

## Do Debates Enhance Critical Thinking and Argumentation in Political Science Education?\*

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### 〈Abstract〉

What are the impacts of debate pedagogy for students in the political science classroom? Despite their application as an active learning method, the educational impact of debates on critical thinking and argumentation skill is not well known. This study utilizes a quasi-experimental design approach with pre- and post-tests for treatment and control groups. We collected and compared survey data from political science classes that have implemented structured classroom debates(SCDs) and that did not. Statistical analyses suggest that debate is likely to enhance critical thinking and enable students to tell coherent political arguments. After taking a debate course, students perceived that debates are likely to improve their ability to provide evidence for their argument that are related to the subject or contents of the class. However, debate per se may not enable students to judge the validity of the evidence presented in an argument made by others, or to conduct independent research by themselves. This study concludes that carefully designed and implemented debates during and after class can facilitate students' capacity to think critically and make arguments about a wide range of complex political concepts and realities.

\*Key Words: debate, SCDs (structured classroom debates), critical thinking, argumentation, experiment

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## I . Introduction

Teaching and research: these are the two primary virtues and duties of academia. Instructors employ a variety of pedagogical approaches to enhance student understanding of pertinent subjects. However, in many cases, we are not aware of the educational impact of our pedagogies. Among pedagogies, we assume that debate is an effective tool to improve students' capacity for critical thinking and argumentation(Oros 2007). However, this assumption on the effectiveness of debate in the class should be empirically tested to enhance students' learning. Do debates indeed enhance students' ability to engage critically with complex political realities? Furthermore, do students perceive that taking debate class improve their argument making capability? To answer these questions, we employ a quasi-experimental pretest-posttest approach with both treatment and control groups consisting of students from a number of political science courses.

Zare and Othman(2015) argued that debate in class has been regarded as an effective strategy to enhance students' ability in critical thinking, empathy, argument making, and oral communication skill. On the other hand, Kennedy(2007) also pointed out that debate may reinforce students' bias toward dualism or existing belief. While in-class debate has been used in higher education, studies that systematically and empirically test the effect of debate on students' capacity in critical thinking and argument making have been rare.

Our research attempts to contribute to the theoretical discussion regarding the effects of a political science education on building students' capacity of critical thinking and argumentation. Answering the question of how students learn about the subject and the impact of the teaching method is a central topic for the researches on political science education(Lee et al. 2019). Many existing studies note that student participation in class is crucial for the political science learning process(Sloam 2010). This paper also agree upon this existing point of view. Among the participation we are particularly interested in how debates in class have impact on the learning process. This article

empirically examines the effectiveness of SCDs in improving students' critical thinking abilities and argument making. It utilizes experimental research design to test the effects of treatment(i.e., Structured Class Debates(SCDs)) on critical thinking and argumentation by controlling a variety of variables across multiple political science classes. By analyzing experiment outcomes, we also provide evidence-based suggestions to enhance the quality of SCDs and student learning in political science. The results of our analyses present that students who have taken SCD-based classes are generally more likely to increase their capacity for critical thinking and argumentation than students who have not taken SCD-based classes.

In the next section we review the existing works on debate pedagogy and critical thinking and argumentation. Then, we present the experimental research design and the empirical results that tested the impact of debate on these two aspects. Finally, we conclude with the implications of this research and suggest possible directions for designing debate class and its implementation.

## II. Structured Classroom Debate

The idea that debate as a higher form of reasoning which is essential for discovering truth has been the premise of the Western political philosophy and education. Since Socrates enlightened his contemporaries with dialectic as a way of discovering truth, it has long been believed that debate encourages the development of critical thinking and argumentation(Colby et al. 2010).

Active learning methods have taken on tremendous pedagogical significance in the field of higher education since the 1980s(Ennis 1993); as a result, SCDs or structured student debates(SSDs) have been regarded as a useful means of enhancing critical thinking and argumentation in various fields(Auerbach 2012; Camp & Schnader 2010; Dickson 2004; Oros 2007). The SCDs or SSDs has been widely used in classrooms in higher education, especially in the field of political science and civic education, because critical thinking and

argumentation are often considered as important factors in sustaining sound democracy(Colby et al. 2010; Omelicheva 2007; Ryan 2006). The role of debate class in intensifying critical thinking and argumentation has, however, been presupposed rather than proven.

