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Using a Study Abroad Experience as the Stimulus to Globalize the Secondary Agricultural Education Curriculum

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Abstract

The purpose of this case study was to document how one preservice agricultural education teacher's study abroad experience was used as a stimulus to globalize a secondary agricultural education curriculum. The lead author participated in a three-week study abroad trip to Costa Rica focused on sustainable agriculture. Upon returning from that trip the researchers developed a four-lesson curriculum on Costa Rican agriculture with lessons focused on Introduction to Latin America, Sustainability, Agroforestry, and Tropical Crops. This curriculum was delivered to a group of ninth grade students in an introductory agricultural education course. The students were taught one lesson per week over a four-week period. Students completed pre- and post-tests to assess their knowledge and a curriculum evaluation survey. Test scores doubled after the curriculum implementation. Additionally, students had favorable opinions about the curriculum. The activities undertaken in this project demonstrate a possible approach to expanding the educational impacts of a study abroad experience. The authors recommend that similar approaches be implemented in other contexts to see if the results can be replicated. The activities undertaken in this project appear to be an effective approach to expose a previously unreached group of young agriculturists to global aspects of their subject. The long-term impacts on these students are beyond the scope of this study but should be examined.

Keywords: Global Education, Study Abroad, Secondary Agricultural Education, Curriculum

Introduction

Agriculture is a global industry that relies on imports and exports of both inputs and products. As the world becomes more interconnected, students are encouraged to prepare to enter into a more internationalized agricultural industry (National Research Council, 2009). Ibezim and McCracken (1994) declared that if students are to compete effectively in the internationalized workforce, they must understand the role globalization plays in agriculture. However, high school students and college undergraduates show a deficiency in knowledge regarding international issues, agricultural policies, people, and cultures (Wingenbach, Boyd, Lindner, Dick, Arispe, & Haba, 2003). This may put students at a disadvantage when they enter into a workforce that is constantly evolving to accommodate global changes (Radhakrishna, Leite, & Domer, 2003). So how can we effectively prepare students to work in a globalized agricultural industry? One common approach has been study abroad experiences for undergraduate students (National Research Council, 2009). However, only 2.5% of undergraduate agriculture students engage in this experience (Food and Agricultural Education Information System, n.d.; Institute of International Education, n.d.). How can the impacts of these experiences be transferred beyond this small group of students? One solution could be capitalizing on preservice agricultural education teachers. For example, this study describes how one preservice agricultural education teacher's study abroad experience was used as a stimulus for globalizing a curriculum for secondary agriculture students. The approach used in this study could serve as a model for future study abroad programs and curriculum development projects involving preservice agricultural education teachers.

Furthermore, with over 650 preservice agricultural education teachers graduating a year in each of the last 10 years from U.S. universities (Kantrovich, 2010), the activities undertaken in this study have considerable opportunities for expanding the impact of study abroad experiences.

Theoretical Framework

This study was framed using the *Framework for Understanding Teaching and Learning* (Darling-Hammond & Bransford, 2005). This framework proposes that teachers must have knowledge of: (a) the learners, (b) the subject matter and curriculum goals, and (c) teaching. This study specifically focused on *knowledge of subject matter and curriculum goals*. How can we advance the knowledge of teachers to broaden curriculum goals? Specifically in this study, this was conceptualized as *how could preservice teacher experiences on a study abroad program be used to globalize the secondary agricultural education curriculum?*

In preparation for this study, the existing literature was reviewed to see what was known about using a globalized curriculum to prepare secondary students to work in the global agriculture industry. "Global perspective is a relatively new concept; therefore, the research literature on this topic is embryonic" (Zhai & Scheer, 2004, p. 40). The results of the authors' literature review supports Zhai and Scheer's statement. Consequently, the literature that exists focuses primarily on post-secondary schools; little research has been conducted at the secondary school level. With that in mind, the researchers organized the existing literature into three themes: (a) developing global competence in secondary students, (b) student attitudes towards international agriculture, and (c) globalized curricula in secondary schools.

Developing Global Competence in Secondary Students

Pre-collegiate agricultural workforce development in the United States often happens through high school agricultural education programs (Phipps, Osborne, Dyer, & Ball, 2008). However, agricultural education programs are not keeping pace with the rapid demand for global education (Connors, 2004; Elliot & Yanik, 2002). High school participants of a Costa Rican travel seminar thought that learning about international agriculture was important, not withstanding that they received little instruction about the subject in their secondary agricultural education program (Connors, 2004).

