

8-1-2017

United States and Latin American Undergraduate Students' Knowledge, Attitudes and Perception of Global Agricultural Issues

Sarahi Morales
Texas Tech University

Todd Brashears
Texas Tech University

Cindy Akers
Texas Tech University

See next page for additional authors

Follow this and additional works at: <https://newprairiepress.org/jiaee>

Recommended Citation

Morales, S., Brashears, T., Akers, C., Malaga, J., & Wingenbach, G. (2017). United States and Latin American Undergraduate Students' Knowledge, Attitudes and Perception of Global Agricultural Issues. *Journal of International Agricultural and Extension Education*, 24(2), 78-92. DOI: <https://doi.org/10.5191/jiaee.2017.24206>

This Research Article is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in *Journal of International Agricultural and Extension Education* by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.

United States and Latin American Undergraduate Students' Knowledge, Attitudes and Perception of Global Agricultural Issues

Abstract

Global trends are demanding agricultural students have a broader perspective of agriculture and competitiveness and they become responsible global citizens. This study compared United States and Latin American undergraduate students' knowledge, attitudes, and beliefs regarding international agricultural issues, as well as their attitudes about global citizenship. Overall, students' results indicated a lack of knowledge regarding international agricultural issues, with only 3.6% obtaining a score above 60%. Students' recorded positive attitudes and beliefs about international agricultural issues but had mixed feelings regarding global citizenship attitudes. Scores on all constructs were found to be significantly different between the studied academic institutions ($p < .05$). The stepwise multiple linear regression indicated the predictors of university of enrollment and students' attitudes and beliefs about international agricultural issues were significantly related to their global citizenship attitudes: $F(3, 1194) = 83.04$, $p = .01$, explaining 17% of the variance in the model. The obtained results suggest students hold positive and open-minded attitudes and beliefs regarding international agricultural issues. These attitudes should be balanced by academic institutions with the knowledge needed by students to meet the demands of the agricultural industry. A global understanding can potentially enable future professionals to succeed in both local and global settings, and furthermore, help them become global citizens.

Keywords

international agricultural issues, global citizenship, knowledge, undergraduate education.

Authors

Sarahi Morales, Todd Brashears, Cindy Akers, Jaime Malaga, and Gary Wingenbach

doi: 10.5191/jiaee.2017.24206

United States and Latin American Undergraduate Students' Knowledge, Attitudes and Perception of Global Agricultural Issues

Sarahi Morales
M. Todd Brashears
Cindy Akers
Jaime Malaga
Texas Tech University

Gary Wingenbach
Texas A&M University

Abstract

Global trends are demanding agricultural students have a broader perspective of agriculture and competitiveness and they become responsible global citizens. This study compared United States and Latin American undergraduate students' knowledge, attitudes, and beliefs regarding international agricultural issues, as well as their attitudes about global citizenship. Overall, students' results indicated a lack of knowledge regarding international agricultural issues, with only 3.6% obtaining a score above 60%. Students' recorded positive attitudes and beliefs about international agricultural issues but had mixed feelings regarding global citizenship attitudes. Scores on all constructs were found to be significantly different between the studied academic institutions ($p < .05$). The stepwise multiple linear regression indicated the predictors of university of enrollment and students' attitudes and beliefs about international agricultural issues were significantly related to their global citizenship attitudes: $F(3, 1194) = 83.04$, $p = .01$, explaining 17% of the variance in the model. The obtained results suggest students hold positive and open-minded attitudes and beliefs regarding international agricultural issues. These attitudes should be balanced by academic institutions with the knowledge needed by students to meet the demands of the agricultural industry. A global understanding can potentially enable future professionals to succeed in both local and global settings, and furthermore, help them become global citizens.

Keywords: international agricultural issues, global citizenship, knowledge, undergraduate education.

Introduction

The interaction between globalization and agriculture continues to increase as interrelations among countries and regions expand. For example, large agribusinesses have a presence in multiple countries and employ large numbers of people, especially agriculturalists. Therefore, it is not surprising agribusinesses expect college and university graduates to be prepared for global competence within their fields (Whigham & Acker, 2003). Conversely, the global agricultural system faces many issues, ranging from climate change, reduction in soil fertility, reduction in biological diversity, and a rapidly growing world population (McIntyre, Herren, Wakhungu & Watson, 2009). The proceeding literature highlights the many ways agriculture is connected to the global community (Bruening & Shao, 2005).

Current pressing world issues have led countries, business leaders, and educators to discuss the need for schools to meet the needs of globalization and prepare students for international work (Spring, 2008; Olson & Evans, 2007). Students may potentially fill work positions worldwide that require international knowledge and awareness (Anthony, Bederman, & Yarrish, 2013). The 2011 – 2015 National Research Agenda of the American Association for Agricultural Education (AAAE) indicated in order to meet global food, fiber, and energy needs, it is essential to prepare new scientists and professionals in the appropriate academic settings (Doerfert, 2011). The 2016 – 2020 AAAE National Research Agenda expanded on this, indicating agricultural graduates will be required to function in global settings. Therefore, the agricultural curricula should incorporate international topics in order allow students to explore agriculture matters from multiple perspectives and in a global setting (Stripling & Ricketts, 2016).

