(ISSN 0149-4910)

NACTA

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Vol. 56, No. 2 • June 2012

a publication of the NORTH AMERICAN COLLEGES AND TEACHERS OF AGRICULTURE

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Vol. 56, No. 2 • June 2012

NACTA Journal

the professional journal advancing the scholarship of teaching and learning in agricultural, environmental, natural and life sciences

NACTA Journal (ISSN 0149-4910) is published quarterly by the North American Colleges and Teachers of Agriculture (formerly the National Association of Colleges and Teachers of Agriculture). It is directed toward the scholarship of teaching and learning in agricultural, environmental, natural and life sciences by presenting articles covering topics that treat all aspects of teaching such as methods, problems, philosophy, and rewards at the college level. All manuscripts undergo double-blind peer review. An author's guide for manuscript preparation is available on the NACTA web page: http://www.nactateachers.org/ or are available upon request. Page charges of $75.00 per manuscript are waived if one of the authors is a NACTA member at the time of publication.

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The Journal is published electronically/online and quarterly - March, June, September and December. The issues for the current year are available to NACTA members at this website: http://www.nactateachers.org/journal.html, a login and password obtained through membership is required.

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A yearly hard copy of all four issues is printed in December and is available for purchase through Lulu.com.

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Elements and Analysis of an Internship Program in Animal Sciences

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Abstract

The purpose of this paper is to describe the organization, management, and outcomes of an internship program in Animal Sciences. The goals of the internship experience are to provide an experiential learning opportunity for students to apply the concepts, knowledge, and skills gained during their undergraduate education to real world situations as they connect theory with practice. The internship experience provides students an opportunity to enhance written and oral communication skills, improve critical thinking skills, and promote awareness of community and societal issues while increasing student marketability for employment. The internship program is administered online through a course management system. The majority of internships were completed during summer quarter by students of senior rank. Eighty-four percent of internships were local and less than 6% of students completed more than a single internship for academic credit, with students completing multiple internships participating in longer internship experiences ($P < 0.001$). Veterinary internships represented 21.3% of all experiences, followed by food animal production (20.0%), and research (18.3%). Within animal industries, dairy cattle internships dominated (40.8% of total food animal production internships). According to graduate surveys, 94% of survey respondents rated the internship as valuable and 28.6% of respondents were offered full-time employment by the internship organization ($P < 0.001$).

Introduction

Over the last four decades, the prevalence of internship programs in academia has increased (Hurst and Good, 2010; Katula and Threnhauser, 1999). Originally criticized on the grounds of academic merit (Santarino and Rogers, 1979), internships are now a familiar element of the academic experience and it is estimated that three in four students participate in an internship prior to graduation (Coco, 2000). The benefits of an internship extend through the student, host organization, and academic institution. Internships provide a realistic understanding of the organization, structure, and expectations of a chosen profession; support the transition from student to professional; and promote networking opportunities that establish professional relationships (Parilla and Hesser, 1998; Ryan and Cassidy, 1996). In addition, internships encourage application of knowledge and technical skills and integrate these competencies with the broader goals of academic programs that include critical thinking, problem solving, and communication abilities (Gault et al., 2000; Hurst and Good, 2010; Sterns et al., 2005). For the internship experience to capture the learning potential and move beyond work for credit criticism, internship programs require structure that ensures work experience is coupled to intentional learning that is self-directed and self-reflective (Katula and Threnhauser, 1999; Ryan and Cassidy, 1996). To this end, the College of Food, Agricultural, and Environmental Sciences of The Ohio State University established a mandatory internship program to enhance the quality of undergraduate education by promoting hands-on, career related experiences that allow students to put into practice the concepts, knowledge, and skills gained during their undergraduate education. Student interns engage in self-directed learning that encourages the connection of classroom knowledge to real world experiences and reflection to reinforce learned concepts and ground theory with practice. Although there are exhaustive reports of internship programs in the literature, reports center on business and marketing internships (Clark, 2003; Gault et al., 2000; Hurst and Good, 2010) and less information is available concerning the implementation and value of programs in science related disciplines. The purpose of the article herein is to document the implementation of an animal sciences undergraduate internship program, characterize the student interns and their experiences, and report the perceived value of the internship experience to postgraduate career decisions.

[1]The author gratefully acknowledges Mariette Benage for her contributions to this study.

