single student with a faculty mentor who introduces students to high-level reasoning skills. However, this apprenticeship model suffers from providing those research opportunities to only a select few students. In order to bring undergraduate research opportunities to a larger number of students and to a more diverse array

of students, many disciplines in the biological and natural sciences have integrated Course-based Undergraduate Research Experiences (CUREs) into their courses. Unfortunately, these types of course-based undergraduate research experiences are far less common in the social sciences and seemingly non-existent in the discipline of political science. This project seeks to test the efficacy of CUREs in an upper-level political science course focused on the U.S. Supreme Court.

Benefits of Course-based Undergraduate Research Experiences (CUREs)

Research from the natural sciences indicates multiple benefits from the implementation of CURE-based instruction including increased content knowledge (Lopatto et al. 2008, Shaffer et al. 2014, Brownell et al. 2012, Rowland et al., 2012 and Jordan et al. 2014), increased analytical skills (Alkaher and Dolan 2014, Brownell et al. 2012, , Jordan et al. 2014, Shaffer et al. 2014; and DeKa et al. 2022), persistence in science (Drew and Triplett 2008; Brownell et al. 2012; Jordan et al. 2014; Shaffer et al. 2014; and Corwin et al. 2022), increased self-efficacy (Drew and Triplett 2008, Jordan et al. 2014, Shaffer et al. 2014; and Corwin et al. 2022), increased technical skills (Drew and Triplett 2008, Rowland et al., 2012, and Jordan et al. 2014), and career clarification (Drew and Triplett 2008, Shaffer et al. 2014). Empirical studies also show that exposure to CUREs increases student confidence when engaging the research process (Ballen et. al., 2017; Corwin, Graham and Dolan, 2017; Dolan 2016) and increases the diversity of students who have access to undergraduate research opportunities (Bakshi, Patrick and Wischusen, 2016; Ballen et. al., 2017; Corwin, Graham and Dolan 2017; Frankowski 2021; Smith et al. 2021; Stanfield et al. 2022).

Despite these well-documented benefits of CUREs, there has been remarkably little experimentation with the pedagogy in the social sciences. In a systematic review of the literature on Course-based Undergraduate Research Experiences, Ahmad and Al-Thani (2022) found that

only 6 of 67 CUREs studies published between 2011 and 2021 were from social science disciplines, none of which were political science. Compared to the biological and natural sciences, social science disciplines typically offer fewer opportunities for student research and as such, which decreases the opportunities for CUREs integration into undergraduate curriculum. While research is scant from the social sciences, one study from sociology showed that a collaborative, faculty-led research project increased student understanding of the primary literature, research methods, data collection and analysis (Cuthbert, Arunachalam and Licina 2012). Another study showed positive impacts of faculty-led research projects during study abroad program that engaged students in human subject research and survey administration (Ruth et al. 2019) while another examination of CUREs in anthropology showed improvement in student confidence, perseverance, and understanding of the research process and ethics (Ruth, Brewis, and SturtzSreetharan 2023).

If these findings hold when CURE-based assignments are introduced into the discipline of political science, I expect both student skill and comfort levels with the research process to increase from pre- to post-class surveys. More importantly perhaps, I expect students to report being more resilient when engaging the research process after completion of the CUREs based class.

Integrating CUREs into an Upper-Level Political Science Class

This course was developed as part of a grant-funded initiative with the Office of Research and Sponsored Programs at West Chester University to encourage faculty to develop and incorporate course-based undergraduate research experiences into departmental offerings across the disciplines. As part of this program, I redesigned a 300-level political science elective course focused on the U.S. Supreme Court to incorporate various CUREs that would allow students to

engage and apply various aspects of the social science research process into course content and assignments while allowing students to deeply explore various empirical aspects of the U.S.

Supreme Court.

The goal of creating a CUREs-based course for the Department of Political Science was two-fold. First, students in political science are rarely afforded the opportunity to work on high-impact student-faculty research projects during their undergraduate careers because faculty-led research and lab experience is not integrated into the degree program as is often the case in the STEM fields. The lack of available faculty-led student research opportunities is also lessened by the reality that West Chester University is a regional state university where faculty regularly teach four courses per semester and are thus rarely able to incorporate research opportunities for students outside of the classroom. For these reasons, political science students rarely have opportunities to engage in faculty-led, empirical research during their undergraduate careers.