Scholars have suggested a primary goal of universities should be to globalize undergraduate education (Bruening & Shao, 2005; Bruening & Frick, 2004; Acker & Scanes, 2000). The most effective way to add a global component to undergraduate studies is through the use of study abroad programs (Brooks, Frick, & Bruening, 2006). Even though several studies have evaluated the significance and impact of study abroad programs (Klein & Lawver, 2007; Brooks et al., 2006; Kitsantas, 2004; Oppen, 1990), less than two percent of students majoring in agricultural sciences participated in study abroad programs during the 2013-2014 academic year (Institute of International Education, 2015). This level of involvement has been similar in previous years suggesting more effective ways should be explored to internationalize students' curriculum in agricultural sciences.

In recent years an emphasis has been placed on education regarding global citizenship that aims to engage citizens in the understanding and resolution of social, cultural, and political issues worldwide (The United Nations Educational, Scientific and Cultural Organization [UNESCO], 2013). Indicators of global citizenship have existed since the year 450 (Carabain, Keulemans, Van Gent, & Spitz, 2012). Currently, the term is widely used in international education and various others disciplines (Reysen & Katzarska, 2013; Morais & Ogden, 2011), but an "agreed definition is yet to be developed" (UNESCO, 2013, p. 3). Morais and Ogden (2011) pointed out global citizenship is "rarely conceptually or operationally defined" (p. 445, 2011). Some have used the term to describe a human condition of belonging to the global community and a feeling of responsible for the world that goes beyond borders, nation-states, and even cosmopolitanism (UNESCO, 2013). For the purpose of this study, the definition established by Morais

and Ogden (2011) was used, which indicates global citizenship is a multidimensional construct built from the interaction and display of three major components: social responsibility, global competence, and global civic engagement.

Academic institutions and their faculty members must take a pro-active role to effectively teach students how to contribute to the solution of issues around the world (Bruening & Shao, 2005). Elting (2001) recommended the undergraduate education curriculum in agricultural sciences should aim to prepare aware and knowledgeable students for a global context. Additionally, Wingenbach et al. (2003) suggested an agricultural curriculum needed to expand students' knowledge of international agriculture issues and understanding of "policies, products, people, and cultures to prepared students for their careers (2003). Furthermore, an adequate internationalization of the agricultural curriculum will most likely foster positive attitudinal change in students, thus increasing their international awareness (Moriba, Edwards, Robinson, Cartmell, & Henneberry, 2012).

Theoretical Framework

This research study is based on the Theory of Planned Behavior (Ajzen, 1985), which explains "individuals' intentions to perform a given behavior; intentions are assumed to capture the motivational factors that influence behavior" (Ajzen, p. 181). According to Ajzen (1991), the elements of this theory have been found to accurately predict a person's behaviors. In addition, this research study is supported by the Theory of Human Capital applied to education by Schultz in 1961, which indicates "individuals and society derive economic benefits from investments in people" (Sweetland, 1996, p. 341). This theory suggests "[the] pursuit of education

leads to individual and national economic growth" (Sweetland, 1996, p. 356). Moriba (2011) proposed investments in the educational systems by governments and stakeholders have taken place to prepare students with international awareness and global competence. This leads to national productivity and prepares future professionals for a globalized world.

Purpose and Objectives

The purpose of this study was to compare United States (U.S.) and Latin American (L.A.) students' knowledge, attitudes, and beliefs toward international agricultural issues and their attitudes to engage in society as global citizens. The following research objectives were created to guide this study: (a) describe undergraduate students enrolled in agricultural sciences in Texas Tech University (TTU) and The Panamerican Agricultural University, Zamorano (EAP); (b) assess undergraduate students' knowledge of international agricultural issues in TTU and EAP; (c) determine undergraduate students' attitudes regarding international agricultural issues in TTU and EAP; (d) determine undergraduate students' beliefs about international agricultural issues in TTU and EAP; (e) assess undergraduate students' attitudes toward global citizenship in TTU and EAP; and (f) establish the relationship between undergraduate students' global citizenship and the students' university of enrollment, gender, and their knowledge, attitudes, and beliefs about international agricultural issues.

Methods

This study design was causal – comparative; which is used to identify cause and effect relations, with the critical feature of an independent categorical variable (Gall, Gall, & Borg, 2007). To evaluate students' knowledge and attitudes toward global

agricultural issues and their attitudes to engage in society as global citizens, we used modified versions of the International Agricultural Awareness and Understanding survey instrument by Wingenbach et al. (2003) and Hurst (2013), and the Global Citizenship Scale by Morais and Ogden (2011). Knowledge items that were outdated were replaced with others addressing the main issues highlighted by the Food and Agriculture Organization of the United Nations (FAO) in 2014, in the post-2015 development agenda, and the Millennium Development Goals (MDG). Remaining items regarding the students' attitudes toward global agricultural issues and global citizenship were revised and changed for applicability to the target population. Items not applicable were removed. The final instrument quantified the student's knowledge, attitudes, and beliefs about international agricultural issues, their attitudes toward global citizenship, and demographics. A non-probabilistic convenience sample of students in classes with large numbers of enrollment was taken at TTU and EAP. We used this procedure to ensure participants response rate. Other benefits of this sampling procedure included low cost and collecting data in a short period of time (Ary, Jacobs, Sorensen, & Walker, 2013).