To empirically examine the effects of debate in political science classrooms, seven courses at Yonsei University, University of Seoul, and Hankuk University of Foreign Studies in South Korea in the academic year of 2018 were set as treatment and control groups.<sup>1)</sup> Although each class was organized differently to some degree, the SCDs used for our quasi-experiments as treatment groups were basically organized in the following manner. During the first half of the semester, the instructors delivered lectures on foundational concepts and theoretical frameworks. Topics for the debates—which were to be held in the second half of the semester—were pre-selected by the instructors and announced on the syllabus. In the first few weeks, all students were required to sign up for a debate topic. According to Ryan(2006), debate topics or propositions can be divided into three categories: propositions of fact, propositions of value, and propositions of policy. The SCDs used for our quasi-experiment consisted mostly of propositions of policy, along with some propositions of value. For example, under the rubric of Environmental Politics, the debate topics included statements such as, “To reduce greenhouse gas emission, Korea needs to suggest and implement enhanced goals under the Nationally Determined Contributions(NDCs) of the Paris Agreement” or “Regional infrastructure development projects are acts of destruction of the local environment.” “To protect the Korean film industry from Hollywood capital, Korea needs to increase screen quotas” was a topic under the rubric of Politics in the Age of Globalization. For instance, on the one hand, regional infrastructure

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1) Courses include Environmental Politics, Introduction to International Commerce and Theories of Globalization at Yonsei University, and Politics in the Age of Globalization at the University of Seoul in Spring 2018. Other courses include Environmental Politics, Introduction to International Commerce, Globalization: Theory and Reality at Yonsei University, Foreign Policy at Hankuk University of Foreign Studies, Gender, Politics and the Law at Jeonbuk National University in Fall 2018.

development projects have been regarded as a primary measure to boost up local economy. On the other hand, regional infrastructure development have been a primary cause of environmental degradation. Debate in class can facilitate discussion on economic, social, and environmental aspects of regional development, which can enhance critical thinking and augmentation.

Students selected topics in accordance with their interests, but their positions—in favor of or against the topic—were randomly assigned to them by their instructors. As the positions were randomly assigned, some students had to argue in favor of (what was to them) the opposing viewpoint, making it possible for them to understand that other opinions could also be reasonable. Before the debate, each position group had to prepare an opening statement, a main argument, and a closing statement. Handouts or notes for the presentation were to be uploaded before the debate. During the debate, students in each group took turns presenting their arguments over a period of five to ten minutes. After the presentation, each participating student could ask questions of the group with the opposing view. It allowed them to deal with the counter arguments directly and to find a weak link in each other's claims. The audience could participate in the debate by asking questions to members of the debate teams. Even though each class provided different topics for the debate, all instructors shared a common scheme and manual to make the SCDs consistent across the classes and topics. For instance, the shared manual specified the allotted time for opening and closing statements, the role of moderator and audiences, grading rubric, and good examples for counter-arguments for extra points, and format of summary note. In that way, all the debates in different classes served the goal of SCDs in a uniform way.

In consistent with the guideline from Institutional Review Board(IRB), students participated in the quasi-experiment with explicit consent, and 379 students-286 for the experimental group and 93 for the controlled group-were included in our sample for the analysis. Participants' school year was almost equally distributed as 94 freshmen, 87 sophomores, 89 juniors, 79 of seniors responded to our survey. And the sample was slightly asymmetrical in terms of gender as 134 students were male and 216 students were female. They had diverse majors: political science, sociology, communication, psychology,

literature, math, and engineering. As some students missed checking the box on their personal information, there is a small gap between the total number of participants and the released distribution of school year, major, and gender.