The second goal of integrating CUREs into the political science curriculum was to reinforce many of the research skills that political science majors are exposed to in their introductory-level research methods course which is typically taken during sophomore year. As there is no upper level required political methodology or political analysis course in our department, students often have gaps in methodological knowledge by the time they get to our senior research seminar, which requires students to fully execute a research project from research design, to data collection, and data analysis. Few students are well-prepared to undertake such projects and incorporating CUREs experiences into the political science curriculum was designed to give students the opportunity to practice and apply the empirical research methods taught in our required research methods course.

The final goal of incorporating CUREs assignments into an upper-level political science course was to alleviate student anxiety when working with quantitative data. As someone who regularly teaches our introductory-level research methods course as well as our senior research seminar, I am well-acquainted with the level of anxiety students feel when required to work with quantitative data and the subsequent ways that students react to required quantitative data analysis. These reactions often range from procrastination and avoidance to emotional distress and physical manifestations of anxiety that negatively affect student attendance. Embedding CUREs assignments into an upper-level political science course aims to provide students with the opportunity to learn resiliency skills when confronted with quantitative data analysis.

Student Learning Outcomes & Learning Activities

In order to reinforce and strengthen the empirical research skills initially developed in our required undergraduate research methods course and to alleviate student anxiety surrounding working with quantitative data in the social sciences, this CUREs-based course was designed with seven student learning outcomes in mind:

By the end of the semester, students will be able to (1) formulate hypotheses based on existing political science literature and theory, (2) identify dependent and independent variables of interest based on a research question, (3) operationalize variables of interests, (4) code data using various levels of measurement, (5) identify and execute proper quantitative data analysis techniques, (6) draw conclusions from quantitative data analysis and explore the generalizability of those conclusions, and (7) identify areas for future research based on empirical results.

To facilitate the acquisition of the student learning outcomes, course content was organized around three primary research questions focused on the U.S. Supreme Court. (1) Is the

U.S. Supreme Court activist in its use of judicial review? (2) How does the Court utilize its discretionary jurisdiction when granting certiorari? and (3) What factors influence decision-making on the U.S. Supreme Court? In order to examine each of these questions, students worked both individually and in groups throughout the semester to complete scaffolded learning activities designed to actively engage various stages of the empirical research process.

As part of the unit focusing on judicial activism and restraint, students completed a Research Question Assignment that asked students to generate three empirical research questions involving the concept of judicial activism. As part of the assignment, students created a concept map for judicial activism and refined three of their generated ideas into research questions worthy of empirical examination. Students also engaged in a Variables and Measurement Assignment that required students to construct three empirical measurement strategies for the concept of judicial activism. This assignment started as an in-class group assignment and then challenged students to formulate two additional measures of activism as part of a take-home assignment. In addition to being an excellent exercise for students to work through the process of operationalization of a political science concept, this assignment also allowed students to strengthen their skills with identifying unit of analysis, level of measurement, identifying aspects of content validity, and identifying strengths and weakness of each measure.

In the second unit of the course focusing on the Supreme Court's agenda setting behavior, students completed a Hypothesis Building Assignment that allowed students to practice identification of independent and dependent variables while learning to build directional hypotheses based on class readings. Students were challenged to create three testable hypotheses to explain the factors that affect the likelihood of the Supreme Court granting certiorari in a case. Students also had to identify two hypotheses tested in an assigned academic article on the

Court's agenda setting process. For each hypothesis, students identified the independent and dependent variable, explain how these variables were coded, and identified the level of measurement.

A similar Hypothesis Building Assignment was also included into the final unit on Supreme Court decision-making to ensure students had plenty of practice with these fundamental skills. The culmination of the scaffolded CUREs assignments led up to the final research project that challenged students to formulate and test various hypotheses based on the literature to explain various theories of Supreme Court decision-making. For this assignment, students were placed into groups to alleviate both anxiety and workload responsibilities. Each group was assigned a theory of Supreme Court decision-making that had been previously studied in class and were responsible for generating one primary, testable hypothesis. Groups also had to consider a minimum of two control variables that the literature suggests may have an effect on Supreme Court decisions. Each group then created a research design to test their hypotheses and gain prior approval from the instructor before moving forward to the data collection phase. Groups then collected data for their independent and dependent variables from the U.S. Supreme Court Database (2023) and other data sources provided by the instructor. Groups were given several class days to work in their groups and meet with the instructor to help with all aspects of the research process. Statistical analysis using STATA was done with aid of the instructor during a predetermined class time for which groups had their datasets prescreened and preapproved by the instructor. Groups were responsible for running both bivariate statistical tests and a multivariate analysis to test their hypotheses and draw conclusions about the factors affecting Supreme Court decision-making. Groups were assessed on a 15 -minute research presentation that included the traditional sections of an academic presentation (literature review &

hypotheses, research design, variables & measures, results, implications & future research) and a 10-minute Q&A session during the final week of classes.