The sample size was determined based on Cochran's formula as suggested by Bartlett, Kotrlik, and Higgins (2001). An alpha level of .05 was established *a priori*. The sample size was determined to be 310 students at TTU and 294 students at EAP, for a total sample of 604. However, taking into consideration the findings by Sax, Gilmartin, and Bryant (2003) regarding low response rates among college students, we over-sampled the population following the recommendations by Bartlett et al. (2001). We estimated a response rate of 50% considering the low response rates found by

Sax et al. (2003), 22% on paper-only surveys and 17% on web surveys. The increased sample helped compensate potential non-response and ensure an adequate sample to conduct the study.

Data collection procedures in this research study were specific to the sub-sets of the targeted population, TTU and EAP, nonetheless general procedures were established to maintain as much consistency as possible between the groups. Data collection at both academic institutions was gathered within the initial three weeks of the semester, fall 2014 in TTU and the 2014 third regular period in EAP. Students from all academic standings were recruited in both academic institutions. Students had the option to accept or decline participation in the study. Those participating completed the paper instrument after a regularly scheduled class period. A total of 1,300 students voluntarily completed the instrument. This included 659 students from TTU and 641 students from EAP. Instruments with less than 90% completion were considered invalid and eliminated resulting in 1,218 valid instruments; 612 from TTU and 606 from [L.A. University). Students who opted not to participate in this research study were considered non-respondents. Based on enrollment records at both academic institutions, an overall response rate of 90% was obtained. Those in more than one class were considered duplicates and were asked not to complete the instrument more than a single time. No control for non-response error was implemented as participants were part of a convenience sample with no way to contact the non-respondents given IRB constraints.

Data collected from the paper instruments were entered into an Excel® spreadsheet, coded according to each section, and transferred into a SPSS® for Windows database. Items negatively worded on the global citizenship scale (SR 1.1, SR

1.2, and SR 1.3) were reverse-coded as established by the authors (Morais & Ogden, 2011) prior to conducting the statistical analysis.

About 1% of missing data was found. Missing values can decrease the statistical power, however less than 2% of missing data is considered a minimal loss to the dataset (Roth, 1994). To address the missing values in the knowledge section, the researcher considered any unanswered question as incorrect answers as the correct answer was not identified. Meanwhile, missing values in the Likert scale sections of the global citizenship, attitudes and beliefs about international agricultural issues were mitigated using mean substitution, which allows using the mean value of the variable in place of the missing data point. Even though this technique can alter variance estimates, it is a simple technique worth considering when missing data is less than 10% such as in this case (Donner, 1982).

The final instrument was pilot tested to assess the internal consistency and compared it to the reported reliability coefficients by the instruments authors and other researchers. A post-hoc reliability analysis was also conducted. Findings of the reliability analysis were consistent, and considered acceptable, in the pilot test and at post-hoc for the international agricultural awareness and understanding survey sections of: attitudes ($\alpha = .94$; $\alpha = .96$), beliefs ($\alpha = .81$; $\alpha = .90$) and knowledge (KR = .23; KR = .14). Knowledge reliability results were considered understandable considering interdependence of items tend to reduce reliability coefficients (Frisbie, 1988). Findings in the global citizenship scale section were lower than the reported reliability coefficients by the authors in the pilot test and at post-hoc: social responsibility ($\alpha = .69$; $\alpha = .26$); global competence ($\alpha = .59$; $\alpha = .79$); and, global civic engagement ($\alpha = .68$; $\alpha = .79$). The

majority of these were considered acceptable for newly developed instruments (Nunnally & Bernstein, 1994). The obtained data was analyzed based on the research objectives established in the study using descriptive and variability statistics, independent t – test, and a linear multiple regression. An alpha level of .05 was established *a priori*.

Findings/Results

The purpose of this study was to compare U.S and L.A. students' knowledge, attitudes, and beliefs toward international agricultural issues, and their attitudes to engage in society as global citizens. U.S. participants were represented by undergraduate students enrolled at TTU in an undergraduate program of the College of Agricultural Sciences and Natural Resources (CASNR), while L.A. participants were represented by undergraduate students enrolled at EAP, an agricultural university located in Honduras.

Research objective (a) sought to describe participating students of both academic institutions. Students' demographic characteristics collected in this study included gender, academic standing, and ethnic background. The majority of the participants were males ($n = 644$) in contrast to the female participants ($n = 554$). Males were also the majority at EAP ($n = 382$); however, females were the majority of the participants at TTU ($n = 345$). Regarding the students' ethnic background, the largest classification of students identified themselves as Latin ($n = 539$), followed by Caucasian/white ($n = 475$), Hispanic ($n = 76$), Native-American ($n = 39$), African-American ($n = 32$), other ethnic background ($n = 12$), and Asian/Pacific Islander ($n = 6$). The majority of the students' at EAP classified themselves with a Latin background ($n = 538$) but in TTU the majority considered themselves

Caucasian/white ($n = 472$). Students classified their academic standing according to their university of enrollment, overall the largest group classified themselves as freshmen ($n = 356$), followed by sophomores ($n = 324$), juniors ($n = 261$), and seniors ($n = 255$). Freshmen were also the largest group at TTU ($n = 214$) but in EAP seniors made up the largest group ($n = 195$).