Students' Attitudes Towards International Agriculture

Zhai and Scheer (2004) investigated undergraduate agriculture students' attitudes towards international agriculture at The Ohio State University and found that the undergraduate agriculture students had a moderate global perspective. Only two studies were found that investigated international agriculture at the secondary level. To that end, Radhakrishna et al. (2003) examined high school students' beliefs and attitudes regarding international agricultural concepts. Radhakrishna et al. found that students believed they needed more information on agriculture from a global perspective and curriculum was needed that would prepare them for the globalization of agriculture. Additionally, Radhakrishna et al. reported that more research concerning the attitudes, perceptions, and knowledge of students was necessary, as was developing and assessing international agricultural curricula.

Connors (2004) found high school students who participated in a Costa Rican travel seminar had positive attitudes towards

learning about international agriculture and traveling. The students were also in agreement that knowledge in global agriculture would be important for their careers and would benefit them in the future. Furthermore, the students indicated international agriculture should be taught at the secondary level, which is consistent with Radhakrishna et al. (2003).

Globalized Curricula in Secondary Schools

The education system in the United State often adapts to social movements by changing curricula to match current reform efforts. In the past decade, various reform movements have prompted educators to incorporate international concepts into high school curricula (Elliot & Yanik, 2002). However, this does not mean there is widespread agreement on the best way to globalize the high school curriculum, or even that the curriculum needs to be globalized.

Gibson and Hillison (2005) stated that there is great variation in approaches to delivering instruction of international agriculture. This could be due to a narrow interpretation of agriculture that in turn can lead to little flexibility in the subject matter of secondary agricultural education programs (Acker, 1999). Methods to increase global knowledge include study abroad programs and interactions with international students. However, money, time, diversity of the school population, and number of participants are all factors that limit the effectiveness of such methods. An alternative method is to develop curricula based on agriculture from a wide variety of countries to "integrate...experiences into the broader agricultural curriculum" (Boyd, Felton, & Dooley, 2004, p. 64).

An examination of the *National Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards*

(National Council for Agricultural Education, 2009) revealed only a few standards focused on global agricultural issues. Additionally, reviewing the Florida curriculum frameworks (Florida Department of Education, 2012) for agricultural education showed little emphasis on global agricultural issues. There appears to be a little or no globalized agricultural education curriculum available at the secondary level, indicating a pressing need for expansion in order to prepare high school agriculture students for the globalized industry.

Few international curricula are available for high school agriculture teachers. The development of such curricula has tremendous future application (Elliot & Yanik, 2002; Ibezim & McCracken, 1994). For students to be fully prepared to enter into the global workforce, development of such curricula is essential (Radhakrishna et al., 2003). Using curricula like this has the potential to immerse high school agriculture students into a different culture and enables them to learn about international agricultural issues.

Research Purpose and Objectives

The purpose of this study was to investigate an approach for increasing the impact of a study abroad experience. The research objectives were to: (a) describe changes in knowledge of Costa Rican agriculture of secondary agriculture students as a result of the globalized curriculum and (b) describe student perceptions of the globalized curriculum.

Methods

This study employed a case study approach to document the outcomes of an effort to increase the impacts of a study abroad experience through the development and implementation of a secondary-level curriculum (Gall, Gall, & Borg, 2003). Data collection included a pre-/post-test

knowledge assessment and an attitudinal survey.

Context

This project began with the lead author attending a three-week study abroad program in Costa Rica. At the time of this study, the lead author was a preservice agricultural education teacher in the final year of studying agricultural education at the University of Florida. The program was sponsored through the university and titled *Sustainable Agriculture and Social Entrepreneurship in the Tropics: Experiential Learning in Costa Rica with EARTH University*. Over a three-week period the lead author studied animal science, soil science, agroforestry, and sustainability. Throughout this experience, pictures, interviews, and notes were recorded to provide background research for a curriculum based on Costa Rican and Latin American agriculture.

