Teaching Agriculture-specific Controversial Issues Through Guided Group Discussion

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Abstract

The effect of participating in and observing a guided group discussion on attitude toward agriculture-specific controversial issues was investigated. Fifty-five undergraduate students over two semesters completed a pretest to measure attitudes toward two controversial topics: sustainable agriculture and animal welfare. After the pretest, students were randomly assigned to one of four roles. Each role was assigned one of the two topics and given neutral questions to research in preparation for a group discussion that were related to the characteristics of controversy. Two roles, each with a different topic, met for the purpose of having neutral discussions on the topic. While one group discussed, the other group observed. A posttest was administered to measure the change in attitudes toward the controversial topics. Students also provided written responses to open-ended questions regarding their experience with the group discussion activity. No significant differences between pretest and posttest scores were observed. Based on the qualitative data, students preferred teacher centered methods of teaching controversial issues and appreciated that the guided group discussion approach allowed controversial topics to be considered and delivered objectively.

Introduction

Many controversial issues are closely related to agriculture, such as genetically modified organisms, food product labeling, or animal identification systems. Consequently, much of these issues become infused into agricultural education curricula, often presenting ideas that conflict with the values of students (Cotton, 2006b). Though controversial topics in agricultural science classrooms have become a larger issue in recent years given that political parties have become enamored with debating climate change and other agricultural related topics (Owens et al., 2017), the research on teaching agriculture-specific controversial issues is severely limited (Agbaje et al., 2001; Bennett-Wimbush et al., 2015; Fiske, 1991; Goodwin, 1993; Nordstrom et al., 2000; Poole et al., 2016; Terry & Lawver, 1995). Whether educators can maintain neutrality when teaching controversial issues is questionable, as the rhetorical nature of controversial issues suggests that teacher neutrality may be impractical and "the idea of maintaining a neutral position is portrayed as an illusion" (Cotton, 2006a, p. 77). The inability to maintain neutrality begs the question, why teach controversial issues?

Teaching about issues that are controversial, while requiring a lot of time and preparation, has been viewed as a useful tool for preparing students to become effective citizens (Soley, 1995). A healthy democracy is based on the nature of open discussion about issues of public concern. Therefore, young citizens should be trained in the discussion of social, political, and economic policies that are controversial (Harwood & Hahn, 1990). Additionally, introducing controversial issues serves as an appropriate way for students to learn about values and value conflicts. Another advantage of instruction on controversial issues is the encouragement of thinking. Assessment that measures students' ability to regurgitate facts requires low levels of thinking; however, learning about controversial issues requires in-depth study, consideration of

facts versus opinions, and critical examination of the issues. Learning how to approach, investigate, and form an opinion on controversial issues may present cognitive conflict, but can also serve as a bridge for assisting students in dealing with their own personal conflicts (Soley, 1995). Though the benefits of teaching controversial issues present a strong argument in support of the notion, teacher attitudes and perceptions should be considered.

While many educators believe that teaching controversial issues is important, this belief system is only in place so long as the teaching of these issues does not endanger their careers (Byford, Lennon, & Russel, 2009). Support from educators exists because teaching controversial topics exposes issues of personal and societal interest that students can often relate to, but some teachers are unsure of their ability to teach controversial content (Byford et al., 2009; Zimmerman & Roberston, 2017). Asimeng-Boahene (2007) asserted that "conducting beneficial discussions on controversial issues is an art that requires skills and practice" (p. 235). To increase teacher efficacy for presenting controversial issues, training is needed that focuses on the nature of controversial issues, principles for teaching controversial issues, and effective teaching strategies (Robertson, 2018), especially when topics are polarizing.

Zimmerman and Robertson (2017) explain that controversial issues fall into three categories: expert-expert disagreement, expert-public disagreement, and maximally controversial issues. Expert-expert disagreement is characterized by experts disagreeing on topics not of widespread public concern (such as interpretations of literary works or visual art), whereas expert-public disagreement is described as experts agreeing, but members of the general public contesting the stance of experts (such as climate change being caused by human behavior). Maximally controversial issues are those where experts disagree with each other and members of the general public disagree with each other, the topic is of public concern, and discussions generate an emotional response (such as abortion, voting rights, or same-sex marriage). In agricultural education, animal rights (Nordstrom et al., 2000) and sustainable agriculture (Agbaje et al., 2001) are examples of maximally controversial issues that can be so dividing, teachers must exercise caution when teaching them, but how?

