Journal of Agricultural Education
Volume 54, Number 2, pp. 99 –113
DOI: 10.5032/jae.2013.02232

The Learning Outcomes of Students meeting Their International Dimension Requirement through Courses offered in a College of Agriculture: Did Student Learning differ depending on Mode of Instruction Delivery?

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Many online courses have been developed in an effort to meet the needs of students who are either unable or less inclined to attend face-to-face classes. The College of Agricultural Sciences and Natural Resources (CASNR) at Oklahoma State University has been preparing its students to attain international awareness and become globally competent citizens through online and face-to-face international dimension (ID) undergraduate courses. However, little was known about whether significant differences existed in students' learning outcomes depending on the mode of instruction delivery. This investigation was a census study and the target population consisted of all undergraduate students (N = 147) enrolled in three ID undergraduate courses offered by CASNR during the Fall semester of 2010. No statistically significant differences existed in the attitude and knowledge scores of students for traditional, face-to-face instruction delivery and online instruction delivery. Regardless of the ongoing controversy surrounding which of the two modes of learning is more effective, the findings of this study supported the use of either for the purpose of improving students' international awareness and general global knowledge.

Keywords: global knowledge; instruction delivery; international awareness; undergraduate curriculum

The traditional, face-to-face instruction, where the instructors and learners meet together in a physical environment to teach and learn (Hsu, 1999; Oblinger & Maruyama, 1996), has been criticized (Banathy, 1994; Hannum & Briggs, 1982; Relan & Gillani, 1997). For example, Hannum and Briggs (1982) claimed that face-to-face instruction encouraged passive learning, paid only minimal attention to individual differences of learners, and involved low-level problem solving as well as minimal critical thinking skills. However, the physical interactions and direct observations among students and instructors in face-to-face instruction were vital for effective learning to occur, according to other researchers (Roberts & Dyer, 2005a; Thompson & Russell, 2004). Instructors have the opportunity to interact with the students directly and learn about their past experiences, needs, and aptitudes firsthand. As a result, instructors can plan well, develop quality educational lessons, employ effective teaching methods, and provide comprehensive evaluation of the learners (Bulger, Mohr, & Walls, 2002; Roberts & Dyer, 2005a).

Traditional, face-to-face learning has been the predominant mode of instruction delivery in many educational institutions. Some students, however, have been either unable or less inclined to attend face-to-face classes (Roberts & Dyer, 2005b). In an effort to meet the needs of these learners, many online courses have been developed as an alternative to face-to-face courses (Allen & Seaman, 2003; Brady, 2008; Roberts, 2006). Online instruction takes place in a non-classroom or *virtual learning* environment where the instructor and the learner are separated by time and physical distance. It relies

extensively on the use of educational technology.

Murphy and Terry (1998) asserted that, "[w]ith rapid advancements in telecommunications technology in recent years, a great deal of interest has developed regarding distance education and its uses by colleges of agriculture" (p. 17). According to Brady (2008), online courses give students an alternative way to engage with course materials. Online learning has increased exponentially as many higher educational institutions endeavor to reach students in distant places (McCann, 2006) as well as resident students who opt to take courses online. However, online learning has its challenges, especially with regard to instructors' limited sense of control and students' diverse learning styles (Harriman, 1989; McConnell, 2000; Rogers, 1998).

The debate over which of the two modes of instruction (i.e., online vs. traditional, face-to-face) is more effective continues unabated in academia (Johnson, Aragon, Shaik, & Palma-Rivas, 1999; Lohr, 2009; Neuhauser, 2002; Rob, 2010). Johnson et al. (1999) stated that, "student satisfaction with their learning experience tends to be slightly more positive in a traditional course format although there is no difference in the quality of the learning" (p. 6) in an online course. In contrast, Lohr (2009) reported that, "[o]n average, students in online learning conditions performed better than those receiving face-to-face instruction" (¶ 1).