Curriculum Development

Upon return from the study abroad program, curriculum development began. The data collected from Costa Rica, supplemented with additional information collected by the researchers, was used to develop the curriculum. The curriculum was developed using procedures taught in AEC 4202, *Curriculum Development and Assessment Techniques in Emerging Agricultural Technologies* at the University of Florida. The content of this course was developed based on concepts and procedures outlined by Newcomb, McCracken, Warmbrod, and Whittington (2004) and Phipps et al. (2008). Based on the data collected, the researchers decided the curriculum should be designed for a ninth grade agriculture course and focus on four themes titled *Introduction to Latin America, Sustainability, Agroforestry, and Tropical Crops*.

Learning objectives were developed to align with the National Council for Agricultural Education's (2009) *National Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards*. Instructional material included PowerPoint presentations, videos, readings, individual writings, and cooperative learning activities. The lesson plans were reviewed by three doctoral students in agricultural education at the University of Florida and revised accordingly. The curriculum was designed for one instructional week or five 50-minute class sessions. Four days were devoted to instruction, and one day was used for evaluation. The lesson titles included: *Latin America and Common Agricultural Practices, Sustainability, Agroforestry, and Tropical Fruits, Companies and Business*.

The curriculum was designed to give students a brief introduction to international agriculture from a tropical perspective in Latin America. The purpose of the objective for *Lesson 1: Introduction to Latin America* was to introduce students to the region. This lesson addressed the AFNR standard: *PS.03.04.01.a. Explain sustainable agriculture and objectives associated with the strategy*. The lesson plan contained a PowerPoint presentation, "Welcome to Latin America, Aquaculture, and Organic Farming." In addition, video clips and websites were used. The lesson plan was created in the lecture/note-taking format.

Lesson 2: Sustainability focused on defining the term sustainability and provided each student with the opportunity to form an opinion about sustainable agriculture. This lesson addressed the AFNR standard: *PS.03.04. Apply principles and practices of sustainable agriculture to plant production*. This was done using a lecture that included a PowerPoint presentation, the creation of a newspaper worksheet called *The Sustainable News*, and essay writing. The lesson plan

included lecture/note-taking, cooperative learning, and individual learning activities.

Lesson 3: Agroforestry focused on defining four agroforestry practices, inferring their advantages, and being able to visualize how each practice works. This lesson addressed the AFNR standard: *NRS.03.01. Produce, harvest, process and use natural resource products*. The lecture was presented through PowerPoint to the students. In addition, students were asked to read a handout describing the practices in greater depth and were organized into groups to infer advantages of agroforestry. Lastly, the students applied the practices to hypothetical scenarios and matched agroforestry practices to a map counterpoint. The lesson plan had a higher proportion of cooperative learning compared to individual learning activities in the other three lessons.

Lesson 4: Tropical Fruits, Companies, and Business was designed to introduce students to tropical crops such as pineapples, bananas, coffee, and cacao, which are imported into the United States from Costa Rica. This lesson addressed the AFNR standard: *CS.04.01.01.a. Examine performance and goals to appreciate professional organizations and industries within AFNR*. Using a lecture with a PowerPoint presentation, students were shown pictures of each crop and asked to identify the particular tree and fruit. Students were also shown short video clips produced by the Costa Rican Doka Coffee Estate. Additionally, a PowerPoint presentation on the processing of cacao was presented. A handout containing the logos of companies that import tropical crops was given to students to illustrate that these major brands conduct business globally. A cross-cultural quiz was given orally to students to increase their awareness of the differences in business practices around the globe. The lesson plan was primarily

cooperative learning–oriented, but some individual activities were utilized.

Implementation

A rural high school in Florida was chosen to participate in the study due to its proximity to the University of Florida and because the school offered a ninth-grade introductory agricultural education course. Thirty students were enrolled in the course. Based on the parameters outlined by the high school at which the curriculum was implemented and the protocol approved by the Internal Review Board (IRB) at UF, no formal demographic data were collected by the researchers. Based on informal observation, a majority of the students were white with slightly more males than females.

Informed consent forms were collected from 24 of the 30 students enrolled in the class (80%). Of the 24 students in the accessible sample, complete data were collected from 20 of the 24, yielding a response rate of 83.3%. The other data was rendered ineligible due to absences and/or students not returning IRB forms.

Curriculum implementation and data collection for this study occurred in November, approximately five months following the study abroad experience. Based on the limitations imposed by the high school teacher, the curriculum was implemented over a four-week period, using 1 class session per week for delivery of the curriculum. Prior to beginning the research, students were briefed about the project and what was expected of them should they choose to participate. They also received IRB parental consent forms with instructions to return the forms signed to their teacher the following Monday.