Methods

In order to assess the efficacy of CUREs in the discipline of political science, a pre- and post-class survey¹ was administered to students enrolled in an upper-level political science course focusing on the U.S. Supreme Court in the Fall of 2023. During the first week of class, students were invited to participate in a voluntary Qualtrics survey designed to explore the effects of course-based undergraduate research experiences in the social sciences. Students were notified of the opportunity to participate via email and were assured that their participation was both confidential and anonymous and that participation was not required and would not impact student grades in any way. The informed consent process was administered online through Qualtrics and was required before students could begin the online survey. Similarly, in the final week of classes, students were again invited via email link to participate in a post-course Qualtrics survey to assess their experiences with CUREs in the classroom. Pre- and post-class surveys utilized the following measurement strategies which sought to capture students' abilities, comfort, and interest with the social science research process.

Research Skill/Ability & Comfort Level

In both the pre- and post-class surveys, students were asked a battery of questions related to both their level of skill and level of comfort with various aspects of the social science research process including: reading an academic article, summarizing the findings of an article, writing a research question, identifying dependent and independent variables, operationalizing variables, identifying levels of measurement, writing testable hypotheses, gathering quantitative data, and

¹ Pre- and post-survey was approved by West Chester University's Institutional Review Board: IRB-FY2023-142

analyzing quantitative data to draw conclusions. Students were reminded by the pre-class survey question that this level of skill/ability could have come from a variety of past experiences including high school or college courses, job or intern experience, and or special programs. Students were asked to place themselves on a five-point scale of ability ranging from (1) no ability, (2) little ability, (3) some ability, (4) much ability, (5) extensive ability. Similarly, students placed themselves on a five-point scale of comfort level which ranged from (1) extremely uncomfortable, (2) somewhat uncomfortable, (3) neither comfortable nor uncomfortable, (4) somewhat comfortable, and (5) extremely comfortable.

Learning Benefits & Course Satisfaction

In the final post-class survey, students were also asked a series of questions regarding their perceived learning benefits gained from the CUREs curriculum utilized throughout the class. Specifically, students were asked about their perceived gain in the following areas: interpretation of research results, tolerance for obstacles faced in the research process, readiness for more demanding research, understanding how knowledge is constructed, understanding the research process in political science, ability to integrate theory and practice, understanding that scientific assertions require supporting evidence, ability to analyze data and other information, ability to read and understand scholarly articles. For each, students were asked to place themselves on a five-point scale ranging from (1) no gain, (2) little gain, (3) some gain, (4) much gain, (5) extensive gain.

Finally, student participating in the post-class survey were asked a short battery of questions to gauge their satisfaction with the course overall. For each question, students were asked to rate their level agreement with statements about the course on a five-point scale ranging from (1) strongly disagree to (5) strongly agree.

Results

A total of 12 students, out of the 19 students enrolled, voluntarily participated in the pre-class survey and 15 students voluntarily completed the post-class survey. Table 1 shows the demographic breakdown of students participating in the survey. The course in which the CUREs assignments were embedded is an upper-level elective class in both the Political Science B.A. Program and an elective class in the interdisciplinary Law, Politics, and Society Minor at WCU. Thus, most survey participants were third or fourth-year students and the majority of participants were Political Science majors. However, it is notable that five survey participants in both the pre and post-class surveys were majors from other departments including Criminal Justice, Communications, History, and Public Health. Similar to the racial and gendered demographics of WCU, survey participants were overwhelmingly white and more women completed the post-class survey than men.

Table 1. Demographic Information of Survey Participants

	Pre-Class Survey		Post-Class Survey	
	Count	Percent	Count	Percent
Freshman	0	0.0%	0	0.0%
Sophomore	2	16.7%	1	6.7%
Junior	3	25.0%	3	20.0%
Senior	7	58.3%	11	73.3%
Men	6	50.0%	6	40.0%
Women	6	50.0%	9	60.0%
Asian American	0	0.0%	0	0.0%
Black	0	0.0%	0	0.0%
Hispanic/Latino	2	16.7%	1	6.7%
White	10	83.3%	14	93.3%
Criminal Justice	1	8.3%	1	6.7%
Communications	1	8.3%	1	6.7%
History	2	16.7%	2	13.3%
Political Science	7	58.3%	10	66.7%
Public Health	1	8.3%	1	6.7%
N	12		15	