Research objective (b) assessed undergraduate students' knowledge of global agricultural issues in the target population. Within the instrument, students completed a knowledge section consisting of 20 multiple-choice items. Students were instructed to select the correct answer among 4 options. Results were recorded as correct or incorrect answers with a binary code of 1 and 0 respectively; therefore, the sum of correct answers resulted in the overall knowledge of international agricultural issues score based out of 20 possible points. Results by question varied according to the students' university of enrollment. No identical frequency percentage of correct answer by item was found between TTU and EAP.

Overall, 90.4% of the students ($N = 1218$) responded correctly to the question: "The ___ desert is the world's largest hot desert," while 95% incorrectly answered the following question: "Although large areas of land are brought into cultivation throughout the world each year, large amounts are also rendered useless or are reduced in productive capacity because of the following reasons." TTU students' frequency percentage of responding correctly to the questions varied from 6.7% to 86.9%, while EAP student's frequency percentages of correct answers varied from 3.3% to 93.9%. TTU students' posted higher scores of correct answers than EAP students for the following questions: "Which cereal grain is the basic food for more than half of the

world's population," 45% versus 24%, "Which of the following languages are the four most spoken languages worldwide?" 64% versus 48%, and, "Considering developing and developed countries, the projection of the world population for the year 2050 shows that the largest segment will be in," 46% versus 30%. Whereas EAP students presented higher scores of corrected answers than TTU students for the following questions: "What is the primary household fuel in lower income groups in Latin America," 86% versus 58%, "The economic strength of a country can be measured by," 45% versus 24%, and, "Which country is the largest producer of tea," 43% versus 29%.

The overall mean score of correct answers was 7.6 ($SD = 2.1$) with a median and mode score of 7 ($Mdn = 7$, $Mode = 7$). TTU students' knowledge of international agricultural issues mean score was lower ($M = 7.24$; $SD = 2.20$) than EAP students' mean score ($M = 7.89$; $SD = 2.00$). An independent t-test was used to assess the statistical significance in the differences of students' knowledge scores based on their university of enrollment. The null hypothesis stated there would be no difference in the participants' knowledge scores ($H_o: \mu_1 = \mu_2$). The alpha level was set at .05 *a priori*. Levene's test for equality of variances violated the assumption of homogeneity of variance ($p = .03$). The corrected t-test was used not assuming homogeneity of variance. The independent t-test recorded a t value of -5.46 ($p < .05$). Therefore, the null hypothesis was rejected in favor of the research hypothesis stating, in the population, there is a difference in the participants' knowledge based on the university of enrollment ($H_o: \mu_1 \neq \mu_2$). Cohen's *d* effect size value ($d = .33$) suggested a small to medium effect size (Kotrlík, Williams, & Jabor, 2011).

Quantifying undergraduate students' attitudes regarding global agricultural issues

in the target population was the purpose of research objective (c). Students completed an attitudes section of 25 Likert-type items on a 6-point scale (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree). The mean score of the attitudes section represented the overall attitudes toward international agricultural issues held by the students. Overall, the lowest mean score of this section was 4.44 ($SD = 1.27$) corresponding to the statement: "Lessons on international agricultural issues should not be too complex for me," whereas, the highest was 5.08 ($SD = 1.03$) corresponding to the statement: "Considering my home country agricultural exports, I should be instructed on other countries agricultural production practices." TTU students' mean scores ranged from 4.34 ($SD = 1.27$) to 4.85 ($SD = 1.10$), whereas EAP students' mean score ranged from 4.54 ($SD = 1.35$) to 5.35 ($SD = .91$). The overall students' mean score of attitudes was 4.88 ($SD = .76$), with a median of 5 and a range of 4.92. TTU students mean score was lower ($M = 4.70$; $SD = .78$) than EAP students mean score ($M = 5.06$; $SD = .68$)

An independent t -test was used to assess the statistical significance in the students' attitudes toward international agricultural issues based on their university of enrollment. The null hypothesis stated there would be no difference in the participants' attitudes of international agricultural issues ($H_o: \mu_1 = \mu_2$). The alpha level was set at .05 *a priori*. Levene's test for equality of variances violated the assumption of homogeneity of variance ($p = .01$). The corrected t -test was used not assuming homogeneity of variance. The independent t -test recorded a t value of -8.45 ($p < .05$), therefore, the null hypothesis was rejected in favor of the research hypothesis stating that, in the population, there was a significant difference in the participants'

attitudes toward international agricultural issues depending on their enrollment at TTU or EAP ($H_o: \mu_1 \neq \mu_2$). Cohen's d effect size value ($d = .49$) suggested a medium effect size (Kotrlík, et al., 2011).