Prior to the curriculum implementation, students and the teacher filled out the IRB consent forms and took the pre-test (Oct. 28). On Mondays and/or Wednesdays (Nov. 4, Nov. 9, Nov. 16, Nov.

18) students were instructed for fifty minutes in international agriculture using the designed curriculum. Five days after the completion of the curriculum implementation (Nov. 23), the students were given five minutes to review their notes and then took the post-test, which was followed by the curriculum evaluation survey.

Instrumentation

Two instruments were used to assess the stated learning and research objectives: a knowledge test and an attitudinal survey to evaluate the curriculum. Both instruments were administered face-to-face by the lead researcher. The knowledge test consisted of 21 questions with a point scale of 100 possible points. The following types of questions were on the knowledge test: (a) 11 multiple-choice items, (b) 2 short-answer items, (c) 2 true or false items, (d) 2 list items, (e) 3 matching items, and (f) 1 essay item. The knowledge test was designed to assess students' knowledge on agroforestry practices, general knowledge of the Latin American region and cross-cultural business awareness, the concept of sustainability and the feasibility of implementing sustainable agricultural practices, and tropical crops produced in Latin America. The researchers developed this assessment by creating questions based on the learning objectives of each lesson. The assessment was reviewed for face and content validity (Gall et al., 2003) by an agricultural education professor at the University of Florida who teaches educational assessment and has prior experience teaching similar content.

A researcher-developed curriculum evaluation survey was used to assess students' opinions of the curriculum. The survey consisted of seven statements about the effectiveness of the curriculum and an open-ended question. Student response was measured using a five-point rating scale (1 = *strongly disagree* to 5 = *strongly agree*) for

the effectiveness statements, and the open-ended question asked for recommendations, comments, and concerns about the curriculum. Items in the survey were developed based on the researchers' interest in evaluating specific aspects of the curriculum. The survey was reviewed by a panel of faculty in agricultural education familiar with survey development for face and content validity (Gall et al., 2003). The post-hoc reliability coefficient alpha was .77.

Data Analysis

The knowledge pre-/post-test scores were converted from a point scale into percentages in order to analyze the data. The original test was based on a scale from 0 to 100. After analyzing the data, one question was excluded due to confusion by the students. The final point scale was 96 instead of 100 points. The knowledge test was analyzed using descriptive statistics, and results were rounded to the nearest whole number.

Limitations

Due to the nature of the non-probabilistic sample, the results of the study are limited to just this group of students. The findings of this study are also limited because students may have had other opportunities (other than the curriculum) to learn about Costa Rican agriculture during the four-week period between the pre and post test. Another limitation of this study is that the protocol was implemented over a four-week period, so the long-term impacts of this study are unknown. As with other research with similar designs, this study was limited by participant attrition. A final

limitation noted by the researchers focused on participants. This sample was predominately white, so the impact of this curriculum on a more diverse student group is also unknown.

Results

Objective 1: Describe Changes In Knowledge of Costa Rican Agriculture

Prior to the curriculum implementation, students completed a pre-test knowledge assessment. The pre-test score for the knowledge test was 30% ($SD = 7.3$). The range of the pre-test was 17% to 44%. On the written knowledge test, students left on average 60% of the open-ended items blank. Fifty percent ($n = 10$) of students indicated they supported sustainable agriculture but did not give reasons for their support. Forty five percent ($n = 9$) of students left the essay blank, and one student wrote he/she did not support sustainable agriculture because he/she knew nothing about it.

Students completed a post-test knowledge assessment (same test as the pre-test) at the end of the four-week protocol. The post-test score was 61% ($SD = 18.57$). The range for the post-test was 26% to 90%. Figure 1 shows students' percentages of correct answers on the pre test and post test. Students showed substantial improvement, with the majority of students doubling their scores. Sixty five percent of students ($n = 13$) support sustainable agriculture; 15% of students ($n = 3$) did not support sustainable agriculture. In addition, 15% ($n = 3$) left the question blank and one student was undecided. Responding students supported their opinions with clear arguments.