Table 2 shows a comparison of the mean ability levels as estimated by students in the pre- and post-survey results for each of the specific research skills reinforced by the CUREs experiences embedded in the course. Self-reported ability levels were higher after students completed the class across all skills areas. However, the post-class means showed a statistically significant increase in five of the nine skills areas. Specifically, students showed a statistically significant increase in skill level in the areas of writing research questions, operationalizing variables, identifying levels of measurement, gathering quantitative data, and analyzing quantitative data to draw conclusions. These results suggest that class-based undergraduate research experiences are effective ways of introducing, reinforcing, and strengthening student skills level with many of the fundamental components of the social scientific research process.

Table 2. Student Perceived Ability Levels – Pre-Post CUREs

For each element below, give an estimate of your current level of ability with each task...			
	Pre-Class Mean	Post-Class Mean	Change
Reading an academic article?	3.46	3.60	+ 0.26
Summarizing the findings of an academic article in your own words?	3.38	3.53	+ 0.15
Writing a research question with a dependent and independent variable?	3.15	4.33	+ 1.18*
Identifying dependent and independent variables?	3.54	4.27	+ 0.73
Operationalizing variables?	3.00	4.13	+ 1.13*
Identifying levels of measurement of variables?	2.75	4.33	+ 1.58*
Writing a testable hypothesis for a research question?	3.50	4.07	+ 0.57
Gathering quantitative data to test a hypothesis?	3.17	4.33	+ 1.16*
Analyzing quantitative data to draw conclusions?	3.08	4.20	+ 1.12*
N	12	15	
* Statistically significant at the $p < .05$ or lower			

Students reported similar increases in comfort level when post-class surveys were compared to pre-class surveys. After completing the CUREs-based class, students reported

increases in comfort levels with all research tasks on the inventory and statistically significant increases in comfort levels with operationalizing variables, identifying levels of measurement, writing testable hypotheses, gathering quantitative data, and analyzing quantitative data to draw conclusions. The findings suggest that embedding CUREs assignments into an upper-level political science class can be an effective tool for minimizing student discomfort and anxiety when utilizing social science research methods and analyzing quantitative data.

Table 3. Student Comfort Levels Mean Scores and Pre/Post Differences

For each element below, give an estimate of your level of comfort with each task...			
	Pre-Class Mean	Post-Class Mean	Change
Reading an academic article?	3.62	4.07	+ 0.45
Summarizing the findings of an academic article in your own words?	3.46	4.27	+ 0.81
Writing a research question with a dependent and independent variable?	3.62	4.33	+ 0.71
Identifying dependent and independent variables?	3.85	4.67	+ 0.82
Operationalizing variables?	3.15	4.13	+ 0.98*
Identifying levels of measurement of variables?	3.00	4.27	+ 1.27*
Writing a testable hypothesis for a research question?	3.15	4.47	+ 1.32*
Gathering quantitative data to test a hypothesis?	3.31	4.20	+ 0.89*
Analyzing quantitative data to draw conclusions?	3.31	4.33	+ 1.02*
N	12	15	
* Statistically significant at the $p < .05$ or lower			

In addition to statistically significant increases in skills and comfort levels with many of the fundamental aspects of the social scientific research process, students also reported several other benefits to the CUREs assignments as shown in Table 4. 86.7% of students saw much or extensive gain in understanding the political science research process and understanding that scientific assertions required supporting evidence. 80% of students reported much or extensive gain in understanding how knowledge is constructed and the ability to read and understand scholarly articles. 73.3% of students reported much gain or extensive gain in the areas of

interpretation of research results, the ability to analyze data and other information, and the ability to integrate theory and practice. And 66.7% of students reported much or extensive gain in tolerance for obstacles faced during the research process and in readiness for more demanding research.