Many U.S. universities and colleges have been preparing their students to become globally competent citizens who understand evolving global challenges and opportunities (Bok, 2006; Grudzinski-Hall, 2007; Hayward, 2000; McGowan, 2007; Reimers, 2009). The College of Agricultural Sciences and Natural Resources (CASNR) at Oklahoma State University offers three International dimension (ID) undergraduate courses: ANSI 3903 – Agricultural Animals of the World; AGEC 4343 – International Agricultural Markets, Trade and Development; and AGED 4713 – International Programs in Agricultural Education and Extension (Oklahoma State University Catalog, 2010-2011, p. 214). These courses are intended to prepare students for lives beyond the classroom that will be dominated by the forces of globalization (Nordgren, 2001). Of the ID courses studied, ANSI 3903 and AGED 4713 were offered through the online and the traditional, face-to-face modes of instruction delivery, respectively. In addition, one section of the other ID course, AGEC 4343, was offered online and its other section was provided through face-to-face instruction during the Fall semester of 2010.

Theoretical/Conceptual Framework

The model of the teaching and learning process as developed by Mitzel (1969) formed the basis of the theoretical framework for this study. Its utility has been supported by other scholars: Dunkin and Biddle, 1974; Roberts and Dyer, 2005a; and Smith, Kistler, Williams, Edmiston, and Baker, 2004. The teaching and learning process model comprises four categories of variables: presage, context, process, and product variables (Dunkin & Biddle, 1974). Illustrating the relationships among the four categories, Roberts and Dyer (2005a) posited that the "presage variables and context variables influence process variables, which in turn yield product variables" (p. 2) (see Figure 1).

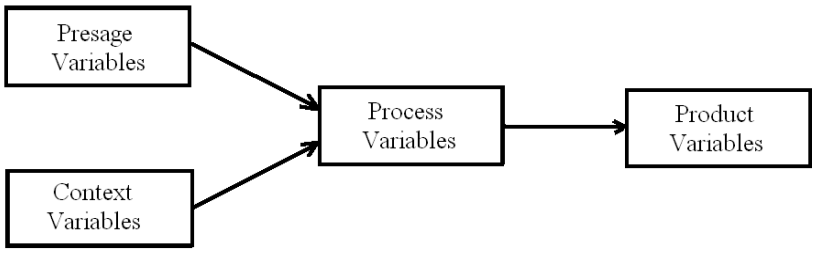

Figure 1. A model of the teaching and learning process. Adapted from "The Influence of Learning Styles on Student Attitudes and Achievement when an Illustrated Web Lecture is Used in on Online Learning Environment" by T. G. Roberts and J. E. Dyer, 2005b, *Journal of Agricultural Education, 46*(2), 1-11.

The *presage variables* focus on the personality, preparedness, experiences, competencies as well as shortcomings of the teacher (Dunkin & Biddle, 1974; Smith et al., 2004). The teacher's personality, classroom management skills, and instruction delivery style may have a considerable effect on students' academic performance and achievement. Teachers should endeavor to work with students on their attitudes toward a course by reflecting on how to transmit the subject matter (Rodriguez, Gutierrez, & Pozo, 2010).

The *context variables* address student experiences and characteristics, school settings, community settings, and the classroom environment (Mitzel, 1969). These variables could influence students' academic success. However, teachers do not usually have control over these variables. For example, the characteristics of students determine their learning styles (Dunn & Dunn, 1992), including the ways students process new information, which is unique to individual learners (Gremli, 1996). It is, however, important for teachers to understand students' learning styles to help them plan well (Roberts & Dyer, 2005a).

The *process variables* address the interaction between instructors and learners and, therefore, involve all classroom activities (Dunkin & Biddle, 1974; Smith et al., 2004). A variety of ways exist to make learning interesting and memorable and teachers may have considerable control over such classroom activities. Teachers who encourage active participation of students in the classroom more often than not succeed in helping students learn. When students are engaged in active learning they do not simply take information passively from instructors, but rather the students read, write, discuss, and are involved in problem solving activities (Bonwell & Eison, 1991; Prince, 2004).

The *product variables* involve the effect or outcome of instruction (Dunkin & Biddle, 1974; Mitzel, 1969; Roberts & Dyer, 2005a). The teaching outcome is what the learners know or are able to do as a result of learning experiences. In other words, the outcome of teaching entails the knowledge, skills, and attitudes a student acquires and can demonstrate after completing learning experiences in a given course or in other learning venues. Research has shown that a causal relationship exists between learning outcomes and the mode of instruction under which the learning was received (Hartnett, Romcke-Jones, & Yap, 2003).