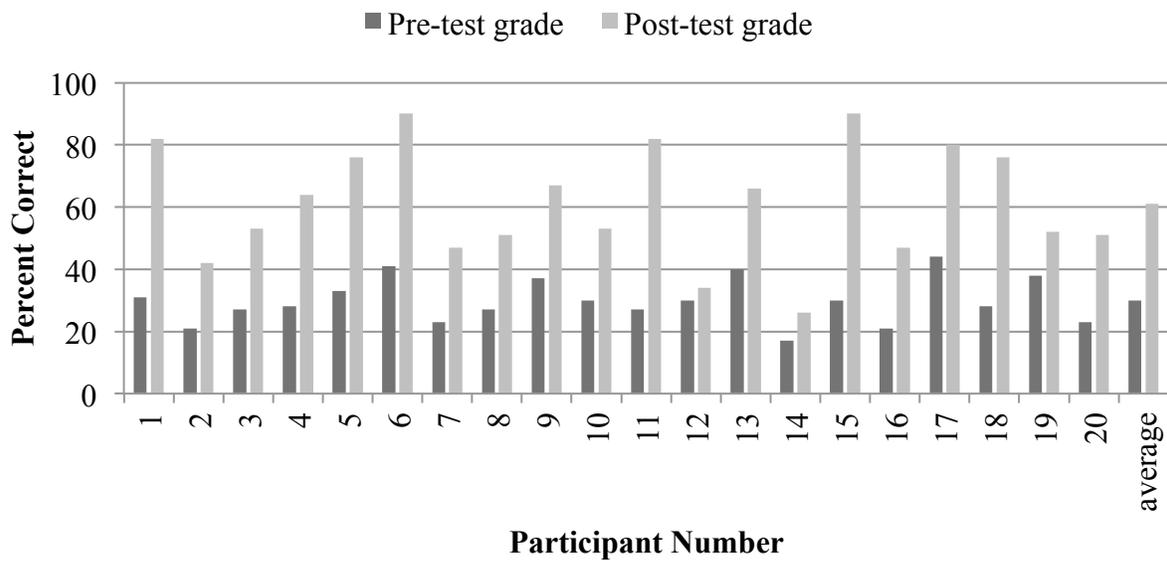


Figure 1. Comparison of each student's percent of correct answers on the pre/post test.

Objective 2: Describe Student Perceptions of the Curriculum

The curriculum evaluation survey used a five-point rating scale (1 = *strongly disagree* to 5 = *strongly agree*) to evaluate the curriculum (see Table 1). Overall, students had a slightly positive opinion about the curriculum. No students strongly disagreed with any of the statements. The means ranged from 3.25 (*SD* = 1.02) (*the assignments challenged me*) to 4.25 (*SD* = .85) (*I was able to ask questions and*

participate during the lessons). No statements had means below 2.99.

Students also responded to an open-ended question on the survey asking for recommendations, comments and concerns about the curriculum. Fifty percent of students (*n* = 10) responded to the question. Student responses were categorized into: *liked it* (*n* = 4), *lessons were well prepared* (*n* = 3), *it was ok* (*n* = 2), and *not challenging* (*n* = 1).

Table 1. Student Curriculum Evaluation Survey

Statement	Frequency					<i>M</i>	<i>SD</i>
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
I was able to ask questions and participate during the lessons.	0	1	2	8	9	4.25	.85
The directions were clear and easy to follow.	0	0	4	9	7	4.15	.75
The test questions were taken directly from what was learned in class.	0	1	4	10	5	3.95	.83
I learned a lot about international agriculture.	0	2	3	10	5	3.90	.91
The activities achieved their objectives.	0	1	5	10	5	3.85	.81
I found the lessons to be engaging and interesting.	0	2	8	5	5	3.65	.99
The assignments challenged me.	0	5	8	4	3	3.25	1.02

Conclusions

Objective 1: Describe Changes In Knowledge Of Costa Rican Agriculture

The curriculum designed to increase students' knowledge in international agriculture was moderately successful. Every student showed an increase in knowledge after participating in the curriculum implementation, on average doubling their score. Although the final knowledge post-test scores averaged 61%, this was an improvement over the pre-test. Determining the exact reason for this level of mastery is beyond the scope of this research project and could be considered for future research. Perhaps differences in student ability or motivation could explain some of the variation.

When examining individual lessons, students did well on the agroforestry and the tropical crops lessons. However, based on test scores there appears to have been some confusion between sustainable agricultural practices and agroforestry practices; students failed to differentiate between the two practices. They were able to develop their own opinion about the feasibility of sustainable agriculture and displayed critical thinking skills when forming their opinion. Several students changed their previous opinion about sustainable agriculture after curriculum implementation. Those who kept their same opinion also gave logical reasons for doing so.