Research objective (d) sought to assess undergraduate students' beliefs about international agricultural issues. Students provided responses to items within a beliefs section of 17 Likert-type items in a 6-point scale (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree). The summated mean score of the beliefs section represented the overall beliefs toward international agricultural issues held by the students; in addition, 10 items indicated the students' educational method of preference to learn about international agricultural issues. Overall mean scores of items in the beliefs section varied from 4.24 ($SD = 1.32$) to 5.25 ($SD = 1.00$), values corresponding to the statements: "I learn about international agricultural issues from listening to selected radio programs," and "International agriculture involves more than farming." Variations were observed between TTU and EAP students' scores; however, results were similar between the subsets of the population. TTU students' mean scores ranged from 4.02 ($SD = 1.29$) to 5.08 ($SD = 1.05$), while EAP students' mean score ranged from 4.44 ($SD = 1.49$) to 5.42 ($SD = .94$). The overall students' mean score in the beliefs section was 4.76 ($SD = .71$). Similar to the attitudes section, TTU students' mean score was lower ($M = 4.56$; $SD = .72$) than EAP students' mean score ($M = 4.97$; $SD = .64$). The range was similar between the subsets of the population.

An independent t -test was used to assess the statistical significance in the students' beliefs toward international agricultural issues based on their university of enrollment. The null hypothesis indicated there was no difference in the participants'

beliefs toward international agricultural issues ($H_o: \mu_1 = \mu_2$). The alpha level was set at .05 *a priori*. Because Levene's test for equality of variances violated the assumption of homogeneity of variance ($p = .01$), the corrected t -test was used not assuming homogeneity of variance. The independent t -test recorded a t value of -10.36 ($p < .05$). Therefore, the null hypothesis was rejected in favor of the research hypothesis that stated, in the population, the participants' beliefs toward international agricultural issues differ depending on if they are enrolled at TTU or EAP ($H_o: \mu_1 \neq \mu_2$). Cohen's d effect size value ($d = .60$) suggested a medium effect size (Kotrlik, et al., 2011).

Research objective (e) sought to assess undergraduate students' attitudes toward global citizenship. Within the instrument, students completed a global citizenship section of 21 items using a 6-points Likert-type scale (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree). The overall score of global citizenship represented the level of global citizenship held by the students. Overall mean scores of items varied from 2.35 ($SD = 1.23$) to 5.02 ($SD = 1.11$), values corresponding to the statements, "Over the next 6 months, I will contact a newspaper or radio to express my concerns about global environmental, social, or political problems," and "I think people around the

world get the punishments they deserve." TTU students' scores by item ranged from a mean value of 2.12 ($SD = 1.07$) to 4.98 ($SD = 1.02$) whereas EAP students' scores varied from 2.19 ($SD = 1.42$) to 5.05 ($SD = 1.19$). The overall mean of students' global citizenship scores was 3.71 ($SD = .63$) with a median of 3.75. TTU students' scores were lower ($M = 3.55$; $SD = .62$) than EAP students' mean scores ($M = 3.87$; $SD = .61$).

An independent t -test was used to assess statistical significance in the students' attitudes toward global citizenship based on their university of enrollment. The null hypothesis stated there would be no difference in the participants' attitudes toward global citizenship ($H_o: \mu_1 = \mu_2$). The alpha level was set at .05 *a priori*. Levene's test for equality of variances met the assumption of homogeneity of variance ($p = .92$). The independent t -test recorded a t value of -8.86 ($p < .05$), therefore the null hypothesis was rejected in favor of the research hypothesis that stated, in the population, the participants' attitudes toward global citizenship differed depending on the university of enrollment ($H_o: \mu_1 \neq \mu_2$). Cohen's d effect size value ($d = .52$) suggest a medium effect size (Kotrlik, et al., 2011).

Table 1 summarized the findings regarding the students' knowledge, attitudes, and beliefs toward international agriculture issues, and the students' attitudes toward global citizenship.

Table 1

Summary of Mean Difference of Students' Knowledge, Attitudes, and Beliefs toward International Agricultural Issues and Attitudes toward Global Citizenship (N = 1218)

Variable	TTU <i>n</i> = 612		EAP <i>n</i> = 606		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Knowledge ^a	7.24	2.20	7.89	2.00	1207.62	-5.46	> .01*	.33
Attitudes ^b	4.70	.78	5.06	.68	1196.08	-8.45	> .01*	.49
Beliefs ^b	4.56	.72	4.97	.64	1199.35	-10.36	> .01*	.60
Global Citizenship ^b	3.55	.62	3.87	.61	1216.00	-8.86	> .01*	.52

Note. ^a = 20 multiple choice items coded: 0 incorrect, 1 as correct, total possible = 20. ^b = Likert-type scale: 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree. * *p* < .05

Research objective (f) sought to establish the relationship between undergraduate students' global citizenship attitudes and the university of enrollment, gender, knowledge, attitudes, and beliefs concerning international agricultural issues. A stepwise multiple regression analysis was conducted to predict the global citizenship score students may hold. The predictors were the students' gender, university of enrollment, and their attitudes, beliefs, and knowledge of international agricultural issues; the criterion variable was global citizenship. Table 2 displays the regression model summary. The linear combination of students' attitudes ($t = 5.78, p < .05$) and beliefs ($t = 4.30, p < .05$) toward international agricultural issues, and university of enrollment ($t = 5.49, p < .05$) was significantly related to the students' global citizenship, $F(3, 1194) = 83.04, p =$

.01. Participants' predicted global citizenship is equal to the constant 1.87 + .18 (students' attitudes toward international agricultural issues) + .19 (students' university of enrollment) + .14 (students' beliefs of international agricultural issues). The dependent variables of knowledge and gender were excluded from the multiple linear regression model as they did not significantly impact the model's ability to predict students' attitudes toward global citizenship ($t = .79, p > .05$; $t = .87, p > .05$). The multiple correlation coefficient was .42, indicating approximately 17% of the variance in the students' global citizenship attitudes within the sample population can be accounted by the linear combination of students' university of enrollment, and their attitudes and beliefs regarding international agricultural issues.