This study focused on the product variables of Mitzel's (1969) teaching and learning process model. The researchers explored whether significant differences existed in attitudes and knowledge on international awareness and general global knowledge between students who participated in CASNR ID courses taught online and face-to-face. Although most students still pursue formal education through the traditional, face-to-face mode of instruction, online learning gives students the opportunity to acquire formal education without the schedule regimen of a traditional classroom. This learning option may be especially important for students whose schedules prevent them from being present physically in a classroom, such as working or place bound adults.

Even though acquiring formal education online is becoming more popular, the debate over its efficacy continues (Kozma, 1994; Lohr, 2009; Min, 2007; Neuhauser, 2002; Parry, 2009; Rob, 2010; Roberts & Dyer, 2005b). CASNR has been preparing students to attain international awareness and become more globally competent citizens through online and face-to-face ID undergraduate courses. However, little was known about whether significant differences existed in students' learning outcomes depending on the mode of instruction delivery.

Purpose of the Study

The purpose of this study was to compare the international awareness and general global knowledge of students enrolled in the ID undergraduate courses offered in CASNR at Oklahoma State University during the Fall semester of 2010 based on mode of instruction delivery. The study compared differences between student groups regarding their attitudes and knowledge whether enrolled in online or traditional, face-to-face undergraduate courses taken for ID credit. Three null hypotheses guided the study's data collection and analyses.

Research Hypotheses

H_o 1 No statistically significant ($p < .05$) difference existed in students' post course attitudes regarding CASNR's role in impacting their international awareness with respect to mode of course delivery (H_o: $\mu_{1\text{post course traditional instruction delivery, pooled}} = \mu_{2\text{post course online instruction delivery, pooled}}$).

H_o 2 No statistically significant ($p < .05$) difference existed in students' post course attitudes regarding their general awareness of the impact of international issues and globalization on the agriculture sector with respect to mode of course delivery (H_o: $\mu_{1\text{post course traditional instruction delivery, pooled}} = \mu_{2\text{post course online instruction delivery, pooled}}$).

H_o 3 No statistically significant ($p < .05$) difference existed in students' general global knowledge, post course, with respect to mode of course delivery (H_o: $\mu_{1\text{post course traditional instruction delivery, pooled}} = \mu_{2\text{post course online instruction delivery, pooled}}$).

Methods & Procedures

The design of the study was non-experimental, posttest descriptive and comparative. The study compared differences between groups of students who participated in online and traditional, face-to-face ID courses taught in CASNR during the Fall semester of 2010. To determine the level of equivalence of the two groups, the researchers measured students' *international awareness* and *general global knowledge* using a pre-treatment assessment (Campbell & Stanley, 1963; Tuckman, 1999). No significant difference ($p > .05$) existed between the two groups based on students' attitude and knowledge scores, pre-treatment (see Table 1). The target population ($N = 147$) of this census study (Patton, 2002) consisted of all undergraduate students enrolled in the three ID courses. Although the participants were not selected randomly, students who completed the research instruments were considered to be representative of undergraduates who had enrolled for these courses in previous semesters or were likely to enroll thereafter (Oliver & Hinkle, 1982).

Table 1

Independent Samples t-Test of Students' Pre Treatment Attitudes and Knowledge Scores regarding International Awareness and Global Knowledge with Respect to Mode of Course Delivery during the Fall Semester of 2010

							95% Confidence Interval of the Difference		
			t	*df*	*Sig.**	*MD*	*Lower*	*Upper*	*eta*^{2}
Pre Course	Attitude 1	Equal variances assumed	2.086	92	.056	.17	.008	.333	.045
	Attitude 2		.649	92	.518	.08	-.168	.332	.005
	Knowledge		-.114	92	.910	.06	-1.032	.920	.0001

*$p < .05$

Note. Attitude 1 - scores regarding CASNR's role in impacting students' international awareness; Attitude 2 - scores regarding students' general awareness of the impact of international issues and globalization on the agriculture sector; Knowledge – students' scores regarding general global knowledge

The research instrument consisted of posttest attitude and knowledge constructs developed using items from a number of previous studies and content relevant websites (Global Awareness Quiz, 2007, 2008, 2009; Radhakrishna & Dominguez, 1999; Sammons & Martin, 1997; Wingenbach et. al., 2003). A summated rating scale, ranging from 1 to 5, was used to measure students' attitudes regarding CASNR's role in developing their international awareness (11 items): 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*) (Creswell, 2008). In the case of students' attitudes regarding their general awareness of the impact of international issues and globalization on the agriculture sector, a six-point, summated-rating scale was used (26 items): 1 (*strongly disagree*), 2 (*disagree*), 3 (*slightly disagree*), 4 (*slightly agree*), 5 (*agree*), and 6 (*strongly agree*) (Creswell, 2008). The measure of general global knowledge consisted of 21 multiple-choice questions. The participants were asked to select the best answer from four possible choices (i.e., "A," "B," "C," or "D").