Table 4. Perceived Benefits Gained Post-CUREs

In this section of the survey, you will be asked to consider a variety of possible benefits you may have gained from your research experience in PSC 329.					
	No Gain	Little Gain	Some Gain	Much Gain	Extensive Gain
Skills in the interpretation of research results	0 (0.0%)	0 (0.0%)	4 (26.7%)	6 (40%)	5 (33.3%)
Tolerance for obstacles faced in the research process	0 (0.0%)	1 (6.7%)	4 (26.7%)	6 (40%)	4 (26.7%)
Readiness for more demanding research	0 (0.0%)	0 (0.0%)	5 (33.3%)	6 (40%)	4 (26.7%)
Understanding how knowledge is constructed	0 (0.0%)	0 (0.0%)	3 (20%)	6 (40%)	6 (40%)
Understanding the research process in your field	0 (0.0%)	0 (0.0%)	2 (13.3%)	7 (46.7%)	6 (40%)
Ability to integrate theory and practice	0 (0.0%)	0 (0.0%)	4 (26.7%)	6 (40%)	5 (33.3%)
Understanding that scientific assertions require supporting evidence	0 (0.0%)	0 (0.0%)	2 (13.3%)	6 (40%)	7 (46.7%)
Ability to analyze data and other information	0 (0.0%)	0 (0.0%)	4 (26.7%)	5 (33.3%)	6 (40%)
Ability to read and understand scholarly articles	0 (0.0%)	2 (13.3%)	3 (20%)	7 (46.7%)	5 (33.3%)
N=15					

Results of the course satisfaction questions in the post-class survey are displayed in Table 5. When asked to rate their level of agreement on a 5-point scale, most students appeared satisfied with the course. 80% of students agreed or strongly agreed with the statement “This course was a good way of learning about the process of social scientific research” and “I was able to ask questions in this class and get helpful responses”. 73.3% of students agreed or strongly agreed with the statement “This course had a positive effect on my interest in social

scientific research”. And finally, 66.6% of students agreed or strongly agreed with the statement “This course was a good way of learning about the U.S. Supreme Court”.

Despite most students’ satisfaction with the course, it is important to note that there were a few students who reported ambivalence with the CUREs aspects of the class. The greatest level of ambivalence was with the statement “This course was a good way of learning about the U.S. Supreme Court” where one third of respondents (5) neither agreed nor disagreed with the statement. It should also be noted that one student strongly disagreed with two of the statements about the course and disagreed with another. This level of ambivalence and disagreement is not all that surprising as the class presented information about the U.S. Supreme Court in a very different way than other traditional upper-level political science courses to which students may have been accustomed.

Table 5. Course Satisfaction Post-CUREs

For each item below, please rate your own level of agreement on the five-point scale ranging from (1) strongly disagree to (5) strongly agree.					
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
This course was a good way of learning about the U.S. Supreme Court.	0 (0.0%)	0 (0.0%)	5 (33.3%)	5 (33.3%)	5 (33.3%)
This course was a good way of learning about the process of social scientific research.	1 (6.7%)	0 (0.0%)	2 (13.3%)	6 (40%)	6 (40%)
This course had a positive effect on my interest in social scientific research.	0 (0.0%)	1 (6.7%)	3 (20%)	4 (26.7%)	7 (46.7%)
I was able to ask questions in this class and get helpful responses.	1 (6.7%)	0 (0.0%)	3 (13.3%)	5 (33.3%)	7 (46.7%)
N=15					

Conclusion & Discussion

Results of this pre- post research design suggests that the incorporation of course-based undergraduate research experiences into an upper-level political science class can achieve many of the same results as observed in the biological and life sciences. Students reported having significantly greater skill levels in the areas of writing research questions, operationalizing variables, identifying levels of measurement, gathering quantitative data, and analyzing data to draw conclusions as compared to the pre-class survey. Similarly, after completing the CUREs-based assignments, students reported significantly greater levels of comfort with social scientific research methods as compared to the beginning of the semester. Students identified being significantly more comfortable with operationalizing variables, identifying levels of measurement, writing testable hypotheses, gathering quantitative data, and analyzing quantitative data to draw conclusions. These results suggest that embedding guided research experiences into upper-level classes in political science can serve to both engage students in content area explanation while also building and reinforcing their research skills while providing undergraduate research skills to a wider array of students.

Future research on the efficacy of CUREs in political science and the social sciences more broadly should be expanded. There remain several important questions that have yet to be tested empirically. Do CUREs increase the diversity of students who gain access to research experiences? Are students exposed to CUREs more likely to pursue future research opportunities or graduate school? and Does CUREs experience better prepare students to complete capstone undergraduate research assignments? Future research should also test actual research skills in a pre-post research design rather than relying on student self-assessments. Finally, future investigations should also focus on the efficacy of utilizing CUREs in political

science to serve as bridging courses between required undergraduate research methods courses and senior capstone research projects. The results of this study suggest CUREs have the ability to help student acquire and reinforce essential research skills while also increase student self-efficacy and comfort with the social scientific research process.

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