Discovery, The Student Journal of Dale Bumpers College of Agricultural, Food and Life Sciences

Volume 15 Article 18

Fall 2014

Encouraging teacher change within the realities of school-based agricultural education: lessons from teachers' initial use of socioscientific issues-based instruction

Amie Wilcox
University of Arkansas, Fayetteville

Catherine W. Shoulders
University of Arkansas, Fayetteville

Brian E. Myers
University of Arkansas, Fayetteville

Encouraging teacher change within the realities of school-based agricultural education: lessons from teachers' initial use of socioscientific issues-based instruction

Amie K. Wilcox[*], *Catherine W. Shoulders*[†], *and Brian E. Myers*[§]

ABSTRACT

Calls for increased interdisciplinary education have led to the development of numerous teaching techniques designed to help teachers provide meaningful experiences for their students. However, methods of guiding teachers in the successful adoption of innovative teaching approaches are not firmly set. This qualitative study sought to better understand how school-based agricultural education teachers decide to adopt or discontinue a teaching innovation when introduced through ready-made lesson plans, which is currently a common practice of teaching method integration in school-based agricultural education (SBAE). Constant comparative analysis unveiled themes within the reactions to the teaching method's use, as well as how teacher actions to those reactions led to their ultimate adoption or discontinuance of the teaching method.

* Amie Wilcox is a senior majoring in Agricultural Education, Communications and Technology.
† Catherine W. Shoulders, the faculty mentor, is an assistant professor in the Department of Agricultural Education, Communications and Technology.
§ Brian E. Myers is a Professor and the Associate Department Chair of the Department of Agricultural Education and Communication at the University of Florida, Gainseville.

MEET THE STUDENT-AUTHOR

Amie Wilcox

I am a junior from Waldron, Ark. majoring in Agricultural Education, Communications and Technology (AECT) with a concentration in Agricultural Education. I have served as a Bumpers College ambassador and the Director of Lectures for the Honors Student Advisory Board. In the AECT department, I am a member of Representing Excellence, Pride and Service and am a former President of the Collegiate FFA chapter (previously known as the Future Farmers of America). Throughout my undergraduate education, I have had the opportunity to travel and present leadership workshops to high school students with the National FFA Organization. These experiences piqued my interest in curriculum development and presentation. I look forward to continuing research in my future educational career. I would like to give a special thank you to Dr. Catherine Shoulders, who challenged me and supported me. I will be forever grateful for the opportunities that have been shown to me throughout this research.

INTRODUCTION

The notion of change stemming from school reform has ironically been a constant within the United States public school system for the past 60 years. School-based agricultural education (SBAE) has not been omitted from these calls. The national calls for increased interdisciplinary education and real-world connections (American Association for the Advancement of Science, 1993) have led to the development and delivery of numerous teaching methods designed to help teachers provide meaningful experiences for their students. While these methods are not unique to agricultural education, agriculture teacher educators focus on introducing these interdisciplinary teaching methods to their students (Newcomb, et al., 2004; Phipps, et al., 2008). Recent studies have introduced socioscientific issues (SSI)-based instruction, a method stemming from inquiry-based instruction and commonly highlighted within science education, as an appropriate method for use in SBAE due to its focus on agricultural issues (Shoulders, 2012).

Thus far, one study has examined the impact of SSI-based instruction in agriculture classrooms (Shoulders, 2012). This study found significant gains in student knowledge following the SSI-based instructional unit, which delivered 45 ready-made lesson plans and accompanying PowerPoint presentations and student materials to teachers after they attended a one-hour training session on SSI-based instruction. While the methods of integration, chosen due to teachers' available time to engage in professional development related to the instruction, followed recommendations of researchers in agricultural education, the study experienced an exceptionally high attrition rate; seven out of the 11 original teachers requested to be removed from the study after they began utilizing the materials. The quantitative nature of the study did not lend itself to further investigation into the reasons for this high attrition. Based on the positive impact the SSI-based instructional model had on the students whose teachers remained in the study, the researcher recommended qualitative research be conducted to further understand how SSI-based instruction can impact student learning within the realities of the everyday classroom. The current study served to better understand how teachers made the decision whether to continue utilizing the SSI-based instructional approach when given ready-made materials in an effort to provide recommendations for teaching method adoption approaches appropriate for agriculture teachers, both within SSI-based instruction and for those focused on in the future.