### III. Critical Thinking

Social scientists and educationalists have long advocated the intrinsic value of critical thinking, emphasizing its importance as a cherished educational goal. They have also drawn attention to critical thinking as a crucial dimension of any intellectual effort(Siegel 1980). Popper(1965), for example, asserted that “criticism and critical discussion are our only means of getting nearer to the truth.” John Dewey used a similar concept – “reflective thinking” – and emphasized its merits, which “would make for individual happiness and the reduction of social waste”(Dewey 2010). Recent empirical studies have found a positive correlation between critical thinking and performance levels in other areas such as standardized tests like SAT or GRE; course grades and GPA; job performance; and even the odds of experiencing negative life events(Butler 2012; Ennis & Millman 2005)

Despite its theoretical salience and empirical validity, the conceptual fuzziness of critical thinking occasionally makes it a challenging goal to pursue in the classroom. Ennis(1993), for instance, reports 14 philosophically-oriented scholarly definitions, and three dictionary definitions of the term. A landmark study on the concepts of critical thinking reveals that different aspects of critical thinking are emphasized in different domains, from higher education to the workplace(Markle et al., 2013). However, even though a domain-specific approach persists in the study of critical thinking, these varied definitions have a common denominator. Most pieces of literature grasp “the correct assessing of statements” as a core dimension of critical thinking, which includes the ability to: (a) interpret, (b) analyze, (c) evaluate, (d) infer, (e) explain, and (f) self-regulate(Ennis, 1993; Facione, 1990).

In a nutshell, people with critical thinking skills tend to be goal-oriented thinkers, who can easily integrate all elements of analysis into their thought-processes. They also tend to be independent thinkers and active participants in their own learning process(Oros, 2007; Phan, 2010).

In a similar vein, critical thinking in the teaching and study of political science has centered around the logical assessment of political arguments in readings, assignments, contemporary issues, and peer students' arguments. As political science courses frequently mimic real-world decision-making processes, cultivation of critical thinking in the classroom is expected to contribute to better collective decision-making(Terenzini et al. 1995). Students' enhanced capacity for critical thinking as a result of the Environmental Politics course, for example, could trigger educated debate and active participation in a series of crucial decisions in many policy realms such as the promotion of clean energy, construction of nuclear power plants, and the use of market-mechanisms in the Paris Agreement, just to name a few. With improved critical thinking skills, students of political science are more likely to be better evaluators and analyzers of many public issues, which might give them a competitive edge as opinion leaders.

#### IV. Argumentation

At all levels of education, especially in higher education, argumentation has been regarded one of the most important goals to achieve in the classroom(Oros, 2007). As argumentation has been viewed not only as a goal of higher education but also as a necessary skill in the daily lives of responsible citizens(Colby et al. 2010; Ryan 2006) and in the specialized fields, such as science(Clark & Sampson 2008; Kuhn 1999), law(Spence 1997; Trachtman & CreateSpace 2013), politics(Andone 2013), and policy making(Majone 1992), so a variety of ways to develop this skill has been widely introduced(Spence 1997; Walton 2013; Weston 2018). In other words, as Walton(2013) puts it, it is "a practical skill that needs to be taught".

Argumentation is also recognized as a core skill that can nurture critical thinking through learning(Ferguson & Bubikova-Moan 2019). In particular, debate intensive courses in higher education are regarded as essential to the development of argumentation skills(Kuhn 1999; Omelicheva 2007; Oros 2007; Phan 2010) as in the debate course, two or more groups with different opinions, if not opposing, must perform the task of persuading the other with their arguments.

It is not clear, however, the in-class debate activities themselves will enhance students' argumentation skills. Argumentations skill is often presupposed to measure the students' ability of critical thinking and assessed whether they are strong or weak based on the rules suggested by various argumentations teaching methods, but it is rare to empirically investigate the impact of the debate intensive courses on students' argumentation skill. Considering the fact that many surveys show that there is lack of confidence among the college students in making profound argument and the research that proves measuring the quality of students' argument is challenging, it needs to be examined the relations between debate intensive courses and the students' argumentation skill.

Considering the theoretical and empirical backdrop, this paper posits that student participation in classes using the debate method can enhance their level of critical thinking. In the quasi-experiment illustrated below, therefore, we expect that a group of students who have taken courses using the debate method will show a higher degree of confidence in their critical thinking and argumentation abilities, as compared to a group of students who have taken conventional lecture-style classes. The debate method can improve students' capacity for critical thinking since it requires them to critically review the readings assigned to the opposing team, pinpoint any inconsistencies or fallacies in the argument, evaluate the validity of the evidence, and also develop an alternative argument. In that way, the whole process of cross-debate demands a deep immersion in critical thinking and argumentation.