A panel of experts consisting of faculty members of the Department of Agricultural Education, Communications, and Leadership and the Department of Agricultural Economics at Oklahoma State University evaluated the face and content validity of the research instrument.

Threats to reliability for the two sets of items measuring students' attitudes had been addressed by other researchers (Sammons & Martin, 1997; Wingenbach et al., 2003) who conducted previous studies using the attitude items and scales. Sammons and Martin (1997) used Cronbach's alpha to analyze the first set of 11 attitude-focused items and found a reliability estimate of .90. *Post hoc* reliability estimates were also established and a Cronbach's alpha coefficient of .82 was found for the 11 attitude-focused items per the college's role. The 26 attitude-focused items were grouped into three categories conceptually to ascertain construct-based, internal consistency. Per the *post hoc* procedure, Cronbach's alpha coefficients were determined: understanding global agriculture (15 items), .86; cultural differences (4 items), .71; and U.S. agriculture in the global context (7 items), .78. The overall reliability estimate for this portion of the instrument was .92. Wingenbach et al. (2003) examined the overall reliability of the 26 attitude-focused items and found a Cronbach's alpha coefficient of .95.

Wiersma and Jurs (1990) suggested eight factors to enhance the reliability of criterion-referenced instruments: "homogeneous items, discriminating items, enough items, high-quality copying and format, clear directions to the students, a controlled setting, motivating

introduction, and clear directions to the scorer" (as cited in Pense & Leising, 2004, p. 90). The researchers employed these guidelines to increase reliability of the knowledge portion of the research instrument.

Data were collected on or about the first and last weeks of the Fall semester of 2010. Descriptive statistics were performed to obtain measures of central tendency, *mean differences*, variability, and effect size (*eta* squared). Per "time and place" rationale (Oliver & Hinkle, 1982) regarding the study's subjects, the researchers also used inferential statistics, i.e., independent-samples *t*-tests were used to compare the posttest mean scores of students for ID courses taken by the traditional, face-to-face mode versus the online mode of course delivery.

Findings

Pre-Treatment Assessment

An independent-samples *t*-test was used to determine if statistically significant differences ($p < .05$) existed in students' international awareness and general global knowledge, pre course, by comparing the scores of students enrolled in international dimension courses delivered via the traditional, face-to-face mode of instruction and by online course delivery. Overall, *t*-test results revealed no statistically significant differences in the attitude and knowledge scores of students at the onset of the courses (see Table 1).

A Comparison of Students' Attitudes regarding CASNR's Role in Developing Their International Awareness by Mode of Course Delivery

H_o 1 No statistically significant ($p < .05$) difference existed in students' post course attitudes regarding CASNR's role in impacting their international awareness with respect to mode of course delivery (H_o: $\mu_{1\text{post course traditional instruction delivery, pooled}} = \mu_{2\text{post course online instruction delivery, pooled}}$).

An independent-samples *t*-test was used to determine if a statistically significant ($p < .05$) difference existed in students' post course attitude scores regarding CASNR's role in impacting their international awareness by comparing international dimension courses completed based on mode of course delivery. Overall, *t*-test results revealed no statistically significant difference in the attitude scores of students for traditional, face-to-face instruction ($M = 3.80$; $SD = .487$) and online instruction ($M = 3.79$; $SD = .540$) (see Table 2), $t(96) = .107$, $p = .915$ (two-tailed) (see Table 3). The *mean difference* in knowledge scores was .01 with a 95% confidence interval ranging from -.200 to .223. The *eta* squared statistic (.0001) indicated a very small effect size (Cohen, 1988) (see Table 3). The researchers failed to reject the null hypothesis.