The purpose of this basic qualitative study was to understand how teachers made the decision to continue or discontinue using an SSI-based instructional approach when supplied with ready-made materials. To achieve this purpose, the following research questions guided this study:

1. What are teachers' perceptions regarding SSI-based instruction throughout the unit?
2. What are teachers' perceptions regarding the use of ready-made materials in their classrooms?
3. How do teachers decide whether to fully adopt SSI-based instruction?
4. What teacher concerns and/or actions lead to decisions to discontinue using SSI-based instruction?

MATERIALS AND METHODS

This study followed basic qualitative methodology in order to better understand how teachers made the decision to continue or discontinue using an SSI-based instructional approach when supplied with ready-made materials.

Participants

Teachers were selected to participate in the study using purposeful criterion sampling, in which the cases studied meet specific criteria to ensure richness and quality of data (Patton, 1990). When using criterion sampling, the researchers predetermine the criterion by which participants should be selected, based on aspects which the researchers deem influential on data quality (Patton, 1990). The social desirability of teachers to successfully and easily adopt teaching methods required that only teachers with proven ability to maintain honest communication with the researchers would supply honest evaluation of the lesson plans. Therefore, teachers were purposefully selected based on their history with the researchers; and those with a professional history that exhibited honest, detailed, and consistent communication with at least one of the researchers were invited to participate. The teachers were also selected based on their past willingness to attempt novel teaching approaches on their own. Each teacher taught a variety of animal science, plant science, mechanics, and introductory agriculture courses, and each had high school agricultural education experience.

Data Collection

Two researchers were involved in all aspects of data collection, while one was omitted from data collection in order to enable him/her to analyze the raw data from a perspective alternate to that of the other researchers, whose lens of the data could have been altered by the data collection experience. Data were collected through the use of daily journal prompts, weekly semi-structured interviews, and a focus group (Flick, 2006). Journal prompts included a set of questions for teachers to answer after every lesson, and included items intended to guide teachers through a lesson reflection. Protocols for the semi-structured interviews were different each week, and each included questions that guided teachers through their overall reactions to the lessons, the current state of their classrooms' cultures, aspects of the lessons they had trouble with or altered, classroom preparation, and student behaviors. The planned focus group protocol enabled teachers that successfully entered the confirmation stage of adoption to collectively provide insight into what they saw as the main strengths of the lessons, the main weaknesses of the lessons, their students' reactions to the unit, the alterations they made to the lessons, and their opinions on what changes would enable a greater number of teachers to adopt the innovation.

Daily journals were submitted by teachers via email at the end of each day. Weekly interviews were conducted via telephone and were recorded. The focus group was conducted through a recorded online session which enabled the group to speak together, see one another, and collectively work on a web-based "white board". All recordings were then transcribed and coded. Coded data were first identified by the participant (P1–5), then by the data source, (J = journal, I = interview, E = email), then by the number of the data source, then by line number (L). Mrs. Smith was coded as Participant 1, Mrs. Jones was coded as Participant 2, Mr. Jackson was coded as Participant 3, Mr. East was coded as Participant 4, and Ms. Martin was coded as Participant 5. Using this method, data obtained from, for example, the third participant, on the fourth journal entry, from lines 6–10 would be coded as P3, J4, L6–10.