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Methods

Internship Structure

Completion of an internship is a degree requirement for the animal sciences major. Students are evaluated on a satisfactory/unsatisfactory basis for award of academic credit according to the number of internship hours completed in the quarter system. Students may earn three credits for completion of 200 h, four credits for 300 h, or five credits for 400 h of work experience. Internship credits are repeatable to a maximum of 10 credits. Consultation with an academic advisor and prior approval of the internship experience through submission of an internship proposal is mandatory. Student performance is monitored by student submission of activity reports, which summarize internship responsibilities, time dedicated to these responsibilities, knowledge and skills learned or used, and proficiency level evaluated on a five-point response scale. A similar five-point response scale is used for the intern evaluation report, which rates students' professionalism, knowledge, initiative, and quality of work and documents the interns strengths and areas for improvement as discussed between the employer and intern. At the conclusion of the internship, a detailed report that includes reflection on the value of the experience is submitted. An oral presentation followed by a question and answer session is scheduled for an audience of peers. Satisfactory completion of the internship report and presentation is required to earn academic credit for the experience. Faculty and staff supervisors provide individual guidance for student interns and are responsible for assessing satisfactory completion of the requirements.

A faculty coordinator is responsible for program oversight and administering the program through the universities online course management system (CMS). Students are required to use the CMS to complete the internship. Management tools within the CMS restrict student access of program requirements until first completing an internship orientation. The orientation is linked to a quiz tool that assesses student awareness of the program and a score of 80% on the quiz is required to remove site restrictions. Program metrics are monitored through the CMS. The online content provides animal sciences majors continual access to the programs mission, guidelines, and requirements. The CMS also provides access to internship opportunities, career services, and graduate and professional school information. Internship opportunities reflect a comprehensive database of over 500 organizations that have previously participated in intern hires or have contacted program personnel with interest in hiring an intern. The database is provided for contact purposes and positions not listed may be considered for internship credit as well. Internship experiences in general agriculture; food animal industries (aquaculture, beef, camelids, dairy, horse, pigs, poultry, sheep, and goats); breeding and genetics; business, sales, and pharmaceuticals; companion animals; conservation and wildlife management; meat and food science; nutrition; research; veterinary medicine; zoos and aquariums; outreach and education; and public and health policy are advertised. The database is updated continually to reflect new or dissolved internship positions.

Program Assessment

This study used data collected from existing records of animal sciences students (n=734) participating in the internship program between 2004 and 2010. Data was retrieved from internship records maintained by the Animal Sciences department and included: internship year, academic quarter and minimum hours completed, employment category, and internship location. Transfer status was determined from enrollment records. Students with less than 15 credit hours of course matriculation or who entered with proficiency examination credit were considered nontransfer students. The application of an online CMS for administering the program was assessed using the survey tool function of the CMS that was made available to students in 2006. A survey instrument developed to profile animal sciences graduates of The Ohio State University was used to determine perceived value and employment outcomes associated with internships. The online survey was sent to graduating seniors (n=184) between 2009 and 2010 with a response rate of 48.9%. This study was deemed exempt by The Ohio State University Institutional Review Board.

Statistical analyses were performed by the Cochran-Mantel-Haenszel test to control for student and determine the associations between academic rank, transfer status, credit hours, and internship location using the PROC FREQ procedures of SAS (version 9.1; SAS, Cary, NC). The Rao-Scott chi-square test (PROC SURVEYFREQ) was used to estimate response frequencies to survey questions. Mean responses to CMS survey questions were compared by ANOVA using the mixed model (PROC MIXED) procedures of SAS appropriate for random nested effects. Data are presented as means ± SEM with $P \leq 0.05$ considered significant. No identifying information was used in data analysis.

Results and Discussion

Benefits of internships for students, host organizations, and academic institutions are well documented (Gault et al., 2000; Hurst and Good, 2010; Parilla and Hesser, 1998; Ryan and Cassidy, 1996; Sterns et al., 2005). Despite the recognized benefits, the time investment required by personnel to govern internship programs can be a limiting factor in their implementation (Hanson, 1984). Similar to a previous report (Hanson, 1984), the internship program discussed herein was maintained by the concerted efforts of an internship coordinator as well as faculty and staff supervisors; however, informational and administrative components of the program were delivered through a CMS. The hybrid structure preserved the academic integrity of the program while reducing face-to-face contacts associated with a mandatory program that involves diverse internship interests and continual student participation. Survey data retrieved suggests that an internship program can be effectively administered online. Students expressed greatest agreement with questions concerning expectations of the program and awareness of internship opportunities (P = 0.03; Table 1). While there was less agreement on program orientation, a generally positive consensus was reached. Survey findings also provide evidence that the CMS is an effective technology for increasing career services and occupational awareness.

Course management system survey findings should be interpreted cautiously, however, due to the low response rate of 3.3%, which was determined from the ratio of completed surveys to the number of students completing an internship. Factors contributing to survey response rates are complex and include subject demographics, mode of survey administration and confidence in anonymity, survey topic, incentives, and engagement (Porter and Whitcomb, 2005). It is likely that these same variables influenced the low response rates in the current study. Indeed, survey participation was voluntary, respondents were not solicited, and incentives were not provided. It is generally accepted that survey bias is increased with increased nonresponse rates, however, the relationship between nonresponse rates and survey quality is tenuous (Krosnick, 1999). Although low response rates increase the likelihood that responders are not representative of the population in question, data obtained from surveys with high response rates may equally misrepresent the population (Asch et al., 1997; Krosnick, 1999).