Table 2

Descriptive Statistics for Students' Post Course Attitude Scores regarding CASNR's Role in Impacting Their International Awareness with Respect to Mode of Course Delivery during the Fall Semester of 2010

Attitude	Mode of Delivery	*n*	*M**	*SD*
Post Course	Traditional (Face-to-Face)	63	3.80	.487
	Online	35	3.79	.540
	Overall	98	3.80	.503

*"Real limits" of the scale: 1.00 to 1.49 (*strongly disagree*), 1.50 to 2.49 (*disagree*), 2.50 to 3.49 (*neutral*), 3.50 to 4.49 (*agree*), and 4.50 to 5.00 (*strongly agree*)

Table 3

Independent Samples t-Test of Students' Post Course Attitude Scores regarding CASNR's Role in Impacting Their International Awareness with Respect to Mode of Course Delivery during the Fall Semester of 2010

						95% Confidence Interval of the Difference		
Attitude		*t*	*df*	*Sig.**	*MD*	*Lower*	*Upper*	eta^2
Post Course	Equal variances assumed	.107	96	.915	.01	-.200	.223	.0001

*$p < .05$

A Comparison of Students' Attitudes Regarding Their General Awareness of the Impact of International Issues and Globalization on the Agriculture Sector by Mode of Course Delivery

H_o 2 No statistically significant ($p < .05$) difference existed in students' post course attitudes regarding their general awareness of the impact of international issues and globalization on the agriculture sector with respect to mode of course delivery (H_o: $\mu_{1post\ course\ traditional\ instruction\ delivery,\ pooled} = \mu_{2post\ course\ online\ instruction\ delivery,\ pooled}$).

An independent-samples *t*-test was used to determine if a statistically significant ($p < .05$) difference existed in students' post course attitude scores regarding their general awareness of the impact of international issues and globalization on the agriculture sector by comparing the CASNR international dimension courses completed based on mode of course delivery. Overall, *t*-test results revealed no statistically significant difference in the attitude scores of students for traditional, face-to-face instruction ($M = 5.21$; $SD = .403$) versus online instruction ($M = 5.28$; $SD = .392$) (see Table 4), $t(96) = -.751$, $p = .454$ (two-tailed) (see Table 5). The *mean difference* in attitude scores was .07 with a 95% confidence interval ranging from -.230 to .104. The *eta* squared statistic (.006) indicated a very small effect size (Cohen, 1988) (see Table 5). The researchers failed to reject the null hypothesis.

Table 4

Descriptive Statistics for Students' Post Course Attitude Scores regarding Their General Awareness of the Impact of International Issues and Globalization on the Agriculture Sector with Respect to Mode of Course Delivery during the Fall Semester of 2010

Attitude	Mode of Delivery	*n*	*M**	*SD*
Post Course	Traditional (Face-to-Face)	63	5.21	.403
	Online	35	5.28	.392
	Overall	98	5.23	.398

*"Real limits" of scale: 1.00 to 1.49 (*strongly disagree*), 1.50 to 2.49 (*disagree*), 2.50 to 3.49 (*slightly disagree*), 3.50 to 4.49 (*slightly agree*), 4.50 to 5.49 (*agree*), and 5.50 to 6.00 (*strongly agree*)

Table 5

Independent Samples t-Test of Students' Post Course Attitude Scores regarding Their General Awareness of the Impact of International Issues and Globalization on the Agriculture Sector with Respect to Mode of Course Delivery during the Fall Semester of 2010

						95% Confidence Interval of the Difference		
Attitude		*t*	*df*	*Sig.**	*MD*	*Lower*	*Upper*	eta^2
Post Course	Equal variances assumed	-.751	96	.454	.07	-.230	.104	.006

*$p < .05$

Comparison of Students' General Global Knowledge by Mode of Course Delivery

H_o 3 No statistically significant ($p < .05$) difference existed in students' general global knowledge, post course, with respect to mode of course delivery (H_o: $\mu_{1\text{post course traditional instruction delivery, pooled}} = \mu_{2\text{post course online instruction delivery, pooled}}$).