Table 2

Regression of Global Citizenship on Characteristics (N = 1218)

Variable	<i>R</i>	<i>R</i> ²	<i>B</i>	<i>SE B</i>	β	<i>pr</i>
Model	.42	.17				
Attitudes			.18	.03	.21*	.17
University			.19	.04	.15*	.16
Beliefs			.14	.03	.16*	.12
(Constant)			1.87	.12		
Excluded Variables						
Gender					.02	.03
Knowledge					.02	.02

Note. Adjusted $R^2 = .17$. Model: $F_{(3, 1194)} = 83.04$; $p < .05$. * $p < .05$

A multicollinearity diagnosis was conducted to identify if the model presented collinearity issues. The Variance Inflation Factor (VIF) for each of the predictors was less than 2.0 and the tolerance was above .2. VIF values greater than 10.0 and tolerance values lower than .2 are reasons of concern (Bowerman & O'Connell, 1990; Myers, 1990). Therefore, the model to predict global citizenship does not present multicollinearity issues.

Conclusions, Recommendations, and Implications

The results obtained in this research study should be considered with caution and should not be generalized to other populations as non-random assignment procedures were used; however, these results describe TTU and EAP students well.

The positive attitudes and beliefs, toward international agricultural issues found in this study may be effectively increasing and strengthening students' open-minded attitudes, allowing them to become comfortable in global settings, and even more importantly, aware of international agricultural issues. However, their knowledge was found to be deficient. These findings suggest students at both academic institutions may not be connecting the actual information learned in classes to an international context, as suggested by Wingenbach et al. in 2003. This may be

disadvantageous for students entering a labor force which demands skillful employees who are able to apply their technical knowledge and show internationally proficiency.

Olson and Evans suggested "students should be able to think, work, and operate across boundaries" (2007, p. 14). Furthermore, global citizenship attitudes, which assessed students' social responsibility, global competence, and global civic engagement, were found to be toward the mid-point of the scale. These findings suggest students may not necessarily fully understand and exhibit the behaviors of global citizenship as prescribed by Morais and Ogden (2011). This is supported by the conspicuously low scores obtained in items such as, "Over the next 6 months, I will work informally toward solving a global humanitarian issue."

The linear combination of students' attitudes and beliefs toward international agricultural issues, and university of enrollment were significantly related to the students' global citizenship, and explained approximately 17% of the variance observed. Researchers indicate variance (r^2) in social sciences models generally range from .15 to .40. This range of variance might not indicate the goodness of models in some fields; however, when examining human behaviors is considered appropriate (Aneshensel, 2012), especially when taking

into consideration human behaviors are highly unpredictable (Westfall & Henning, 2013).

Ajzen (2006) indicated when following the Theory of Planned Behavior that “as a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person’s intention to perform the behavior in question” (2006, p. 1). This research study results imply that the students’ attitudes (attitudes toward the behavior) and beliefs (subjective norms) of international agricultural issues do explain 17% of the variance in the students’ intentions to engage as global citizens in the agricultural sciences (intentions). However, knowledge of international agricultural issues (perceived behavioral control) was found to have minimal contributions to the students’ intentions. These findings partially support what previous researchers have suggested regarding global citizenship and future behaviors, which are built from the students’ attitudes, beliefs and knowledge (Reysen & Katzarska, 2013; Carabain et al., 2012).

These results indicate students at both academic institutions are building positive attitudes and beliefs toward international agricultural issues. These can potentially influence the students’ understanding of global citizenship and their surroundings, and consequently they may display in the future attitudes of global citizenship. The Theory of Human Capital suggests investments in education are done for the purpose of advancing a nation’s economy, and consequently help a nation to keep up with a globalized world (Sweetland, 1996), therefore, it is important to balance students’ attitudinal conditions with the needed knowledge to prepare them as global citizens for the demands of the agricultural industry, locally and globally, especially to build a better world in both developing and

developed countries in the upcoming years. This relationship was suggested by the UNESCO in 2013, and supports the goals proposed by philanthropic projects, such as the Gates Foundation 2015 challenge to improve the lives of people in poor countries in the next 15 years in a faster manner than in the past (Gates Annual Letter, 2015).

It is recommended to emphasize actions that may reinforce students’ knowledge of international agricultural issues and may consequently impact their attitudes of global citizenship, in addition to the already established activities at both academic institutions to infuse international dimensions into the students’ curriculum and experience in college. Over the years, researchers have suggested multiple mechanisms to internationalize the students’ curriculum, such as the infusion of international dimensions into core courses; combining domestic and global issues or topics in classes; international agricultural majors and minors, and certificates; and foreign language and culture courses (Brooks et al., 2006; Navarro, 2004; Whigham & Acker, 2003; Radhakrishna & Dominguez, 1999). Therefore, it is suggested to explore these alternatives in both academic institutions.