## V. Research Design

This study utilized a quasi-experimental research design to test hypotheses on the impact of SCDs on students' critical thinking and argumentation abilities. Analogous to an experimental design, quasi-experiments illuminate the impacts of a treatment or intervention, which allowed researchers to infer a causal relationship between key variables, by controlling other plausible variables (Druckman et al. 2006). In a research examining the impact of an experimental teaching method, for instance, a researcher can test it by measuring and comparing it in the pre and post-implementation of the method. The analytical merits made the method popular in many fields of social science, particularly in psychology, education, and political science (Gersten et al. 2005).

The critical difference with a pure experiment is that quasi-experiments are frequently conducted when the random assignment is difficult. In the case of a research on an experimental teaching method, students usually cannot be randomly assigned just for the purpose of experiment, due to the course registration rule or other curriculum regulations. As a result, in theory, there can be other differences between two groups of students who signed up for the class with a new teaching method and the class with a conventional method, which makes them "non-equivalent comparison groups." Despite many advantages, this problem makes a theoretical claim drawn from a quasi-experiment limited in some contexts (Magidson & Sörbom 1982).

While this paper recognizes the intrinsic and prevalent limitations of a quasi-experiment, it tried to minimize the problem by targeting similar groups of students. The experiment consisted of two groups of participants: a treatment group of students participating in SCDs, and a control group of students who were not. We also compared differences in critical thinking and argumentation between the control and treatment groups using pre-post surveys. The survey includes a self-assessment question of whether students think critically and confidently participate in argumentations. To test the effects of the SCDs, there should be no difference between the control and

treatment groups in the pre-survey phase(prior to the class debates), but there should be a substantial difference between two groups in the post-survey phase(after class debates)(McDermott 2002). Students were all informed of the ethical collection and use of experimental data, and voluntarily agreed to participate in the survey.

Owing to their quasi-experimental nature, the samples were not randomly assigned(Campbell et al. 1963). To reduce the problem of confounding variables, all the control and treatment classes comprised political science majors, and we also excluded the mandatory courses and targeted only elective courses for the analysis. Furthermore, we included the "debate experience outside of class" variable in the statistical testing. In this way, the research design tried to maximize "the equivalency" of experimental and control groups for the comparison.

Unlike some extant pieces of literature above comparing students' test score on critical thinking and argumentation, this paper operationalizes and measures the impacts of SCDs by decoding the survey result of students' self-assessment. This approach can be justified for some compelling reasons. Practically, it is difficult to set a standardized test that can measure the changes in critical thinking of students in several classes that cross wide-ranging topics compassing environmental politics, international relations, globalization, etc. By referring to the various measurement criteria presented in the research discussing various critical thinking measurement(Ennis 1993; Facione 1990; Oros 2007; Phan 2010), as illustrated above, we developed questions that students can self-assess those criteria. More than anything, the self-assessment is more fits into the reality of universal voting rights system. As long as most democracies do not require a test or educational level for the ballots, citizens decide to participate or not to participate in the collective policy-making based on their judgement and assessment. Ultimately, the enhanced level of critical thinking and argumentation is believed to promote active participation of citizens in the political process and informed collective decision-making(Guyton 1988). Taking into accounts the institutional-setting of democracy and critical thinking, the SCDs in our experiment is oriented to promote the self-conviction and confidence of critical thinking and

argumentation. Likewise, “self-assessment” of students is a more appropriate measurement of the impacts on SCDs and critical thinking and argumentation, due to the intrinsic goals and the context of political science education.

## VI. Analyses and Results

Do in-class debate activities or SCDs improve student’s capacity for critical thinking and argumentation? Are there significant differences in enhancing the ability of critical thinking and argumentation of students for classes with and without debates? In this research, the dependent variables are measured by the survey questions demanding responses on four different statements - (1) I can spot inconsistencies in a political argument easily, (2) I can judge the validity of the evidence presented in the political assertion made by an expert, (3) I research on my own if there is any question in the content of the lecture or textbook for a class, and (4) I can present evidence of my argument regarding (“name of the class”). The first three statements capture student’s capacity for critical thinking and the last statement capture their argumentation ability. In addition, the first and the fourth question directly ask the influence of debate process on students. Students’ capacity measured with the second and the third questions would be gradually enhanced through a series of debates. The responses to these statements are based upon multiple-value Likert scale - “strongly disagree,” “disagree,” “agree,” and “strongly agree.” We expect students in the classes using SCDs to be more likely to agree to above four statements(or increase their level of critical thinking and argumentation abilities) at the end of the semester than the students who took the classes without SCDs.