An independent-samples *t*-test was used to determine if a statistically significant ($p < .05$) difference existed in students' scores of general global knowledge, post course, by comparing the CASNR international dimension courses completed based on mode of course delivery. Overall, *t*-test results revealed no statistically significant difference in the knowledge scores of students for traditional, face-to-face instruction ($M = 11.37$; $SD = 2.684$) and online instruction ($M = 10.97$; $SD = 2.905$) (see Table 6), $t(96) = .675$, $p = .501$ (two-tailed) (see Table 7). The *mean difference* in knowledge scores was .39 with a 95% confidence interval ranging from -0.763 to 1.550. The *eta* squared statistic (.005) indicated a very small effect size (Cohen, 1988) (see Table 7). The researchers failed to reject the null hypothesis.

Table 6

Descriptive Statistics for Students' Scores of General Global Knowledge, Post Course, with Respect to Mode of Course Delivery during the Fall Semester of 2010

Knowledge	Mode of Delivery	*n*	*M*	*SD*
Post course	Traditional (Face-to-Face)	63	11.37	2.684
	Online	35	10.97	2.905
	Overall	98	11.22	2.757

Note. A minimum passing score on the test, i.e., 60% or more correct answers, would have meant a student answered at least 13 of 21 questions correctly.

Table 7

Independent Samples t-Test of Students' Scores of General Global Knowledge, Post Course, with respect to Mode of Course Delivery during the Fall Semester of 2010

						95% Confidence Interval of the Difference		
Knowledge		*t*	*df*	*Sig.**	*MD*	*Lower*	*Upper*	eta^2
Post Course	Equal variances assumed	.675	96	.501	.39	-0.763	1.550	.005

*$p < .05$

Conclusions and Implications

No statistically significant difference existed in the post course attitudes of students regarding CASNR's role in impacting their international awareness with respect to mode of course delivery (i.e., traditional, face-to-face versus online). These findings imply students could form similar attitudes regarding CASNR's role in impacting their international awareness regardless of whether they take an ID course online or through face-to-face instruction. This information is important because of the ongoing debate about which of the two modes of instruction delivery is superior or more effective (Kozma, 1994; Lohr, 2009; Min, 2007; Neuhauser, 2002**;** Parry, 2009; Rob, 2010; Roberts & Dyer, 2005b).

Important differences may exist between the two modes of instruction, especially regarding the instructors' sense of control (McConnell, 2000) and its effect on student learning outcomes. In the case of this study, however, the effect on or change in students' attitudes and knowledge was not significantly different between the two modes of course delivery. *Product variables* underlie what learners perceive and know and are able to do owing to their learning experiences (Mitzel, 1969), which is supported by researchers (Miller & Pilcher, 2001; Sussman & Dutter, 2010) asserting that a relationship exists between the mode of course delivery and learning outcomes. The nonexistence of statistically significant differences between the two modes of instruction in this study, however, underscores the opportunity students had to attain international awareness and general global knowledge regardless of mode of instruction.

Regarding students' general awareness of the impact of international issues and globalization on the agriculture sector, no statistically significant difference existed in the post course attitudes of students with respect to mode of course delivery. This finding implies students could form similar attitudes regarding their general awareness of the impact of international issues on agriculture irrespective of whether they take an ID course through traditional, face-to-face instruction or online. Therefore, a similar result could be anticipated for students enrolling in ID courses offered by CASNR whether the mode of course delivery was face-to-face or online. This *anticipated comparability* allows students more options when selecting a course to meet their international dimension requirement. It also provides some assurance to college administrators that students exit those courses having received learning experiences impacting their attitudes similarly regardless of the course's mode of delivery.

In the case of general global knowledge, very few students achieved a *passing score* (i.e., 60% or more correct answers) on the knowledge test. A passing score of 60% correct answers on the test meant a student answered correctly 13 of the 21 questions that comprised the knowledge construct of the study. The results revealed, however, that no statistically significant difference existed in the post course knowledge of students regarding general global knowledge

with respect to mode of course delivery. This finding implies that students could gain similar levels of general global knowledge irrespective of whether they take an international dimension course online or face-to-face. Many colleges and universities have been offering courses online totally, or, in some cases, they have blended online with face-to-face elements (Allen & Seaman, 2003; Roberts, 2006). Roberts (2006) asserted that, "[i]t is reasonable to assume that students enrolled in an online class have a different learning experience than students enrolled in a face-to-face class, recognizing that different does not necessarily imply better or worse" (p. 112). As for the construct of general global knowledge, the findings of this study support Roberts' (2006) assertion.