When introducing controversial issues, adopting a stance that is non-committal and neutral is critical (Asimeng-Boahene, 2004; Zimmerman & Robertson, 2017) because "everything the teacher does, as well as the manner in which he does it, incites the child to respond in some way or another, and each response tends to get the child's attitude in some way or the other" (Dewey, 1933, p. 59). Teachers should not be afraid to share their opinions with a class; however, they need to be able to defend their opinions with logical explanations and should emphasize that their position is one of many and that it may be challenged. Still, agriculture, as a content area, is unique in that student attitudes may be strongly rooted and influenced by personal background. For example, Terry and Lawver (1995) discovered that male students had more positive perceptions about using medications on animals that females and that hometown background such as growing up on a farm or living in a town of less than 5,000, for example, explained large amounts of variance in student perceptions of issues related to agriculture. Further, Poole et al. (2016) discovered academic major influenced student concerns about agricultural issues, and Bennett-Wimbush et al. (2015) reported female students were better able to distinguish between animal rights and animal welfare than male students. Therefore, agricultural educators may be more inclined to employ a strategy that affords

ambiguity of personal stance when teaching. One method of introducing controversial issues into the classroom, alleviating the teacher from committing to one side or the other, is group discussion (Ho et al., 2017).

Through group discussion, students can expand their clarity of controversial issues. In addition to serving as a bias free approach, group discussions on topics that are controversial in nature are stimulating and "can be an excellent way of expanding the knowledge students have about the changing world in which we live" (Asimeng-Boahene, 2004, p. 233). According to Hess (2009), discussion is a valued form of learning for students. After selecting an issue to be discussed, teachers must prepare students for the discussion, provide an adequate amount of information resources, ensure an intellectual balance, and encourage equal participation. Because there are typically not right or wrong answers with controversial issues, performance-based activities, such as group discussions, are often better suited for assessment than traditional paper-based tests. Performance based activities allow educators to assess a student's ability to evaluate competing arguments, use evidence to defend a position, and draw well thought out conclusions (Asimeng-Boahene, 2004). Furthermore, participation in group discussion demonstrates performance at higher levels of learning (Anderson et al., 2001), but not all educators agree with discussion as the best technique. Proponents of teacher centered classrooms argue that teaching only the facts or concepts is easier and more straightforward than helping students examine attitudes, values, and beliefs associated with controversial issues; however, if students do not learn to address moral dilemmas and argue social issues when in school, when will they? Teachers have the responsibility of supplying a format for learning how to identify controversy and labor through it (Asimeng-Boahene, 2004; Zimmerman & Robertson, 2017).

### Theoretical and Conceptual Framework

The framework for this study was built on Festinger's (1957) cognitive dissonance theory and the cognitive reconstruction of knowledge model (CRKM) (Figure 1) presented by Dole and Sinatra (1998). According to Festinger (1957), people desire consistency among individual concepts including attitudes, behaviors, beliefs, values, and opinions. Cognitive dissonance theory purports dissonance occurs when information is presented that contradicts with one's held concepts. The strength of dissonance is impacted by two things – the amount of discordant beliefs and the degree of importance attached to each belief. When contradiction is present, something must adjust to eliminate the dissonance. Festinger's theory provides three methods by which dissonance can be removed. One possibility for eliminating dissonance is the reduction of importance of the inharmonious thought. A second option for removal involves attaching more harmonious beliefs that compensate for the dissonant beliefs. The third method for removing dissonance is to change the cacophonous beliefs so that they are no longer inconsistent (Festinger, 1957). When beliefs are altered to rid inconsistency, conceptual change occurs. Conceptual change refers to "revisions in personal mental representations; revisions that are often precipitated by purposeful educational experiences" (Murphy & Mason, 2006, p. 307). Because group discussions about controversial topics will facilitate cognitive dissonance, conceptual change may occur.