Table 1 presents the pretest and posttest mean estimates for the responses of treatment and control groups. The pretest results demonstrate that the mean estimates are slightly higher for the treatment group in comparison to the control group for all four variables. This implied that selection bias may

be not a significant challenge between two groups. Yet, we found significant difference of mean estimations for the control and treatment groups in the case of the Variable 1 - "spotting inconsistencies in political arguments". For Variable 1, the pretest and posttest mean difference for the control group is 0 (= 2.83 - 2.83), whereas it is 0.16 (=3.01 - 2.85) for the treatment group. The difference between the two groups is about 0.16 (= 0.16 - 0) Thus, on average, students were more likely to strengthen their ability of spotting inconsistencies in political arguments after taking classes that implemented SCDs.

However, the pretest and posttest mean differences of both the control and treatment groups seem to be similar or small, in the cases of Variables 2, 3 and 4. In the case of Variable 2, "judging the validity of the evidence", the pretest and posttest mean difference for the control group is 0.22 while that of the treatment group is 0.19. The difference between the control and treatment groups is only 0.03. For Variable 3, "independent research", the pretest and posttest mean differences in the control and treatment groups are both 0.02. Based on the mean estimates of these two variables, we may argue that experience of SCDs do not increase the level of critical thinking ability for the students in terms of judging the validity of evidence and conducting an independent research which are known to be advanced or higher level of critical thinking. There are small difference for Variable 4 - "argumentation". In this case, the pretest and posttest mean difference for the control group is 0.21, whereas it is 0.26. The difference between the two groups is about 0.05. Therefore, students who took classes with SCDs may slightly enhance their ability of argumentation.

〈Table 1〉 Mean Estimations

Variables	Pretest				Posttest			
	Control group		Treatment group		Control group		Treatment group	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
<i>Variable 1: Spotting inconsistencies in political arguments</i>	2.83	2.74 2.93	2.85	2.79 2.91	2.83	2.72 2.93	3.01	2.95 3.08

Variables	Pretest				Posttest			
	Control group		Treatment group		Control group		Treatment group	
<i>Variable 2: Judging the validity of the evidence</i>	2.59	2.51 2.68	2.69	2.61 2.76	2.81	2.69 2.93	2.88	2.81 2.95
<i>Variable 3: Independent research</i>	2.92	2.80 3.04	3.03	2.96 3.11	2.94	2.80 3.07	3.05	2.97 3.13
<i>Variable 4: Argumentation</i>	2.67	2.57 2.77	2.81	2.73 2.88	2.88	2.76 3.00	3.07	3.01 3.13

Table 2 presents the ANOVA results, which show whether the mean differences between treatment and control group variables are statistically significant in the case of the pretests and posttests. There are no statistically significant differences between the control and treatment groups with regard to any of the three variables measuring the capacity for critical thinking in the pretest. These results suggest that there are no meaningful differences between students in either the treatment or the control groups in terms of their capacity for critical thinking prior to participating in the SCDs. Therefore, the similarities between students in the two groups create a sense of confidence when testing the impact of the experiment. In other words, if there are differences in student responses between the two groups, for the posttest, we may argue that SCDs influence students' capacity for critical thinking.

The posttest ANOVA results revealed a statistically significant mean difference between the control and treatment groups for Variable 1—"spotting inconsistencies in political arguments." In this case, the F statistic was below the conventional significance level of 0.05. This result supports our argument that SCDs influence students' capacity for critical thinking in terms of spotting inconsistencies in political arguments. However, as in the pretest, there are no statistically significant mean differences for Variables 2 and 3.

For our second dependent variable (Variable 4)—"argumentation", the mean differences between treatment and control group variables were statistically

significant in both the pretest and posttest. Yet, the difference for posttest presents much stronger statistical significance compare to that of pretest. There may be some difference among the students of treatment and control groups from the pre-survey phase regarding their ability of “argumentation”. However, the difference between the two groups becomes much stronger after the experiment - exposure to SCDs. Thus, we may carefully expect a positive impact of SCDs on student’s argumentation ability.