Instructional Strategies for Assessing Internships

Instructional strategies that promote and assess student learning underscore the academic value of an internship program. Various instructional methods are reported in the literature for ensuring internship effectiveness in the context of academia (Clark, 2003; Parilla and Hesser, 1998; Santarino and Rogers, 1979). The internship program reported herein uses written proposals, activity and evaluation reports, formalized oral presentations, and a culminating final report for assessment. Proposals are an important tool in framing the nature of the relationship between the intern and site supervisor (VonDras and Miller, 2002). The proposal serves as a contract that clarifies the expectations of the internship. Specific learning objectives, skills and knowledge to be gained, and responsibilities are detailed and provide realistic goals

Table 1: Summary of responses to CMS survey statements from The Ohio State Universities Animal Sciences department internship program between 2006 and 2010

	Response, %[z,y]					Mean Response
Statement	**1**	**2**	**3**	**4**	**5**	
The Internship Orientation provided useful information.	5.6	0.0	22	44	28	3.9 ± 1.0
I understand what is expected for successful completion of the internship requirement.	0.0	0.0	0.0	67	33	4.3 ± 0.5
There are a variety of internship opportunities to explore my career interests.	0.0	0.0	5.6	56	39	4.3 ± 0.6
Occupational Awareness contained information that increased my awareness of careers available in Animal Sciences.	0.0	0.0	28	61	11	3.8 ± 0.6
I am more aware of the career services available at OSU.	0.0	5.6	11	72	11	3.9 ± 0.7
The Career Planning Resources were helpful.	0.0	11	22	44	22	3.7 ± 1.2
The Basics of Interviewing provided useful information on what I can expect during the interview process.	0.0	5.6	22	56	17	3.5 ± 0.6
I will continue to use the resources available on the CMS even after I have completed my internship.	0.0	11	11	56	22	3.9 ± 0.9

[z]Respondents (n=18) used a five-point response scale rating system: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.
[y]Chi-square analysis for distribution of responses P = 0.03.

toward which progress can be measured. Establishing learning objectives encourages active participation in the learning process, assists students in clarifying their individualized goals, and increases the likelihood of learning outside the classroom (DeVuyst, 2006; Parilla and Hesser, 1998). Activity reports document the responsibilities and tasks completed and assess progress. In addition, these reports are an opportunity to ensure communication is maintained between the intern and the academic community. Meaningful learning is said to be compromised when students are removed from communication with the university (Bulger, 2006). The intern evaluation report reinforces the learning experience through feedback, which is considered a cornerstone of learning when it identifies strengths and suggests areas for improvement (Coco, 2000; Orrell, 2006). An oral presentation and culminating final report guide student reflection of the experience. Specifically, interns communicate both technical and social skills that were used or acquired, previous academic knowledge that contributed to their success, and areas where academic preparation was inadequate. The instructional strategies used facilitate meaningful reflection, and in agreement with others (Clark, 2003; DeVuyst, 2006; Parilla and Hesser, 1998), are of great academic value as students are directed to comprehend the importance of their experience and connect it with knowledge previously learned in the classroom.

Profile of Internship Experiences

The majority of students conducted internships during the summer quarter (78%), with lesser participation during autumn (5.6%), winter (6.0%), and spring (10%) quarters when students were dedicated to traditional classroom instruction (Table 2). This is in agreement with Clark (2003), who reported that while students engaged in part-time internships throughout the academic year, most were completed during summer when more time could be dedicated to work. Intern employers also report this time of the year as most valuable for an internship hire (Fenwick and Gartin, 1990). Summer internships can lead to more rewarding opportunities as students do not need to divide time between these hands-on-experiences and the classroom. Gavigan (2010) contends that financial assistance is an important consideration for summer internships as students are unable to participate in these learning experiences without a stipend. In the current study, it was at the student's discretion to complete a volunteer or compensated internship. The association between compensation and time of internship completion is not known, however, a previous report (Fenwick and Gartin, 1990) showed that students in agriculture ranked financial compensation as the least important of the benefits associated with an internship program. Furthermore, unpaid internships are common throughout various employment sectors as students are willing to work without financial compensation for career development and academic credit (Lipka, 2008).