In comparison to cognitive dissonance theory, the CRKM considers cognitive psychological research, science education research, and social psychology (Dole & Sinatra,

1998). This model provides a description of the interactions between learner and message characteristics, which lead to various degrees of engagement with a new concept. The likelihood that conceptual change will occur depends on the depth of engagement – significant conceptual change is more likely when learners present high engagement on the engagement continuum.

Figure 1

*Cognitive Reconstruction of Knowledge Model (Dole & Sinatra, 1998)*
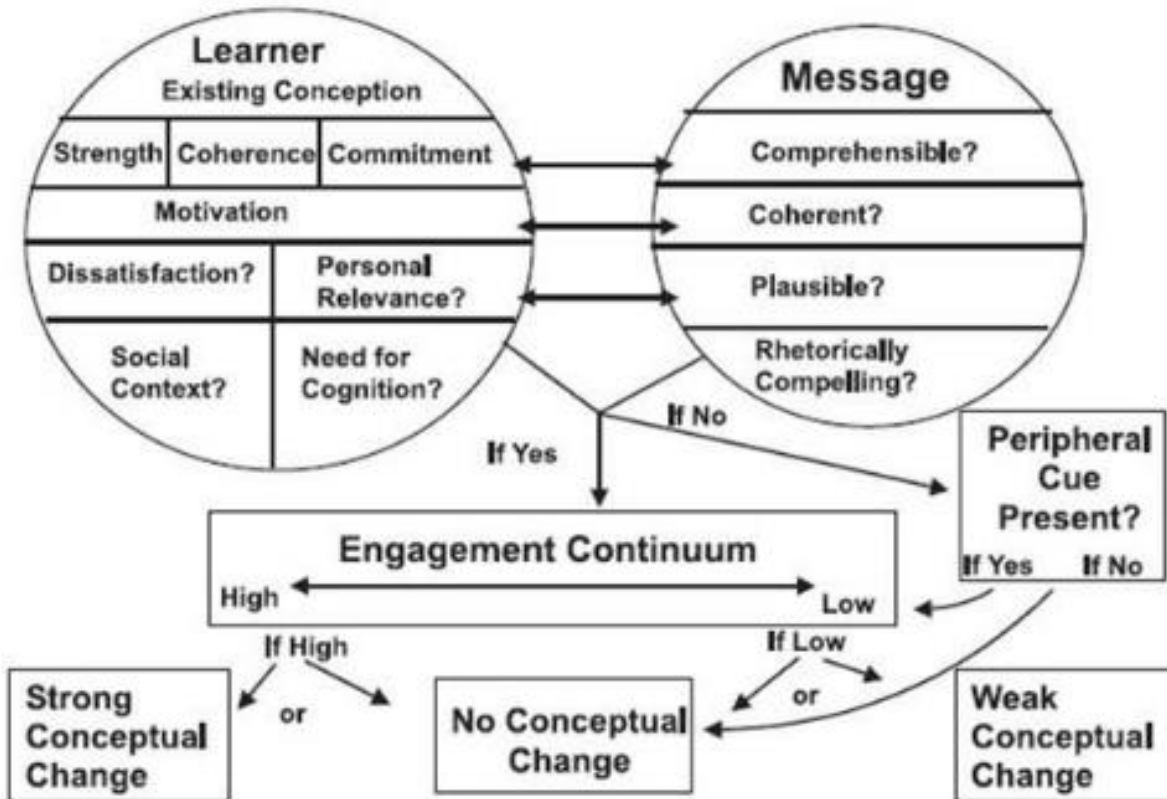
The visual model (Figure 2) developed by the researchers provides the conceptual framework for the present study. In the model, engagement levels of two groups, participant and observer, are depicted by shaded areas at each phase of a group discussion guided by research questions. Participants are those who are involved with researching a topic, discussing the topic from a neutral stance, and formulating a position on the topic after the discussion. Observers are those who watch and listen, but have no formal responsibilities before, during, or after the discussion. Being active in each phase, the researchers assume participant group engagement will start low during the research phase, reach a crescendo during the group discussion, and decrease again in the final phase when participants are formulating a final position. With a passive role, the researchers assume the observer group will not be engaged during the research or formulating position phases and experience limited engagement during the group discussion. Each

engagement continuum is bookended by held attitudes about topics being discussed, as students will hold a perspective before and after the discussion.