The researchers encourage further analysis on students’ knowledge, attitudes, and beliefs of international agricultural issues, and their attitude to engage as global citizens, using randomization sampling techniques and experimental procedures. Moreover, it is recommended to explore faculty according to the constructs assessed in this study and their international experiences. This can help to identify the transferability of professors’ attitudinal conditions regarding attitudes and beliefs of international agricultural issues and attitudes of global citizenship, and their knowledge of international agricultural issues while teaching.

Further research is needed to identify variables that may contribute to explain the global citizenship unaccounted variance in agricultural sciences students (83%). In addition, knowledge of international agricultural issues should not be yet discarded as a potential predictor as previous researchers found knowledge to be an important contributor to global citizenship attitudes.

References

- Acker, D., & Scanes, C. (2000). A case for globalizing undergraduate education and student learning at colleges of agriculture. *Journal of International Agricultural and Extension Education*, 7(1), 47-51. doi:10.5191/jiaee.2000.07106
- Ajzen, I. (1985). From Intentions to Actions: a Theory of Planned Behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11- 39). Heidelberg, Germany: Springer
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. doi:10.1016/0749-5978(91)90020-t
- Aneshensel, C. S. (2012). *Theory-based data analysis for the social sciences*. Thousand Oaks, CA: Sage. doi:10.4135/9781506335094
- Anthony, D., Bederman Miller, P., & Yarrish, K. K. (2013). An analysis of initial global citizenship in a liberal arts college in northeastern Pennsylvania. *Journal of International Education Research (JIER)*, 10(1), 23-28. doi:10.19030/jier.v10i1.8346
- Ary, D., Jacobs, L., Sorensen, C., & Walker, D. (2013). *Introduction to research in education*. Belmont, CA: Cengage Learning.
- Bartlett, J., Kotrlik, J., & Higgins, C. (2001). Organizational research: determining appropriate sample size in survey research appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, 19(1), 43.
- Bowerman, B., & O'Connell, R. (1990). *Linear statistical models: an applied approach* (2nd ed.). Belmont, CA: Duxbury
- Brooks, S., Frick, M., & Bruening, T. (2006). How are land grant institutions internationalizing undergraduate agricultural studies? *Journal of International Agricultural and Extension Education*, 13(3). 91-102. doi:10.5191/jiaee.2006.13307
- Bruening, T., & Frick, M. (2004). Globalizing the U.S. undergraduate experience: a case study of the benefits of an international agriculture field-based course. *Journal of International Agricultural and Extension Education*, 11(1). 89-96. doi:10.5191/jiaee.2004.11110
- Bruening, T., & Shao, X. (2005). What should be included in an international agriculture undergraduate course? *Journal of International Agricultural and Extension Education*, 12(1). 47-54. doi:10.5191/jiaee.2005.12105
- Carabain, C., Keulemans, S., van Gent, M., & Spitz, G. (2012). *Global citizenship: From public support to active participation* [Adobe Digitals Edition version] The Netherlands: Amsterdam. Retrieved from <http://repub.eur.nl/pub/50555/>
- Doerfert, D. L. (Ed.). 2011. *National research agenda: American Association for Agricultural Education's research priority areas for 2011-2015*. Lubbock, TX: Texas Tech University, Department of

- Agricultural Education and Communications. Retrieved from the American Association for Agricultural Education (AAAE) website:
[http://aaaeonline.org/files/research_agenda/AAAE_NRA_\(2011-15\)_interactive_full_report.pdf](http://aaaeonline.org/files/research_agenda/AAAE_NRA_(2011-15)_interactive_full_report.pdf)
- Donner, A. (1982). The relative effectiveness of procedures commonly used in multiple regression analysis for dealing with missing values. *The American Statistician*, 36(4), 378. doi:10.2307/2683092
- Food and Agriculture Organization of the United Nations [FAO]. (2014, March). Post 2015 and SDGs: nourishing people, nurturing the planet (Issue Brief), Rome: FAO
- Frisbie, D. A. (1988). Reliability of scores from teacher-made tests. *Educational Measurement: Issues and Practice*, 7(1), 25-35. doi:10.1111/j.1745-3992.1988.tb00422.x
- Gates Annual Letter. (2015). Our Big bet for the future [Web log post]. Retrieved from
http://www.gatesnotes.com/2015-annual-letter?WT.mc_id=01_21_2015_DO_com_domain_0_00&page=0&lang=en
- Hurst, S. (2013). *Knowledge, perceptions, and experiences of secondary agriculture teachers and 4-h agents regarding global agricultural issues* (Master's thesis, University of Florida). Retrieved from
<http://ufdc.ufl.edu/UFE0045533/00001>
- Institute of International Education. (2015). *Open doors report on international educational exchange: fields of study of U.S. Study abroad students, 2003/04-2013/14*. Retrieved from the Institute of International Education website:
<http://www.iie.org/opendoors>
- Kitsantas, A. (2004). Studying abroad: the role of college students' goals on the development of cross-cultural skills and global understanding. *College Student Journal*, 38(3), 441-452. Retrieved from
<http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=14669496&site=ehost-live>
- Klein, C., & Lawver, D. (2007). Community-based ecotourism design studio in the Yucatan Peninsula: enhancing study abroad with a service-learning component. *Journal of International Agricultural and Extension Education*, 14(3), 97-107. doi:10.5191/jiaee.2007.14308
- Kotrlík, J. W., Williams, H. A., & Jabor, M. K. (2011). Reporting and interpreting effect size in quantitative agricultural education research. *Journal of Agricultural Education*, 52(1), 132-142. doi: 10.5032/jae.2011.01132
- McIntyre, B. D., Herren, H. R., Wakhungu, J., & Watson, R. T. (2009). *Agriculture at a Crossroads. International assessment of agricultural knowledge, science and technology for development (IAASTD): global report*. Synthesis Report. Washington DC: Island Press. Retrieved from FAO website:
http://www.fao.org/fileadmin/templates/est/Investment/Agriculture_at_a_Crossroads_Global_Report_IAASTD.pdf
- Morais, D. & Ogden, A. (2011). Initial development and validation of the global citizenship scale. *Journal of studies in international education*, 15(5), 445-466. doi:10.1177/1028315310375308

