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Assigned Positions for In-Class Debates Influence Student Opinions

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In-class debates are frequently used to encourage student engagement. Ideally, after researching both sides of the debate, students will form their own opinions based on what they have learned. However, in a large course of Environmental Science, opinions of students, when surveyed after the debate, were remarkably consistent with the position that they had been assigned. This study aimed to determine whether an assigned debate position influenced student opinion. Prior to being assigned a debate position, 132 students in Environmental Science were polled for their opinions on six controversial issues. Each student was assigned to a position, without regard to their opinion, for a debate on one of the issues. Students researched both positions and constructed arguments and counter arguments for both sides, but only argued one side of the debate in class. One week following the debates, students were again polled for their opinions. Prior to debating, only 41% of students happened to agree with their assigned position, yet following the debates, 77% of students agreed with their assigned positions ($p = 0.0000005$). This suggests that researching and/or arguing an assigned position in a class debate influences student opinion toward that position.

Active learning has been shown to increase student learning and retention in numerous situations (Bellon, 2000; Bransford, 1989; Kennedy, 2007). Active learning strategies can also improve student skills, such as critical thinking (Gervey, 2009). The educational debate is one form of active instruction, requiring students to prepare material, obtain evidence, create arguments, evaluate opposing data, and construct rebuttals (Bellon, 2000), resulting in greater mastery of the material. Debates have also been proposed as means of encouraging students to thoroughly learn both sides of a controversial issue. For example, Turner, Yao, Baker, Goodman, and Materese (2010) have shown that when individuals are expecting a controversy in debate as opposed to a general discussion, they spend more time learning the opposing viewpoint. Thus, educational debates are considered valuable tools in many social science curricula (Omelicheva, 2005).

Debates have not traditionally been a part of the curricula of the sciences. Yet, educated scientists often disagree on the solutions to complicated problems. This is especially evident in Environmental Science, where many potential solutions exist for a large number of environmental problems. Thus, in order to enhance student learning, foster critical thinking skills, and promote awareness of existing controversies, small group debates (12 students per group) were introduced to a large Environmental Science class.

Previous research has shown that students may change position after debate. One study found that 23 to 45% of students holding opinions contrary to their assigned debate position changed their views following in-class debates, compared to 22% of students who change opinion to agree with the professor's opinion after a lecture (Gervey, 2009). This indicates that debate could be useful in shaping student opinions. Ideally, after preparing material for both sides of the debate and participating in the two-sided debate, students would be better able to form their own, well-informed, opinions.

However, after one semester, surveys showed a very large portion (83%, $n = 90$) of students expressed views that agreed with the debate position to which they had been randomly assigned. This indicates that students were not forming new opinions based solely on new material learned during the debate. Instead, the data indicate that students were more likely to take on the position that they argued during the debate, regardless of their initial view.

To explore this finding, a study was conducted using a large lecture course (144 students) of Environmental Science, where student opinions before and after in-class debate were evaluated in light of the debate position to which the student was assigned.

Methods

This study was conducted in a large, non-major, Environmental Science course with an enrollment of 144 students. The students comprised 53% female and 47% male. The course was organized with one group lecture section accompanied by six separate lab sections of 24 students each.

Debate Topics

To reduce complications due to any particular debate topic, six separate issues relating to current class material were debated. For each issue, students had already received a thorough introduction to the topic and a brief explanation of the conflicting opinions that exist within the scientific community. As advised in Bull's (2007) article on structured academic controversy, questions were chosen to which there were no clear "right" answers. The six issues debated were:

1. Are biofuels the solution to our current energy crisis?
2. Should we use a cap and trade system to control carbon emissions?
3. Should we increase our reliance on hydropower?
4. Should we increase our reliance on nuclear power?
5. Is organic farming the answer to feeding our growing population?
6. Should we burn our trash for energy (waste-to-energy transfer, WTE)?

Initial Polling

Students were initially polled on their opinions after lecture material on these topics had been presented. There was a minimum of one week and a maximum of four weeks between the lecture material and initial polling. Approximately 25 minutes of lecture was devoted to each topic, covering background and some brief scientific perspective for both the pro and con sides of each issue. Students were polled using a personal response system (i.e., clickers), by asking each question and permitting a simple yes/no response. Polling data were stored and not viewed by either the instructor or students until after the post-debate polling was completed.