Figure 2

Visual Model of the Conceptual Framework

shaded area indicates level of engagement during each phase of of the group discussion
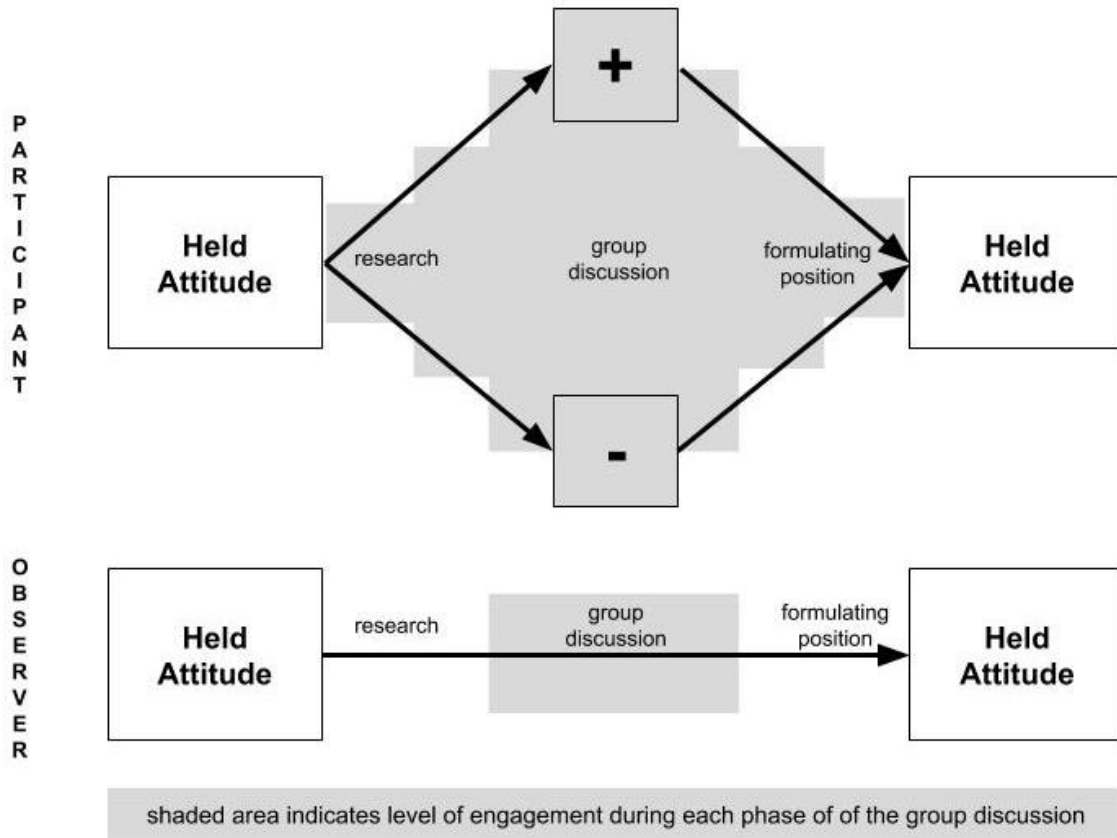
Purpose and Research Questions

The purpose of this study was to investigate the utility of guided group discussion (Lewin, 1952; Werner et al., 2008; Werner & Stanley, 2011) as a method for providing instruction on controversial issues. When a teacher presents information on topics that are controversial in nature, there may be students who disagree with the content, resulting in cognitive dissonance. With continued instruction, conceptual change could occur; however, if the teacher is unable to instruct in a neutral manner, he or she may unintentionally cause conceptual change from a bias standpoint. The study was steered by the overarching question of whether guided group discussion was an effective approach to teaching controversial issues. Specific questions were:

1. What is the effect of participating in a group discussion on attitudes toward controversial issues?
2. What is the effect of observing a group discussion on attitudes toward controversial issues?

3. How do students prefer to learn about controversial issues?
4. How do students perceive the strategy of guided group discussion for learning about controversial issues?