〈Table 2〉 Summary of Pretest and Posttest ANOVAs Between Students in SCD and non SCD-Based Classes

Variables	Pretest		Posttest	
	Sum of squares	Probability > F	Sum of squares	Probability > F
<i>Variable 1: Spotting inconsistencies in political arguments</i>	0.0313	0.7557	2.4081	0.0036
<i>Variable 2: Judging the validity of the evidence</i>	0.8916	0.1221	0.3834	0.2893
<i>Variable 3: Independent research</i>	1.2812	0.1064	0.8941	0.1713
<i>Variable 4: Argumentation</i>	1.6301	0.0408	2.5551	0.0024

Df=1

Table 3 presents the regression results of the ordered logit models examining the impact of SCDs on students’ critical thinking and argumentation abilities. Samples for these four models include 93 students from non SCD-based classes(the control group) and 286 students from SCD-based classes(the treatment group). The SCD-based classes are the classes with student debates. The instructors delivered lectures on foundational concepts and theoretical frameworks for the first half of the semester and the students participate for debates for the second half. The topics for the debates

were pre-selected by the instructors and all students were required to sign up for a debate topic. Responses were collected from both groups in the posttest phase. The results of Model 1 show that SCDs have a statistically significant positive impact on student’s capacity for critical thinking only in terms of spotting inconsistencies in political arguments. Model 4 reports that SCDs have a statistically significant positive impact on student’s ability of argumentation. These results confirm our expectation on the effects of SCDs for the students. However, the results of Models 2 and 3 reveal that SCDs do not have a statistically significant impact on increasing the likelihood of students judging the validity of the evidence presented in the form of political assertions or of students conducting independent research to see if they have any doubts regarding the content of the lectures or the textbooks.

Among the control variables, students who follow political issues or current affairs tend to have higher capacity for critical thinking, in terms of spotting inconsistencies in political arguments and judging the validity of the evidence, and for argumentation. The students who have experience with volunteer activity were more likely to enhance their ability to conduct an independent research. The students who were positive on the impact of debate class in helping them to understand the political situation tend to have higher capacity for argumentation.

〈Table 3〉 Impact of SCD-Based Classes on Student Capacity for Critical Thinking and Argumentation (Ordered Logit Regression)

	<i>Model 1: Spotting inconsistencies in political arguments</i>	<i>Model 2: Judging the validity of the evidence</i>	<i>Model 3: Independent research</i>	<i>Model 4: Argumentation</i>
<i>SCD-based classes (experimental treatment)</i>	1.0768** (0.3439)	0.2355 (0.3362)	0.3315 (0.2989)	0.7737* (0.3611)
<i>School year (grade)</i>	0.0663 (0.1318)	-0.0801 (0.1299)	-0.1910 (0.1168)	0.0783 (0.1375)

	<i>Model 1: Spotting inconsistencies in political arguments</i>	<i>Model 2: Judging the validity of the evidence</i>	<i>Model 3: Independent research</i>	<i>Model 4: Argumentation</i>
<i>Debate experience in class</i>	-0.2407 (0.2775)	-0.0506 (0.2754)	-0.1463 (0.2467)	0.4836 (0.3018)
<i>Debate experience outside of class</i>	0.3182 (0.3026)	0.3679 (0.2966)	0.4706 (0.2694)	0.3220 (0.3254)
<i>Impact of debate class</i>	-0.1473 (0.2174)	0.2289 (0.2068)	0.3389 (0.1925)	0.5985** (0.2196)
<i>Experience in political science class</i>	0.1614 (0.3472)	-0.2880 (0.3389)	-0.2783 (0.3063)	-0.1794 (0.3650)
<i>Follow political issues or current affairs</i>	0.8561* (0.3409)	1.1601** (0.3339)	0.2928 (0.2995)	0.7535* (0.3717)
<i>Experience with (political or Social) volunteer activity</i>	0.1617 (0.3224)	0.3222 (0.3227)	0.9073** (0.2908)	0.5237 (0.3383)
<i>Gender</i>	0.4009 (0.2758)	-0.1593 (0.2735)	0.1029 (0.2422)	-0.0036 (0.2904)
<i>Cut 1</i>	0.1654 (0.9443)	-3.7754 (1.1386)	-3.1968 (1.0069)	-1.1609 (1.0985)
<i>Cut 2</i>	3.9483 (0.9870)	-0.1105 (0.9089)	0.0109 (0.8460)	1.3831 (0.9658)
<i>Cut 3</i>		3.6203 (0.9429)	2.6037 (0.8627)	5.6854 (1.0516)
<i>N</i>	284	283	284	284