Debate Preparation

Following the initial polling, students were assigned to a debate topic based on laboratory section and last name, with half of each section assigned to argue the "yes" position, and the other half assigned to the "no" position. Students had one week to prepare for their debates. They were encouraged to use their textbook, library resources, and the Internet to research their issue. While students knew which position they were assigned, they were instructed to research both sides of the issue. Every student was to prepare for both the yes and no positions. Based on research with at least three sources, each student was instructed to write a one to two page paper with a brief summary of each perspective, the top three justifications for each position, a rebuttal that could be used against each justification, and a rebuttal to that response. These assignments were due the day of the debate, and were graded on a 10-point scale with respect to completeness, thoroughness of research, and appropriateness of sources.

Debate

The debate was conducted in the structured method, similar to that used by Keller (2001), with the omission of audience questions as all students participated in the debates. For the debate, students separated into the "yes" group and the "no" group. They were given ample time to discuss amongst themselves which three justifications for their position were best. When ready, they presented these three points to the opposing team. Each team then had ten minutes to discuss their best rebuttal response to each of three points. After these were presented, the students had the opportunity to prepare and present rebuttals to the rebuttals. Following a final group discussion, each group then presented a final summary of their position, including the reasons that they felt were the strongest justifications for their position.

It should be noted that there was no focus on "winning" the debate. Instead, debates were focused on the collaborative nature of collective exploration (Bell, 2004). Students were instructed not to look for a winning or losing team, but to assess the information presented in the debate and use it to form their own opinions on the topic matter. It was specifically emphasized that students' personal opinions need not agree with the positions argued during the in-class debate.

Post-Debate Evaluation

One week following the debate, students were again asked for their stance (yes/no) on the issue that they had debated. These responses were then collated with their initial responses and the positions they were assigned to argue in each debate.

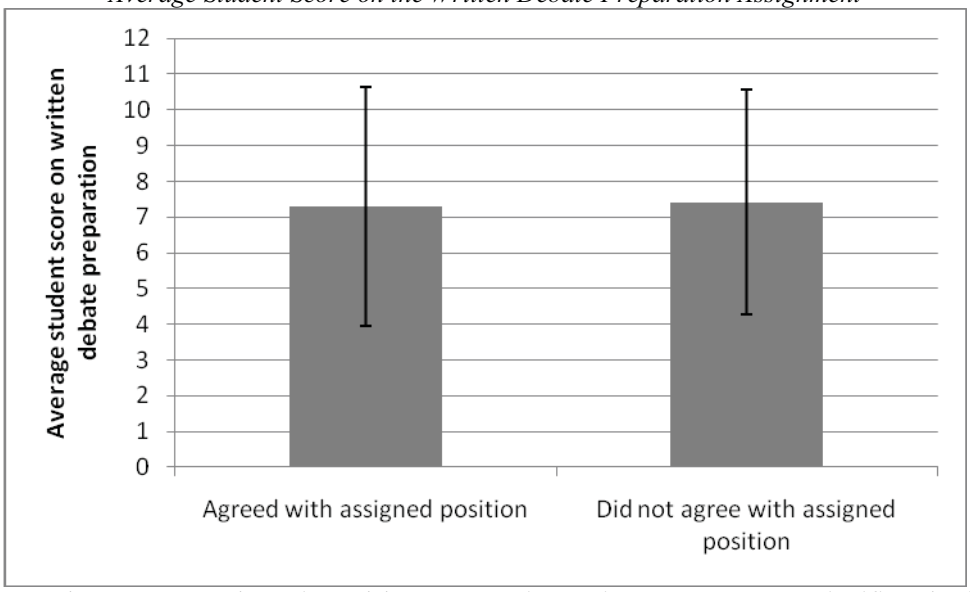
Results

Recording opinion change in this study required that students be present on three separate days to participate in the pre-debate survey, the debate, and the post-debate survey. On each occasion, several students were missing. Thus, data from only 90 students were usable for this study, with 69% female and 31% male. They were broken down as $n = 19$ for the biodiesel debate, $n = 12$ for cap and trade, $n = 14$ for Hydropower, $n = 17$ for nuclear power, $n = 16$ for organic farming, and $n = 12$ for waste-to-energy transfer.