Methods

The participants in this study were undergraduate students enrolled in a fall semester and spring semester agricultural oral communications course at a four-year university in the southeastern region of the United States. The course was a required course for all students pursuing an undergraduate degree in an agricultural field. Data were collected over two semesters resulting in a total of 55 students divided across five laboratory sections over the two semesters. Institutional Review Board procedures were followed by university guidelines. Consent was obtained from all participants. Table 1 provides a description of the participants.

Table 1

Description of Participants (N= 55).

Variable	*n*	%
Sex		
Female	29	52.73
Male	26	47.27
Age		
18–22	47	85.45
23–27	6	10.91
28–32	2	3.64

Instruments were used in a pretest and posttest to assess the attitudes of students toward two specific controversial issues – sustainable agriculture and animal welfare. Sustainable agriculture is the production of plant and animal products for human consumption through methods that are ecologically sound and socially responsible as well as economically viable (Ikerd, 2008, p. 11). As this method of production contradicts modern industrial agriculture techniques, agricultural education teachers are unsure about the potential for sustainable agriculture to enhance the quality of life for famers and society, thus making this topic controversial in the agriculture industry (Agbaje et al., 2001). According to Broom (1991), animal welfare refers to the state of an animal in relation to its environment, with welfare being a characteristic of an animal, not something given to it; indicators of poor welfare may include reduced life expectancy, impaired growth, body damage, and adrenal activity, among others. Attitudes regarding appropriate treatment of animals differ greatly with polarized opinions related to hunting, production and consumption of animals for food, and using animals in biomedical and psychological research (Herzog & Mathews, 1997); therefore, this topic is also controversial in the agriculture industry.

The Sustainable Agriculture Attitude Test was an adapted version of a test, developed by Allahyari et al. (2008), comprised of twelve self-report items on a five-point Likert-type scale. A response of "1" to each item indicated strong disagreement and a response of "5" indicated

strong agreement. Sample items included "The primary goal of farmers should be to maximize the productivity, efficiency, and profitability of their farms" and "The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature". Total scores on this instrument can range from 12 to 60; higher scores suggested positive perceptions toward sustainable agriculture. The calculated Chronbach's alpha reliability coefficient for the pretest and posttest was 0.69 and 0.60, respectively, demonstrating low, but acceptable levels for this type of exploratory research (Murphy & Davidshofer, 1988).

The Animal Attitude Scale, developed by Herzog et al. (1991), measured attitude towards animal welfare and was comprised of 20 self-report items on a five-point Likert-type scale. A response of "1" to each item indicated strong disagreement and a response of "5" indicated strong agreement. Sample items included "I think it is perfectly acceptable for cattle and hogs to be raised for human consumption" and "Much of the scientific research done with animals is unnecessary and cruel". Total scores on this instrument can range from 20 to 100; higher scores suggested greater levels of concern for animals. The calculated Chronbach's alpha reliability coefficient for the pretest was 0.90 and the Chronbach's alpha reliability coefficient for the posttest was 0.90 as well.

One month after completing both pretests, students within laboratory sections were randomly assigned to two groups for the purpose of participating in a group discussion. Each role was then randomly assigned a controversial topic for the group discussion – sustainable agriculture or animal welfare. Students in each group received a set of neutral, topic specific guiding questions that focused on the characteristics of the controversy and were instructed to answer these questions, individually, in preparation for a group discussion. Two weeks after receiving the research questions, students participated in a 20-minute group discussion guided by the questions researched. Prior to the discussion, students were instructed to maintain a neutral position and present evidence gathered during individual research, while addressing both sides of the controversy. As the discussion took place, participating students took notes on various points that were made. At the conclusion of the discussion, each student formulated a position on the topic and articulated this position in a closing statement. While one group in each laboratory section participated in the discussion, the other group observed. Two weeks after the group discussion, the same instruments were used in a posttest. Additionally, students in the spring semester provided written responses to eight open-ended questions regarding their experience with the group discussion activity. According to Bogdan and Biklen (2003), participants will express opinions more freely with open-ended questions.