Data Analysis

Daily written journals and interview and focus group transcriptions were analyzed using the constant comparative method (Lincoln and Guba, 1985), which includes four stages: 1) compare incidents applicable to each category, 2) integrate categories and their properties, 3) delimit the construction, and 4) write the construction. Following this method, the researchers reviewed transcriptions and journals for trends, which were utilized to discover emerging categories within the data. Researchers first used an open coding procedure to discover themes found within fragments of each journal entry or transcription and compare them to the remainder of the journal entry or transcription to determine whether other fragments aligned with the same theme. The researchers then compared fragments from individual texts to determine whether they repeated information or offered new information (Lincoln and Guba, 1985). Those with repeating information were coded to the same theme. Those with new information were initially coded into different themes. Once texts were coded into themes, the researchers sought to label the categories with the most

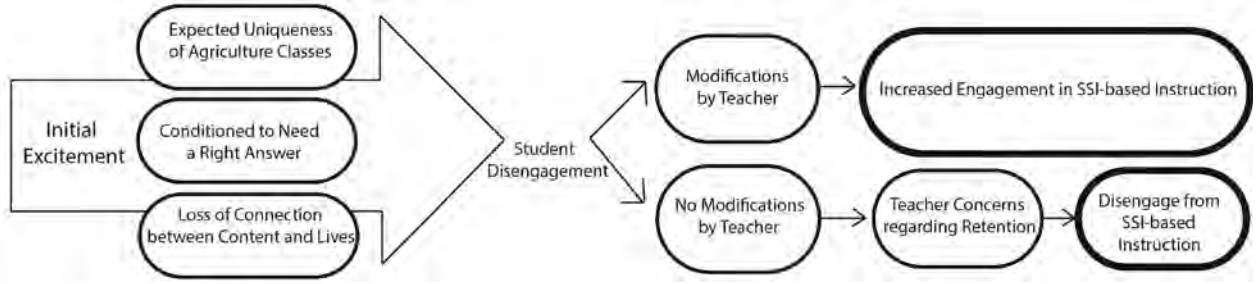

Fig. 1. Evolution of students' reaction to socioscientific-based instruction.

appropriate theme titles. The determination of appropriate theme titles enabled researchers to further distinguish between repetitive themes, overlapping themes, related themes, and separate themes.

RESULTS AND DISCUSSION

To protect participant confidentiality, the five teachers participating in the study were given pseudonyms that accurately reflected their genders. Mrs. Smith, Mrs. Jones, and Mr. Jackson were all high school agricultural education teachers in [State]. Mrs. Jones and Mr. Jackson shared a two-teacher program. Mrs. Smith taught in a three-teacher program, but was the only study participant from her school. Mrs. Smith and Mr. Jackson had both taught for three years in the schools in which they were currently employed. Mrs. Smith, Mrs. Jones, and Mr. Jackson each used the study's lesson plans in their introductory agriculture courses, which consisted primarily of ninth grade students. Mrs. Smith's and Mr. Jackson's classes participated in block scheduling and held class every other day. Mrs. Jones had eight years of teaching experience, all in the school in which she was currently employed. Her classes were 45 minutes long, and students met every day.

Mr. East was a high school agricultural education teacher in a single teacher department in [State] with three years of teaching experience. He had one year of previous teaching experience in [State], and was engaging in his second year teaching in his current school during the study. He utilized the SSI-based lesson plans in his Ag. II course, which is a year-long course for sophomore students. Mr. East's students met for 45 minutes every day. Ms. Martin was a high school agricultural education teacher in a three-teacher department in [State] with three years of teaching experience. She utilized the SSI-based lesson plans in her Survey of Agricultural Systems course, which was comprised of students in grades 10 through 12.

Analysis of the data showed that within each class, after initial excitement, specific factors including the expected uniqueness of agriculture classes, students' conditioned need for a right answer, and a loss of connection between lesson content and students' lives, led to student disengagement from SSI-based instruction. Teachers' actions following this disengagement resulted in either increased engagement in SSI-based instruction or ultimate disengagement from the innovation, which caused the teacher to drop out of the study. This process of adoption or discontinuance as found within the data is displayed in Fig. 1, and is discussed more fully below.