Objective 2: Describe Student Perceptions of the Curriculum

Overall, students had a fairly positive opinion about the curriculum. The curriculum achieved the objective of increasing knowledge in international agriculture. Students indicated the most problematic aspect of the curriculum was that the assignments were not challenging enough. This should be addressed when the

curriculum is revised. Furthermore, the students felt they were able to participate in class and ask questions. This allowed for exploration and may have increased interest in the topic. In regards to the knowledge test, a majority of students agreed the assessment was aligned with the curriculum objectives.

Discussion, Recommendations, and Implications

In this study, the knowledge test scores indicated that the curriculum was successful at expanding the impact of a study abroad experience. This may indicate that utilizing preservice agricultural education teachers (who participate in a study abroad experience) to develop and teach globalized lessons may be an appropriate means of broadening the impact of study abroad experiences. Furthermore, this approach of utilizing preservice teachers and the curriculum they produced may advance the knowledge of preservice and current agricultural education teachers while broadening the curriculum goals at the secondary level. To that end, developing knowledge of subject matter and curriculum goals was a one component of Darling-Hammond and Bransford's (2005) *Framework for Understanding Teaching and Learning*. If this approach proves successful in other settings, the impacts on developing global awareness in preservice and current teachers, developing globally integrated curriculum, and ultimately in preparing globally competent students for careers in agriculture could be significant.

Based on the activities and findings of this research project, the following recommendations are offered. First, this approach appears to be a promising way to develop globalized curricula. This approach should be replicated using different study abroad experiences, preservice teachers, and

secondary students, because the nature of the current study does not allow for generalizability. Thus, only through replication will the true impact be determined.

Based on the results of this study, the researchers suggest that the efforts to develop globalized curricula for secondary students should be increased. This is supported by the recommendations of Radhakrishna et al. (2003), who stated that schools should continue their efforts to incorporate relevant international concepts into the curriculum. Additionally, efforts should be made to ensure that all new curricula developed for secondary education have applicable international foci. This will help prepare students to enter a more globalized workforce, affording them a foundation of international concepts.

The findings of this study also lend themselves to suggestions for faculty who develop and lead study abroad experiences. Often the activities involved in such experiences end shortly after the conclusion of the experience. The researchers recommend that faculty proactively build in assignments that require students to create materials that could be used to develop or supplement curricula with global examples.

The curriculum developed for this study focused on Costa Rican and Latin American agriculture. The United States is a major player on the world stage and interacts with countries from every region. Connors (2004) stated that students received little instruction at the post-secondary level regarding international agriculture. In order to compensate for this shortage of globalized agricultural lesson plans, the researchers recommend that curricula should be developed for other regions of the world in addition to Latin America. In order to fully prepare students to enter the global economy, students should have knowledge of multiple regions around the world.

Furthermore, lessons should be developed focusing on countries with which the United States has particularly close dealings (e.g., China, Mexico). This would give students a more in-depth understanding of these countries and their global positions. These lesson plans focusing on individual countries can be created as a component of a larger global curriculum.

The curriculum that was developed for the purpose of this research project should be revised based on observations and feedback from the students who participated in this study. While the curriculum was successful in increasing students' knowledge of global agriculture, the test scores were considerably less than perfect. The curriculum should be revised by emphasizing components students struggled to understand, making some assignments more challenging, and incorporating more opportunities for feedback from students. The knowledge test should be revised by rewriting questions that were unclear to students. The revision of the curriculum should focus on increasing student comprehension while making the assignments more challenging.

This revised curriculum should be taught and disseminated on a broader scale. Different results may be obtained if the study is conducted in an urban setting or a different region of Florida. Further research should be conducted using a larger sample and a more diverse population of high school students.

In summary, if the United States is to compete in the global market, students at all levels should be prepared to work in an international environment (National Research Council, 2009). One means of preparing students is to incorporate global agricultural concepts into the secondary curricula. More research is needed to understand student attitudes towards international agriculture, and international

curricula need to be developed. The *Association for International Agricultural Education and Extension* and the *American Association for Agricultural Education* should play a lead role in this expansion of international agricultural education at the secondary level and provide opportunities for researchers to further explore this topic.

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