

Socioscientific Issues in Agricultural Education: SBAE Teachers' Use of Resources and Teaching Strategies in the Curriculum

Michelle S. Burrows, Ph.D.
Utah State University
2300 Old Main Hill
Logan, UT 84322-2300
michelle.burrows@usu.edu

Tyson J. Sorensen, Ph.D.
Utah State University
2300 Old Main Hill
Logan, UT 84322-2300
tyson.sorensen@usu.edu

Socioscientific Issues in Agricultural Education: SBAE Teachers' Use of Resources and Teaching Strategies in the Curriculum

Introduction/Theoretical Framework

Topics or issues which are scientific in nature that impact society are also known as socioscientific issues (SSI) (Sadler, 2004). Since agriculture is central to many SSI, school-based agricultural education (SBAE) is uniquely positioned to contribute to building capacity in the next generation of scientists and agriculturists to address these complex issues (Roberts et al., 2016). The current AAAE National Research Agenda, research priority seven calls for research from the field of agricultural education to address complex problems facing society (Roberts et al., 2016). Research priority question number one petitions the field of agricultural education to focus on research answering, "What methods, models, and programs are effective in preparing people to solve complex, interdisciplinary problems (e.g., Climate change, food security, sustainability, water conservation, etc.)?" (Roberts et al., 2016, p. 59).

This research is guided by the SSI-based instruction framework developed by Presley et al. (2013) which provides teaching and curricular guidance through recommended and required learning experiences. SSI-based instruction consists of developing instruction around an issue (e.g., climate change, GMO's, food security) and, helping students confront the science and theory related to the issue (Presley et al., 2013). While SBAE teachers are often familiar with SSI-based instructional teaching methods, they may not use them regularly (Shoulders, 2012).

Methodology

This research was part of a larger study exploring SBAE teachers' integration of SSI into their curriculum. Data were collected through web-based and paper surveys and descriptive methodology was used to analyze the data. The population for this research included all SBAE teachers in the U.S. and U.S. territories for the school year 2020-2021. A frame was obtained from National FFA which contained contact information for 500 SBAE teachers and participants received the Qualtrics designed survey, through email contact.

The survey was designed using researcher developed items with research informed methods and previously published instruments that were tested and found to be valid and reliable (Evren-Yapicioglu, 2018; Giliberti, 2018; Lee et al., 2006). Teachers were provided a list of teaching strategies and asked to indicate which they use either *frequently*, *sometimes*, or *never*. Participants were also asked to rank their use of resources when teaching SSI, on a 5-point Likert scale (1 = *Strongly Agree*, 2 = *Agree*, 3 = *Neutral*, 4 = *Disagree*, 5 = *Strongly Disagree*). The total response rate for this study was 27.2% ($n = 136$). This study sought to describe teaching strategies and resources used by SBAE teachers when incorporating SSI into their curriculum.

Results/Findings

While all respondents indicated they frequently (49.6%; $n = 56$) or sometimes (50.4%; $n = 57$) use lecture or direct instruction, 65% ($n = 67$) indicated they never use role play when teaching SSI. Most respondents also answered they sometimes use debate (70.3%; $n = 78$), and the Socratic Method was never used by nearly half (49%; $n = 50$). All respondents indicated they use media frequently (59.6%; $n = 66$) or sometimes (40.5%; $n = 45$) when teaching SSI and the internet was the most frequently used resource by SBAE teachers (88.5%; $n = 100$). Textbooks were used by SBAE teachers in this study frequently (19.6%; $n = 22$) or sometimes (41.1%; $n = 46$) and outside resources such as guest speakers were used sometimes (78.7%; $n = 85$). Most respondents agreed (38.4%; $n = 43$) or strongly agreed (52.7%; $n = 59$) they use technology, but fewer agreed (55.4%; $n = 62$) or strongly agreed (9.8%; $n = 11$) their students analyze scientific data. In fact, 25% ($n = 28$) of respondents selected neutral for using scientific data analysis when teaching SSI. Most respondents agreed or strongly agreed (61.9%) they integrate SSI into LDEs followed by CDEs (54.8%) and SAEs (46.9%). However, nearly one-third (32.7%; $n = 37$) of respondents chose neutral for CDEs, and 27.4% ($n = 31$) selected neutral for LDEs but respondents chose neutral most for SAEs (38.9%; $n = 44$).