Although all teachers expressed that students were initially excited about the new and modern material, three factors emerged as causes leading to student disengagement in all classes. These factors are the expected uniqueness of an agriculture class, the students' conditioned need for a right answer, and a loss of connection between content and the students' lives. Teachers each noticed the disengagement, but took one of two paths to reengage their students. Mrs. Smith, Mrs. Jones, and Mr. Jackson opted to discontinue use of SSI-based instruction and readopt their traditional methods of teaching, confidently feeling as though their previous methods of instruction would align with students' expected uniqueness of agriculture classes, their conditioned need for a right answer, and the relevance they needed to see between content and their lives. This action aligns with Rogers' (1995) position that adopters of an innovation may discontinue the use of an innovation during the implementation stage, and reflects the pattern of discontinuance seen in Shoulders' (2012) study. Mr. East and Ms. Martin chose to alter lesson plans in order to better align the innovation of SSI-based instruction with the students' expectations of the agriculture classroom and need for connections between content and their lives. This reinvention of the innovation was noted by Rogers (1995) to be a common occurrence within the implementation stage before adopters entered the confirmation stage. As Rogers suggested, the reinvention of the innovation enabled both Mr. East and Ms. Martin to continue to use the innovation throughout the study. Supporting the critical need for reinvention before entering the confirmation stage, both Mr.

East and Ms. Martin recommended that, because of the differences in their classes, the ability to make their own activities to teach the content was a key component to the engagement they saw from their students. It was the reengagement displayed by students that gave them the confirmation they needed in order to fully adopt the innovation and make the lessons their own.

Recommendations

Based on the themes identified through examination of the data, the researchers agree upon the following recommendations for teacher educators interested in introducing agriculture teachers to curricular innovations. First, teacher reaction to student disengagement is key to the long-term success and implantation of a new curriculum innovation. Students and teachers expressed an initial positive reaction to the SSI-based instruction. However, once the realities of the SBAE classroom were realized, student disengagement and frustration with the new approach were witnessed. This finding is consistent with Moore and Moore's (1984) position that the ideals of novel teaching methods may clash with the realities of the classroom, setting them up for failure when implemented. In this study, the reaction observed was reinvention of the innovation to overcome the causes of student disengagement. The teachers in this study who made modifications during the implementation stage by assessing student disengagement and making lesson alterations were rewarded with student behaviors that led to confirmation of the adoption. Rogers (1995) noted that modification is common during the implementation stage; this study suggests that personal modification may be necessary for teachers to reach the confirmation stage when deciding whether to adopt innovative teaching strategies. Teacher educators should therefore create easily adaptable materials for teachers; and during professional development, help teachers distinguish between the components of the curricular innovation that are crucial to its implementation and those that can be altered to best meet the needs of the teachers' students.

Secondly, factors beyond just the classroom component of the complete SBAE program impact the adoption of instructional innovations, and it is recommended that curriculum innovations incorporate FFA (formerly known as Future Farmers of America), supervised agricultural experience (SAE), and classroom instruction. A number of teachers in this study struggled with the opportunity costs of teaching strictly in the classroom and spending less time focusing on the laboratory, FFA, and SAE components of the SBAE program. Ironically, agriculture teachers' year-round responsibilities in each of these three areas may keep them from being able to engage in professional development opportunities designed to help them tailor SSI-based instruction to fit their programs (Anderson, et al., 1992). Therefore, it is recommended that teacher educators give attention to all aspects of the total SBAE program in any new curriculum innovation both during its development and during professional development with teachers.

Participants noted that students expected the culture of the SBAE classroom/program to be different than that of the other classes in the school. Teachers perceived that SSI-based instruction ran counter to the students' expected SBAE program culture and was too similar to what the students expected to find in other courses in the school. In reaction to student perceptions, teachers noted concern on how continuing with the SSI-based instruction would impact future student enrollment in the SBAE program. This teacher implementation concern is unique to literature regarding SSI-based instruction adoption. Previous studies investigating this topic were conducted in academic courses where teachers were not as concerned with student recruitment and retention (Dawson, 2011; Klosterman and Sadler, 2011; Osborne, et al., 2004; Sadler, et al., 2011; Yager, et al., 2006; Zeidler, et al., 2009). This phenomenon deserves further attention to assist teachers in implementing strategies to allow for new curricular innovations while mitigating any negative enrollment impacts. These strategies should include ways teachers can assist students' transitions from known or perceived cultural norms for the SBAE program/classroom to those the teacher is attempting to implement.