This mixed methods study was designed as an embedded sequential explanatory case study with a quantitative→qualitative two-strand design of inquiry (Creswell et al., 2003). The first strand of inquiry used a quantitative approach to explore student attitudes toward agriculture-specific controversial issues. The second strand of inquiry qualitatively investigated how students experienced the group discussion.

To answer research questions one and two, attitude pretest and posttest scores of the two roles (participant or observer) by topic and semester were analyzed using a paired samples t-test. This is an appropriate analysis to compare the difference between the means in cases where the same participants respond on two separate incidents (Howell, 2007).

Research questions three and four, which were qualitative in nature, were answered using a constant comparative analysis approach to interpret responses to the open-ended questions. According to Glauser and Strauss (1967), this approach requires identifying similarities and differences in content through a systematic review of data. As the researchers coded the responses separately, inter-rater reliability was established, which increased the confidence in emergent patterns (Bernard & Ryan, 2010). Participant quotes were used to support research findings. Because critics may be reluctant to accept the findings from qualitative research, the researchers applied Guba's (1981) framework for assessing the trustworthiness of qualitative inquiries. In the present study, the researcher ensured credibility by developing a familiarity with the culture being investigated, using a mixed methods approach for triangulation of data, and conducting member checks by sharing selected quotes associated with conclusions drawn with students who provided the quotes. Transferability was ensured as the researchers described the context of the study and described the phenomenon under investigation. Finally, confirmability was achieved by admitting researcher beliefs and assumptions in regard to the study and identifying limitations of the study.

Findings

The researchers were concerned with looking at data collected from each of the roles for the two topics. Each discussion group was comprised of undergraduate agricultural majors, but heterogeneous in gender, age, and ethnicity. For each topic, there were five groups who participated in a guided group discussion and five groups who observed (Tables 2 and 3).

Table 2

Participant Role Test Scores (N= 55)

	Pretest				Posttest			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
Sustainable Agriculture	39.07	4.27	31	47	38.29	4.14	31	46
Animal Welfare	64.54	14.08	37	85	64.27	13.73	34	89

Note. Scores on the Sustainable Agriculture Attitude Test range from 12 to 60. Scores on the Animal Attitude Scale range from 20 to 100.

The mean score on the pretest for those who participated in a discussion about sustainable agriculture was 39.07 (*SD*= 4.27). For those who observed a discussion about sustainable agriculture, the mean score on the pretest was 41.64 (*SD*= 4.48). On the posttest, for those who participated in the discussion, the mean score was 38.29 (*SD*= 4.14), while the mean score for those who observed was 40.44 (*SD*= 4.03).

Table 3

Observer Role Test Scores (N= 55)

	Pretest				Posttest			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
Sustainable Agriculture	41.64	4.48	32	49	40.44	4.03	34	47
Animal Welfare	65.00	10.45	40	84	65.64	9.68	41	82

Note. Scores on the Sustainable Agriculture Attitude Test range from 12 to 60. Scores on the Animal Attitude Scale range from 20 to 100.

The mean score on the pretest for those who participated in a discussion about animal welfare was 64.54 (*SD*= 14.08). For those who observed a discussion about animal welfare, the mean score on the pretest was 65.00 (*SD*= 10.45). On the posttest, for those who participated in the discussion, the mean score was 64.27 (*SD*= 13.73), while the mean score for those who observed was 65.64 (*SD*= 9.68).

Research question one inquired about the effect of participating in a group discussion on attitudes toward controversial issues. The results of a paired samples *t*-test indicated that the effect of participating in a group discussion was not statistically significant.

Research question two asked about the effect of observing a group discussion on attitude toward controversial issues. The results of a paired samples *t*-test indicated that the effect of observing a group discussion was not statistically significant.