Standard errors in parentheses. \*p<0.05, \*\*p<0.01



Table 4 depicts the predictions regarding the marginal effects of SCD-based classes on student's critical thinking skills, specifically the ability to spot inconsistencies in a political argument and on student's argumentation skills. We compared the marginal effect prediction of the treatment and control groups, when all the other variables were at their means. The results present that the students who had taken the SCD-based class were more likely to respond positively to the statement about their ability to spot inconsistencies in a political argument. The probability of them disagreeing with this statement was 11%, whereas the chances of them agreeing and strongly agreeing were 75% and 16% respectively. On the other hand, for the control group students who had not taken the SCD-based class, the probability of disagreeing was 27%, and their chances of agreeing and strongly agreeing were 67% and 6%, respectively. Similarly, it reports that the students who had taken the SCD-based class were more likely to respond positively to the statement about their capacity to present evidence of their argument regarding the class contents. The probability of them strongly disagreeing(1%) and disagreeing(7%) with this statement was 8%, whereas the chances of them agreeing and strongly agreeing were 78% and 14%. On the other hand, for the control group students the probability of strongly disagreeing(1%) and disagreeing(14%) increased to 15%. Although the probability for them to agreeing with the statement was still 78%, the chance of strongly agreeing decreased to 7%.

(Table 4) Predictions of the Marginal Effects of SCD-Based Classes on Student Capacity to Spot Inconsistencies in a Political Argument and Argumentation

	Groups	Disagree	Agree	Strongly agree
Spotting inconsistencies in political arguments	Treatment group	11%	75%	16%
	Control group	27%	67%	6%
Argumentation	Treatment group	8%	78%	14%
	Control group	15%	78%	7%

Substantively, these results indicate that students who have taken SCD-based classes are more likely to increase their capacity for critical thinking with regard to spotting inconsistencies in a political argument and argumentation than students who have not taken SCD-based classes. However, the results also indicate that students in SCD-based classes are not more likely than their non-SCD counterparts to increase their capacity for critical thinking, particularly when it comes to judging the validity of evidence presented or conducting independent research into the contents of their lectures or textbooks.

These results show us that the educational impact of SCDs on students' critical thinking abilities is limited to the first, and most basic, stage of critical thinking - that of evaluating the arguments others make. This evaluation is based primarily on the content of the other person's argument. In our experiment, students in the SCD-based classes had the opportunity to evaluate the arguments advanced by their peers, within the framework of their presentations and based on comments from their opponents. This process may enhance their ability to spot inconsistencies in a political argument.

However, SCD-based experiences may not help students to develop critical thinking skills beyond the first stage. The ability to evaluate whether the arguments of others are based on valid evidence is the second stage of critical thinking, and the ability to do independent research into the contents of a lecture or a textbook is the third stage of critical thinking. In order to advance to the second and third stages, students need to learn to gather information and knowledge by themselves, which SCD-based classes do not necessarily encourage them to do. For instance, students who are exposed to more information are expected to have better judgment regarding the validity of the evidence presented in an argument. The regression results of Model 2 confirm the fact that students who follow current affairs and are knowledgeable about political are more likely to critically evaluate the validity of any evidence advanced that they may be presented with. Moreover, students who had experience with volunteer activity are more likely to enhance their ability of independent research which is confirmed by Model 3.

The SCD-based classes also enhanced students' ability of argumentation. After taking SCD-based classes students were more positive on their ability to present evidences on their own argument regarding the class contents. Participation in SCDs strengthen the capacity of student to establish and organize their argument by providing evidences from the class contents. This result may imply that students in SCD-based classes were more likely to absorb class contents than the ones in non SCD-based classes. These students of SCD classes may use the absorbed contents for building their own argument.