Recommendations for Additional Research

The target population of this study was limited to students in CASNR at Oklahoma State University. The study should be replicated involving students in other U.S. colleges and universities. Such studies could enhance the generalizability of the study's findings to U.S. undergraduate students more widely. Increasing the generalizability of the findings is critical taking into account the *context variables* of Mitzel's (1969) teaching and learning process model. The *context variables* addressed the experiences and characteristics of students, which could influence their academic success. For example, Bunch, Lamm, Israel, and Edwards (in press) reported that students' views on the motivators and barriers associated with their participation in international learning experiences differed by the university they attended. Therefore, the need exists to gather data from a broad range of students, including enrollees from a variety of higher education institutions.

In addition, the knowledge construct of the instrument was developed using items describing students' general global knowledge. The study did not test for differences in student performance by course or between courses, i.e., course content, based on mode of delivery. A similar study, therefore, should be conducted using course content as the independent variable. This would involve different ways to measure students' general global knowledge, which may be more appropriate, especially regarding facts and understanding of course content that resonate with the demands of a more interdependent world, including its agricultural and natural resources sectors.

A qualitative study should be conducted to obtain more insight and add another dimension to the findings of this study. This may provide increased understanding of the students' viewpoints on international issues and aspects of general global knowledge. Further, the results of such inquiries may be beneficial to future course development and course offerings in colleges of agriculture intended to internationalize undergraduate students.

Recommendations for Practice

Results of this study revealed that students acquired similar levels of attitudes and knowledge (i.e., *international awareness* and *general global knowledge*) irrespective of the mode of course delivery under which they received an international dimension course. Neither face-to-face nor online courses had a significant advantage over the other regarding the attitudes and knowledge measured. Therefore, CASNR should continue to support international dimension courses taught through face-to-face *and* online modes of instruction, which, in effect, should help to reach more students irrespective of the mode of instruction delivery they prefer.

Taking into account the problems and challenges instructors of online courses encounter (McConnell, 2000) as well as students' low performance on the test of general global knowledge, officials in CASNR should provide instructors professional development in the use of effective instructional strategies and teaching methods. Agricultural education, teacher education, faculty members, whose departments are often located in colleges of agriculture, are uniquely qualified to provide this kind of professional development for their colleagues (Shoulders & Myers, 2011; Westfall-Rudd, 2011). CASNR officials should also provide regular workshops, symposia, and seminars intended to keep instructors informed of the latest developments in the field of

agriculture that resonate with global issues and how best to instruct such to students irrespective of a course's mode of delivery.

Discussion

The results of this study support other researchers' findings that no significant differences existed in students' learning whether face-to-face or online instruction was the mode of delivery (Dennis, 2003; Fortune, Spielman, & Pangelinan, 2011; Johnson et al., 1999). The traditional, face-to-face teaching mode, which is the predominant approach to instruction delivery in most U.S. colleges and universities, has been criticized for encouraging passive learning and paying less attention to the individual differences of learners (Hannun & Briggs, 1982). Instructors, however, may have the advantage of understanding students better in face-to-face classrooms because of the physical interactions and direct observations that occur amongst and between students and instructors (Thompson & Russell, 2004). The recognition of *process variables* (Dunkin & Biddle, 1974; Smith et al., 2004) emphasizes the significance of the interactions that transpire between instructors and learners.

The debate persists, however, over which one of the two modes of learning is superior or more effective (Kozma, 1994; Lohr, 2009; Min, 2007; Neuhauser, 2002; Parry, 2009; Rob, 2010; Roberts & Dyer, 2005b). For example, McConnell (2000) compared online and face-to-face learning environments and highlighted differences in several areas, e.g., instructor's sense of control, condition of meeting, mode, physical context, time, work/discussion, and group dynamics, to name a few. In any case, the instructor's experience and competence were critical in determining the effectiveness of the learning regardless of the mode of instruction used. The *presage variables* of the teaching and learning process model (Dunkin & Biddle, 1974; Mitzel, 1969; Smith et al., 2004) underpin the meaningful role of the instructor vis-à-vis the learning outcome. Moreover, regardless of the controversy surrounding the approaches to instruction delivery, the results of this study could inform the decision-making process of CASNR's administrators and faculty, as well as officials at other colleges of agriculture, regarding further internationalization of the undergraduate curriculum through students' course experiences and their preferences for receiving instruction.

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