On average, students prepared well for the debate. The average grade for the written assignments was 7.3/10 points. When later analyzed with respect to initial opinion, there was no difference in scores between students who agreed with their assigned position and students who did not (see Figure 1; 7.3 ± 3.3 and 7.4 ± 3.1, $p = 0.86$ in a two-tailed t-test).

Prior to the debate, only 41% of students expressed agreement with the position that they had been assigned. Following the debate, 77% of student opinions agreed with their assigned debate position.

Figure 1
Average Student Score on the Written Debate Preparation Assignment



Note. Average student scores on the written debate preparation assignments were not significantly different with respect to whether the student agreed with his/her assigned debate position prior to the assignment. Averages 7.3 and 7.4, *SD* 3.3 and 3.1, $p = 0.83$ in a two-tailed t-test.

Thus, 60% of students who initially disagreed with their assigned positions changed their opinion to the assigned position (see Figure 2). This difference was highly significant in a chi-squared goodness-of-fit test ($p = 7.1 \times 10^{-12}$).

In all, 53% of students changed their opinion following the debate. Of these, the vast majority (84%) changed their opinion to agree with the position that they had been assigned to argue, while only 8.5% of students changed their opinion to disagree with the position they had been assigned. Women were slightly more likely than men to change their opinion to agree with the assigned position (54% compared to 44%), but this difference was not significant ($p = 0.19$, chi-squared goodness-of-fit test).

Overall, the *p* value returned by a t-test is highly significant, showing that students tend to change their opinions to agree with the position that they argued during the debate (see Table 1). When broken down by debate topic, no change was observed in student opinions on the use of nuclear power, and the change in opinion on waste to energy transfer was not significant, while changes in opinions were significant for the other four debate topics.

Discussion

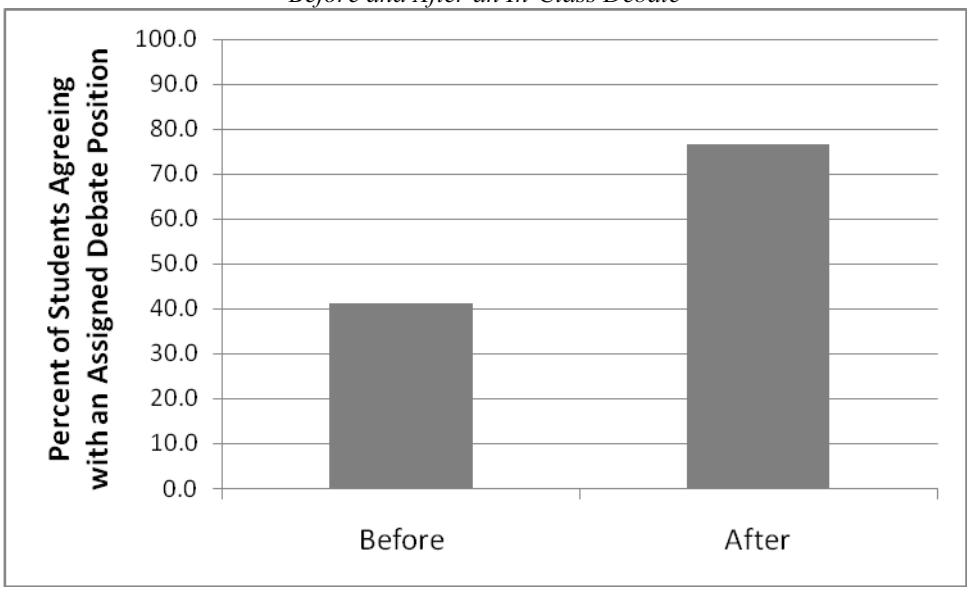
We previously observed that after engaging in a debate activity, students seemed to change opinions to agree with an assigned debate position. This study was carried out to determine if students were statistically more likely to agree with their assigned position (i.e., whether they answered yes or no) following a classroom debate.