Research question three explored how students preferred to learn about controversial issues. The open-ended questions prompted students to reflect on prior experiences with controversial issues in a classroom setting and explain how they preferred teachers to present topics that are controversial in nature. Student responses indicated a variety of experience with methods that encouraged active learning such as debates, research papers, and general classroom discussions. Passive learning experiences were described as lecture or illustrated lecture (where a PowerPoint presentation was used). Students were not favorable of methods that only presented one side of an issue, evidenced by comments such as "I have had teachers only present their biased opinions and I didn't like that at all. Teaching that way doesn't give the student the opportunity to see both sides and make a decision on where the student stands." and "Just listening to a lecturer can cause the audience to take on the lecturer's opinion." Interestingly, when asked about how the students enjoyed learning about controversial topics, the students indicated a preference toward passive learning experiences. Students commented, "I prefer teachers present controversial topics by providing an objective lecture supported with a PowerPoint. I think it is important to introduce the controversial topic and let the audience form their own opinion of the subject." and "I would prefer a completely unbiased presentation of both sides, probably in a list of facts such as on a PowerPoint or in a lecture; but as long as neither view point is pushed on me." The preference for an objective, teacher centered approach is consistent with cognitive dissonance theory (Festinger, 1957), which asserts people crave information to be presented in a way that does not conflict with personal convictions. A non-persuasive lecture void of discussion allows students to diminish the importance of dissonant information.

Research question four addressed how students perceived the strategy of guided group discussion for learning about controversial issues. The general impression was that students enjoyed the learning environment created by the requirement of maintaining neutrality. Most enjoyable was the objectivity and evidence-based component of the discussion:

> The thing I enjoyed most was being able to have a comfortable conversation with classmates without being at each other's throats over some controversial issues. I didn't grow up on a farm, nor do I have strong opinions on sustainable agriculture, but I could tell some people in the class did, so if we had more of a debate, I would expect there to have been much more conflict.

Another participant responded:

> I liked the fact that it was objective and not just people spewing out their opinions. Everything had to be backed up with evidence, which should always be the case, but often times aren't in debate or other opinionated discussion.

While students appreciated the nonthreatening environment, maintaining a neutral position proved to be a challenging aspect of the guided group discussion. Students reported that the inability to state their own opinions, and the domination of conversation by other students was frustrating:

> It was difficult to stay neutral and it was hard to verbalize negative aspects of sustainable agriculture because there were not many negatives found during researching the topic. I found it frustrating to not be able to clearly state your side.

One participant commented, "It was difficult to be neutral on the topic of animal welfare. I also didn't like how I had a hard time butting in to talk when three people in my group dominated the conversation." In spite of these frustrations, students agreed that the teaching strategy was beneficial. Requiring students to research the topic before the discussion and providing questions to guide their research efforts helped engage students in the learning process. One participant wrote, "I still feel the same way about the topic, however I have gained a greater appreciation for sustainable agriculture. I feel quite strongly against sustainable agriculture, however after learning more, I did appreciate it more." Another participant commented:

> I certainly felt that the research was the most informative part of this assignment. I put a lot of time into the research so that I could fully understand both sides of each of the questions posed. The guiding questions were very good because they covered a wide range of animal welfare issues and required that we explore each of the aspects, including those that we may not have considered on our own.

A student concluded, "It really made me see both sides and look at the topic open minded." From an observation standpoint, students commented that watching their classmates engage in the discussion was educational, exposing different viewpoints. The role of observer also made students aware of how telling facial expressions and body language can be in a group discussion. While they enjoyed observing, students often found this role difficult, expressing a desire to join the conversation. According to one student, "I really wanted to jump in to the discussion when we listened to the other group." Interestingly, observing students noticed when those discussing the topic held a certain opinion based on their nonverbal communication - "It was very clear when some people disagreed with what was said because of their facial expression and body language." Observing the participation also had the benefit of exposing students to unknown knowledge: "When observing the other group's discussion, I was surprised at the facts and figures the group gave. I had no idea about the topic and the concrete evidence was very clarifying." Students valued the factual evidence that was presented during the discussion. One

observing participant reported, "I thought that observing another group was very beneficial to me because I was able to gather a lot of unbiased information on the topic and was able to create my own unbiased view on their topic."