Conclusions

The SSI-based instruction framework identifies required and recommended learner experiences when teaching SSI. Results from this research suggest while SBAE teachers are using a variety of resources, they may not be using the learning experiences outlined in the SSI-based instruction framework (Presley, et al., 2013), supporting findings from Shoulders (2012) that SBAE teachers are not regularly infusing SSI teaching strategies into their curriculum.

Yet, SBAE teachers in this study indicated they were using media frequently (59.5%) or sometimes (40.5%) and most teachers agreed their students use technology and analyze scientific data when learning about SSI, which is in line with the SSI-based framework. However, nearly 40% of the SBAE teachers in this study indicated they never use a textbook and 25% selected neutral when it came to their students analyzing scientific data. Previous research suggests a neutral selection could indicate the respondents do not know the answer or they selected the answer believed to be the social norm for that response (Chyung et al., 2017). Several queries should be considered from these results. Perhaps SBAE teachers never use textbooks because they are outdated or expensive, creating additional barriers to integrating SSI. They may also be using more current online resources instead of textbooks. Finally, SSI are often controversial and can lead to what some might consider disruptions in classroom management and students feeling uncomfortable. Thus, teachers maintain a degree of control over the classroom environment and the content learned when using lecture or direction instruction. Teachers may also be using teaching methods they learned by, teaching the way they were taught (Lortie, 1975/2002).

Implications/Recommendations/Impact on Profession

Knowing the resources and teaching strategies SBAE teachers are using in their classes to address SSI adds to the understanding of what teachers are using to integrate SSI. Knowing what kinds of media and technology teachers are using and how they are being used would add to the research of SBAE and SSI. Knowing the types of scientific data students are analyzing and what SSI they represent would also assist in our understanding of SSI in SBAE courses.

References

- Chyung, S. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017). Evidence-based survey design: The use of a midpoint on the Likert scale. *International Society for Performance Improvement*, 56(10), 15-23. <https://doi.org/10.1002/pfi.21727>
- Evren-Yapıcıoğlu, A. (2018). Advantages and disadvantages of socioscientific issue-based instruction in science classrooms. *International Online Journal of Education and Teaching*, 5(2), 361-374. <http://iojet.org/index.php/IOJET/article/view/327/240>
- Giliberti, M. (2018). *Examining characteristics and barriers on the adoption of school gardens among agricultural education teachers* [Doctoral dissertation, Auburn University]. Auburn University Digital Commons [https://etd.auburn.edu/bitstream/handle/10415/6753/ELECTRONIC%20DISSERTATION%20PUBLICATION_\(MARCO%20GILIBERTI\).pdf?sequence=2](https://etd.auburn.edu/bitstream/handle/10415/6753/ELECTRONIC%20DISSERTATION%20PUBLICATION_(MARCO%20GILIBERTI).pdf?sequence=2)
- Lee, H., Abd-El-Khalick, F., & Choi, K. (2006). Korean science teachers' perceptions of the introduction of socio-scientific issues into the science curriculum. *Canadian Journal of Science Mathematics and Technology Education*, 6(2), 97-117. <https://doi.org/10.1080/14926150609556691>
- Lortie, D. C. (2002). *Schoolteacher a sociological study* (2nd ed.). The University of Chicago Press. (Original work published 1975).
- Presley, M. L., Sickel, A. J., Muslu, N., Merle-Johnson, D., Witzig, S. B., Izci, K., & Sadler, T.D. (2013). A framework for socio-scientific issues based education. *Science Educator*, 22(1), 26-32. <https://files.eric.ed.gov/fulltext/EJ1062183.pdf>
- Roberts, T. G., Harder, A., & Brashears, M. T. (Eds.). (2016). *American Association for Agricultural Education National Research Agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication. http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf
- Sadler, T. D. (2004). Informal reasoning regarding socioscientific issues: A critical review of research. *Journal of Research in Science Teaching*, 41(5), 513-536. <http://doi.org/10.1002/tea.20009>
- Shoulders, C. W. (2012). *The effects of a socioscientific issues instructional model in secondary agricultural education on students' content knowledge, scientific reasoning ability, argumentation skills, and views of the nature of science* [Doctoral dissertation, University of Florida]. ProQuest. <https://search.proquest.com/docview/1369845995?pq-origsite=gscholar>