In the first semester, most students (83%) agreed with their assigned positions when surveyed one week after the debate. Because pre-debate opinions were not surveyed in those classes, it was not possible to say whether the students just happened to be assigned positions that agreed with their original positions. In this

Table 1
Percentage of Students Agreeing with their Assigned Debate Positions Before and After the Debate

	Percent Agreement		
Debate Topic	Before	After	p value
Biofuels	21.1	68.4	0.004
Cap and Trade	50.0	83.3	0.019
Hydropower	21.4	71.4	0.014
Nuclear Power	76.5	76.5	0.500
Organic Farming	31.3	87.5	0.001
Waste-to-Energy Transfer	50.0	75.0	0.096
Average	41.1	76.7	0.0000005

Figure 2
Agreement Between Student Opinions and their Assigned Debate Positions Before and After an In-Class Debate



study, the pre-debate surveys showed that the prior opinions of only 41% of students happened to agree with the positions they were later assigned to debate, while after the debates 77% of students agreed with their assigned position. Thus, after the debates students were significantly more likely ($p = 0.0000005$) to agree with their assigned positions. This indicates that some aspect of the debate assignment had a profound influence on their opinions.

The students' tendency to change their opinion to agree with an assigned position is troubling. One of my objectives in using debates was to enable students to make informed decisions on important issues. This may have been the influence behind some shifts in opinion, but the directionality of the shift toward agreement with the assigned position, as opposed to towards either the yes or no position, should not have been so strong were students simply moving to the more compelling argument.

One worry in debates is that students will devote more energy to researching the position with which they agree, and therefore create a stronger argument for themselves. Indeed, prior research has shown that when observing debates, opinions are likely to be strengthened (Sears, 1964), not change. When preparing for a debate in which they will participate, individuals are more likely to seek information that validates their own opinions (Turner et al., 2010), and may even ignore information that contradicts their personal opinions (Bell, 2004). Such behavior in debates serves to reinforce students' existing opinions (Kennedy, 2007). If that were the case in this exercise, students should have reinforced the positions that they held prior to the debate. Instead, they were likely to change positions.

It is possible that the students put more effort into researching the position they were assigned. To prevent this one-sided approach, students were forewarned of the debate format and of the opposing side's position, thus increasing their likelihood to thoroughly research both sides of the issue (Turner et al., 2010). Based on the written assignments they prepared in preparation for the debate, students did research both viewpoints. However, in a future debate, it might be advisable to not assign students to a position prior to the debate. Students would research both positions, and then be assigned to one team or the other only at the beginning of class. This would increase the chances that they would invest equally in their research for both positions.

It is also possible that it was not preparation, but the act of arguing for a certain position, that influenced the students' opinions. The act of debating has been shown to be slightly more effective in changing opinions than other discussion or role-play activities (D'Eon, 2007; Simonneaux, 2001). Additionally, watching peers on their team argue for the assigned position may have been influential as well. Research has shown that modeled opinions are likely to influence subjects to agree with those opinions when the subject sees him/herself as similar to the modeler (Hilmert, Kulik, & Christenfeld, 2006). Additionally, it has been shown that people are more likely to be swayed to agree

with opinions that they hear from multiple individuals or that are repeated multiple times (Weaver, Garcia, Schwarz, & Miller, 2007). In our class activity, students spent considerable time (three 15-20 minute sessions) discussing their research and debate strategies within their assigned groups. In these discussions, the assigned position was voiced many times by several different students. When the teams presented their arguments during their debates, each student heard the opposing argument from only one student presenter on that team, and the presentation was typically less than one minute. Thus, students had more exposure in terms of time and numbers of students to their assigned position than to the alternate position. It seems possible that the experience of arguing and defending a position during the in-class debate was the factor contributing to their opinion change.

Bell (2004) found that students did not succeed well at defending positions with which they did not personally agree. Yet, based on their written preparation (see Figure 1), students in this debate exercise did just as well whether they had initially expressed agreement with the position or not. Perhaps this success in defending their assigned position influenced their agreement with the position. One possibility to avoid this complication would be the structured controversy debate format. In this type of debate, students not only prepare information for both sides of the debate, but also actively argue both sides (D'Eon, 2007).

This study suggests that debates should be used with care in the classroom, and precautions taken to avoid biasing student positions. Future research is warranted to determine if leaving debate positions unassigned, or using structured controversy debates, produce less bias in opinion shift.

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