## VII. Conclusion

Critical thinking in the scientific world is understood as an important starting point for academic breakthroughs, like building an advanced model, upgrading a theory or solution seeking(Lee & Hurley 2020). Making argument with evidences is another virtue that students nurture in their education. We are quick to assume that learning to debate is a useful way to improve critical thinking and argumentation. To test this assumption and fill the gaps in the debate education literature, we sought to demonstrate that students could improve their critical thinking and argumentation abilities through debate.

To test our research questions, we surveyed political science majors in both SCD-based classes(the treatment group) and non SCD-based classes(the control group). Our survey results confirmed that SCD-based learning enables students majoring in political science to increase their capacity for critical thinking and argumentation. And students in the treatment group supported this confirmation with their different perception on the academic effectiveness of the debate learning through pretest and posttest.

We found that with the mean estimation of the treatment and control groups, the variable "spotting inconsistencies in political arguments" was the one to register a marked difference, both before and after the test. Students

in the treatment group in particular, had a more positive response to this first variable after taking classes with SCDs. The F- statistics of the ANOVA results, and the regression results of the ordered logit models detailing the impact of the SCDs on students' critical thinking and argumentation, showed a statistical significance and a positive association between debate and critical thinking and argumentation. At least, the accumulation of debate experiences in SCD-based class increases students' perception on its role in enhancing their capacity of critical thinking and improving their ability to provide creative evidence for an argument, which will be helpful for building their own argumentation and critical thinking. On the basis of these findings, we can argue for the effectiveness of debate-based learning in improving political science majors' critical thinking and argumentation skills. Carefully designed debate classes allow students to discover the logical and factual weakness of others' arguments. In addition, adopting the debate pedagogy in higher education, particularly social science class can make class interactive as well as lively.

However, to develop students' critical thinking further, instructors should reinforce a student's capacity to judge the validity of these arguments, as well as their ability to conduct independent research. To this end, for instance, making students write short note on fact check for the argument and comprehensive evaluation of the whole debate after debate would enhance students' critical thinking abilities. To make our findings more generalizable, experiments involving more political science students, students from other disciplines, as well as from other countries could prove useful.

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## 국문요약

## 정치학 토론 수업과 비판적 사고의 상관성에 대한 실험 연구

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본 연구는 정치학 전공 수업에서 토론을 진행하는 것이 학생들의 비판적 사고를 고양시키는데 얼마나 의미 있는 학습효과를 가져오는가에 대한 연구 질문에 답하는 것을 목적으로 한다. 일반적으로 교실에서 진행되는 토론이 학생들의 비판적 사고와 논쟁 능력을 향상시킬 수 있다는 점에 대한 가정은 있지만, 토론 수업의 교육적 효과에 대한 연구는 드물다. 본 연구는 토론의 비판적 사고 향상이라는 교육적 효과를 확인하기 위하여, 토론 수업의 이전과 이후에 준실험설계방식을 적용하였다. 교실에서 구조화된 토론(Structured Classroom Debates)을 진행하는 수업(실험집단)과 진행하지 않는 수업(통제집단)을 구분하여, 정치학 강좌를 수강하는 학생들을 대상으로 사전과 사후 설문조사를 진행하고, 그 결과를 비교 분석하였다. 통계 분석의 결과, 토론이 정치적 현안에 대한 학생들의 논쟁 능력과 비판적 사고의 고양에 도움이 된다는 것을 확인할 수 있었다. 실험집단의 학생들은 토론이 수업에서 다루는 주제와 내용에 대한 자신들의 논리를 뒷받침하는 논증 능력을 향상시켜준다는 점에 대해 긍정적으로 답변하였다. 그러나 토론 그 자체만으로는 토론의 상대방이 논쟁 과정에서 제시하는 논리와 주장의 유효성과 적실성을 판단하고 반박하거나, 학생 스스로 주제와 관련된 독립적인 연구를 진행하는 데에도 의미 있는 도움이 되지 않는다는 점을 확인할 수 있었다. 이러한 점들을 고려하여, 본 연구는 토론 수업은 다양하고도 복잡한 정치적 현안들에 대한 학생들의 비판적 사고능력과 논쟁 능력을 의미 있게 향상시킬 수 있으나, 토론 후에도 상대방 의견의 적실성을 판단하고, 독립적으로 연구할 수 있는 디자인이 필요함을 역설하고 있다.

주제어: 토론, 구조화된 토론수업, 비판적 사고, 논증, 실험 연구