- Moriba, S., Edwards, M., Robinson, J., Cartmell, D., & Henneberry, D. (2012). Investigating the international awareness of students meeting their international dimension requirement through course offerings in a college of agriculture. *Journal of Agricultural Education*, 53(4), 98–111. doi:10.5032/jae.2012.04098
- Moriba, S. (2011). *Investigating the international awareness and global competence of students meeting their international dimension requirement through course offerings in a college of agricultural sciences and natural resources: a descriptive and comparative study* (Doctoral dissertation, Oklahoma State University). Retrieved from <https://shareok.org/handle/11244/6567>
- Navarro, M. (2004). *Analysis of factors affecting participation of faculty and choice of strategies for the internationalization of the undergraduate agricultural curriculum: the case in two land grant universities* (Doctoral dissertation, University of Texas A&M). Retrieved from <http://repository.tamu.edu/bitstream/handle/1969.1/580/etd-tamu-2004A-AGED-Navarro-1.pdf?sequence=1&isAllowed=y>
- Nunnally, J. & Bernstein, I. (1994). *Psychometric Theory* (3rd ed.). New York: McGraw-Hill
- Olson, C. L., & Evans, R. (2007). *At home in the world: Bridging the gap between internationalization and multicultural education*. American Council on Education.
- Ogden, A. (2010). *Education abroad and the making of global citizens: assessing learning outcomes of course-embedded, faculty-led international programming* (Doctoral dissertation, Pennsylvania State University). Retrieved from <https://etda.libraries.psu.edu/paper/10524/>
- Opper, S. (1990). *Impacts of Study Abroad Programmes on Students and Graduates. Higher Education Policy Series* (Vol. 2). England: Jessica Kingsley Publishers
- Radhakrishna, R., & Dominguez, D. (1999). Global awareness and understanding of governor school scholars: a four-year study. *Journal of International Agricultural and Extension Education*, 6(3), 19-25. doi:10.5191/jiaee.1999.06303
- Reysen, S., & Katzarska-Miller, I. (2013). A model of global citizenship: Antecedents and outcomes. *International Journal of Psychology*, 48(5), 858–870. doi:10.1080/00207594.2012.701749
- Roth, P. (1994). Missing data: a conceptual review for applied psychologists. *Personnel Psychology*, 47(3), 537–560. doi:10.1111/j.1744-6570.1994.tb01736.x
- Sax, L., Gilmartin, S., & Bryant, A. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in higher education*, 44(4), 409-432.
- Spring, J. (2008). Research on globalization and education. *Review of Educational Research*, 78(2), 330-363. doi:10.3102/0034654308317846
- Stripling, C. T., & Ricketts, J. C. (2016). Research priority 3: sufficient scientific and professional workforce that addresses the challenges of the 21st century, *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 29

- 35). Gainesville, FL: Department of Agricultural Education and Communication.
- Stromquist, N., & Monkman, K. (Eds.). (2014). *Globalization & education: integration and contestation across cultures*. United Kingdom: Rowman & Littlefield Education
- Sweetland, S. R. (1996). Human capital theory: foundations of a field of inquiry. *Review of Educational Research*, 66(3), 341–359.
doi:10.3102/00346543066003341
- United Nations Educational, Scientific and Cultural Organization [UNESCO]. (2013). *Outcome document of the technical consultation on global, citizenship education: Global citizenship education: an emerging perspective*. (ED/2013/PSD/PHR/PI/4). Retrieved from
<http://unesdoc.unesco.org/images/0022/002241/224115E.pdf>
- Westfall, P., & Henning, K. S. (2013). *Understanding advanced statistical methods*. Boca Raton, FL: CRC Press.
- Whigham, K., & Acker, D. (2003). Globalization of agriculture. *South African Journal of Plant and Soil*, 20(4), 209-214.
doi:10.1080/02571862.2003.10634938
- Wingenbach, G., Boyd, B., Linder, J., Dick, S., Arispe, S., & Haba, S. (2003). Students' knowledge and attitudes about international agricultural issues. *Journal of International Agricultural and Extension Education*, 10(3), 25-35.
doi:10.5191/jiaee.2003.10304