Finally, this study yielded a recommendation for future research. While researchers discovered the process through which teachers proceeded in order to move from implementation to either discontinuance or confirmation, the reasons why teachers decided to either discontinue the innovation or reinvent it were not uncovered. Interviews with participants did not include any suggestions or recommendations regarding teachers' possible options to proceed when they expressed difficulties with the innovation; two teachers requested to alter lesson plans and three requested to discontinue their use. The researchers recommend that further investigation be carried out to determine the factors that lead teachers to make the decisions they choose with regard to reinventing or discontinuing an innovation.

As this study implies, teachers of SBAE may be faced with unique circumstances that impact their abilities to adopt innovative teaching techniques designed for the traditional science classroom. However, unyielding calls for educational reform require that teachers and teacher educators continue to experiment with different instructional techniques in an effort to improve student learning. Through trials, adaptations, and recognition of the unique circumstances of SBAE, teachers and teacher educators can continue to meet the needs of today's students.

LITERATURE CITED

American Association for the Advancement of Science (1993). Project 2061–Science for All Americans. Washington, DC: Authors.

Anderson, T.J., R.K. Barrick, and M. Hughes. (1992). Responsibilities of teacher education vocational teacher professional development programs. J. Agric. Edu., 33(2), 43-50. doi: 10.5032/jae.1992.02043

Dawson, V.M. (2011). A case study of the impact of introducing socio-scientific issues into a reproduction unit in a catholic girls' school. In T. Sadler (Ed.), Socioscientific issues in the classroom (pp. 311-344). New York, NY: Springer Publication.

Flick, U. (2006). An introduction to qualitative research. London, UK: SAGE Publications.

Klosterman, M.I. and T.D. Sadler. (2011). Multi-level assessment of scientific content knowledge gains associated with socioscientific issues-based instruction. International Journal of Science Education, 32(8), 1017-1043. doi:10.1080/09500690902894512

Lincoln, Y.S. and E.G. Guba. (1985). Naturalistic inquiry. Newbury Park, CA: Sage Publications.

Moore, G.E. and B.A. Moore. (1984). The problem solving approach to teaching: Has it outlived its usefulness? J. Amer. Assoc. Teacher Educ. Agric., 25(2), 3-10.

Newcomb, L.W., J.D. McCracken, J.R. Warmbrod, and M.S. Whittington. (2004). Methods of teaching agriculture. (3rd ed.) Upper Saddle River, NJ: Pearson Prentice Hall.

Osborne, J., S. Erduran, and S. Simon. (2004). Enhancing the quality of argumentation in school science. J. Res. Sci. Teach., 41(10), 1004-1020. doi:10.1002/tea.20035

Patton, M. (1990). Qualitative evaluation and research methods. Beverly Hills, CA: Sage

Phipps, L.J., E.W. Osborne, J.E. Dyer, and A. Ball. (2008). Handbook on Agricultural Education. (6th ed.). Clifton Park, NY: Thomson Delmar Learning.

Rogers, E.M. (1995). Diffusion of Innovations. (4th ed.). New York, NY: Simon and Schuster Inc.

Sadler, T.D., M.I. Klosterman, and M.S. Topeu. (2011). Learning science content and sociosientific reasoning through classroom explorations of global climate change. In T.D. Sadler (Ed.), Socioscientific issues in the classroom: Teaching, learning and research (pp. 45-47). New York, NY: Springer.

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). Retrieved from ProQuest (No. 2012.3569446)

Yager, S.O., G. Lim, and R. Yager. (2006). The advantages of an STS approach over a typical textbook dominated approach in middle school science. School Science and Mathematics, 106, 248-260.

Zeidler, D. L., T.D. Sadler, S. Applebaum, and B.E. Callahan. (2009). Advancing reflective judgment through socioscientific issues. J. Res. Sci. Teach., 46(1), 74-101. doi:10.1002/tea.20281