Conclusions, Implications, and Recommendations

Guided group discussion is characterized by an instructor identifying a controversial topic, creating questions to guide students through investigating all aspects of the topic before a discussion, and designing a structure for group discussion that requires participants to speak from the supporting and opposing side of a topic while asking questions of other participants. The guided group discussion technique may help teachers feel comfortable facilitating the learning about controversial topics, as this approach removes instructors from the possibility of impacting conceptual change due to not maintaining a neutral position. Participating in a guided group discussion about controversial issues has many implications in support of this instructional method as an approach to cognitive dissonance and conceptual change. First, participating in and observing a guided group discussion encourages students to consider both sides of an issue which might not occur in a lecture format. The action of researching both sides of an issue encourages student learning at higher levels of Bloom's Taxonomy (Anderson et al., 2001), where examining data, organizing ideas, and preparing for a discussion require analyzing ideas and evaluating positions. The highest level of Bloom's Taxonomy, creation, is reached when students compare the different points of discussion, evaluate the information, and then construct their own position when presenting a closing statement where an argument toward the controversy is presented and supported by garnered knowledge. Secondly, guided group discussion allows the teacher to maintain neutrality and avoid bias when providing instruction on controversial issues, which Cotton (2006a) explained is unfeasible. This frees the teacher from struggling to not employ a personal agenda and creates an autonomous learning environment for the students, which gives way to a third advantage of guided group discussion – teacher protection from responsibility of conceptual change. The CRKM (Dole & Sinatra, 1998) suggests that conceptual change is unlikely with low engagement; however, the possibility of conceptual change increases when engagement is high. As the guided group discussion technique accelerates high engagement for students participating in the discussion, conceptual change is possible. In the present study, if conceptual change had occurred, students would have been responsible for their individual conceptual change, not the instructor, concluding that guided group discussion as an instructional approach to controversial issues relieves the teacher from responsibility of conceptual change that may occur amongst students.

While the data did not show a significant difference between the effects of participating in or observing a group discussion on attitude toward controversial issues, further research with additional groups of varying sizes, populations, and topics is recommended. In addition, we recommend that modifications be made in future studies to provide for the collection of evidence that each student conducted background research prior to the discussion. Evidence could be in the form of written responses to the guiding questions, an outline that explains key findings during research, or a conceptual model designed by students that highlights information discovered, for example. Another recommendation is the provision of equitable talk time amongst participants. During the group discussions, some students dominated the conversation while others were more passive in their participation. Brookfield and Preskill (1999) posit that

participation in discussion will help students develop a more critical understanding of and appreciation for diverse viewpoints; therefore, ensuring equal participation by each student in the discussion is critical for maximum benefit of the small group discussion. Additionally, equitable treatment, regarding amount of time spent discussing the various characteristics of controversy, is encouraged. Early in the discussions, students spent much of the allotted time focusing on a few specific areas of controversy, resulting in less time for discussing additional aspects. Not providing time for discussing the topics from multiple angles and viewpoints may limit students in their ability to form an opinion on the issue. Students who participated in the discussion recommended more preparation before the activity occurs. One student remarked, "I really don't have any more recommendations, other then maybe explaining how it's done a little more in depth then what we covered in class." Another student indicated:

> Since this was our first discussion I would have liked to do a dry run and gone over what things were going to be said and get a feel on what things impacted the memebers the most. I am not quick at thinking off the top of my head and I felt like that was a huge drawback for me with this exercise and I feel like I really didn't do a good job on the task at all.

We acknowledge limitations of this study related to the population and sampling. Findings are limited to the case site under investigation and cannot, therefore, be generalized to a larger population. This limitation could not be overcome using the chosen method because data collection required adapting course syllabi and curricula, and therefore, other case sites willing to accommodate such required adaptations were not identified. Also, the student sample for the qualitative data collection only represented perspectives from students in the spring semester. It is possible that perspectives of students from the fall semester could differ; however, because the course is required for all students pursuing an undergraduate degree in an agricultural field at the university where the research took place, we determined the sample was representative of the total population under investigation.

In future studies, we recommend that discussions be recorded, transcribed, and analyzed for the frequency of statements in support of or opposition to a topic, as this might have an impact on posttest scores. This type of analysis would identify possible inequity in treatment to the topic being discussed if significantly more comments were in favor or spoke against the issue. Future research should include both quantitative and qualitative measurements of cognitive dissonance, student engagement, and student value of the learning experience. Finally, future investigations should occur at multiple case sites to allow for enhanced generalizability.

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