Table 2: Profile on internships completed by Animal Sciences majors of The Ohio State University between 2004 and 2010

Variable	Number	Percent
Academic rank[z]		
freshman	7	1
sophomore	69	14
junior	159	31.4
senior	271	53.6
Quarter conducted		
autumn	41	5.6
winter	44	6.0
spring	75	10
summer	574	78.2
Minimum hours completed[y]		
200	346	49.1
300	44	6.2
400	315	44.7
Internships completed[x]		
1	639	94.7
2	34	5.0
3	2	0.3
Location[w]		
Local	612	84.2
National	111	15.3
Global	4	0.6

[z]Academic rank is reported for nontransfer students (n=506). Students with less than 15 credit hours of course articulation or who entered with proficiency examination credit are considered nontransfer students.

[y]Students complete a minimum of 200 h for three credits, 300 h for four credits, or 400 h for five credits.

[x]Numbers for internships completed reflect number of students.

[w]Internships have been conducted across 36 states and three countries.

There was no prerequisite academic standing or coursework required for conducting an internship, which was in contrast to other reports (Ross and Elechi, 2002; Von Dras and Miller, 2002; Campbell and Kovar, 1994; Santarino and Rogers, 1979). While students completing internships within the first two years of attending the university may not have the breadth of academic knowledge relative to their more senior peers, the internship can serve as a catalyst to a more in depth investigation of a subject. In addition, students participating in internships earlier in their academic career would have greater opportunity to pursue multiple internships prior to graduation. Indeed, a previous study indicated that students were interested in completing multiple internships prior to graduation (Davis and Williams, 2004) and media suggests a rising trend toward multiple internships;

Table 3: Associations of academic classification and number of internships completed with internship length and location

Variable		Percent[z]							
		Minimum hours[y]				Location			
	n	200	300	400	P-Value	Local	National	Global	P-Value
Rank[x]									
Freshman	8	62.5	12.5	25.0		75.0	25.0	0	<0.001
Sophomore	70	41.4	8.57	50.0		78.6	21.4	0	
Junior	159	42.8	3.77	53.5		77.7	22.3	0	
Senior	271	52.0	6.27	41.7		90.0	8.92	1.12	
Transfer status[w]									
Yes	192	53.1	6.77	40.1		84.3	15.1	0.60	
No	508	47.4	5.93	46.4		83.7	15.8	0.53	
Internships completed[v]					<0.001				
1	671	50.7	6.11	43.2		84.0	15.4	0.58	
2-3	34	18.8	9.38	73.5		88.2	12.5	0	

[z] Cochran-Mantel–Haenszel analysis of association.

[y] Students complete a minimum of 200 h for three credits, 300 h for four credits, or 400 h for five credits.

[x] Academic rank is reported for nontransfer students.

[w] Students with less than 15 credit hours of course articulation or who entered with proficiency examination credit are considered nontransfer students.

[v] Data for internships completed were coded to represent the first, second, or third internship experience.

however, there is insufficient data in the literature to support. Findings of the current study revealed that less than 6% of students completed two or three internships (Table 2). It is not known why such limited number of students pursued multiple internships in view of academic programs recommending the practice (Clark, 2003). While the allowance of short duration internships provide flexibility to pursue multiple internships, it is unlikely that the length of the internship was a contributing factor. Students completing multiple internships were more likely to participate in longer individual internship experiences (P< 0.001; Table 3). Furthermore, most internships (53.6%) were completed by students of senior standing (Table 2). It should be noted that the study only captured students that completed internships for academic credit. It is plausible that more students completed a second or third internship independent of academic credit once the degree requirement was fulfilled, but these numbers would be limited due to most students not fulfilling the requirement until their senior year.

The majority of completed internships were local (84.2%), with national and global internships representing lesser percentages of total internships (Table 2). The factors that influence student decision in internship site selection may underscore limited participation in national and global internships. It is well established that selection of an internship site requires careful consideration to achieve both experience and learning (Campbell and Kovar, 1994). Students tend to seek internship sites that promote career exploration and training in a supportive environment; however, schedule flexibility and convenient location also are important factors in selection (Parilla and Hesser, 1998). Internship sites in the current study were established through faculty and student contacts, similar to other published reports (Fenwick and Gartin, 1990; Santarino and Rogers, 1979). While a number of local and national internship sites were made available to students, only four international internship sites have been established. International internships facilitate meaningful learning experiences and are a common form of curriculum globalization (Forsberg et al., 2003). However, prior involvement of faculty with international communities that support the mission of the internship program in an academic context are considered essential to program success and are a limitation for global internships (Engstrom and Jones, 2007) as observed in the current study.

Veterinary internships represented 21.3% of all experiences, followed by food animal production

Table 4: Characteristics of internships completed by Animal Sciences majors of The Ohio State University between 2004 and 2010

Variable	Number	Percent
Category		
Agriculture[z]	6	0.8
Food Animal industries[y]		
Beef cattle	38	5.2
Dairy cattle	60	8.2
Poultry	16	2.2
Pigs	28	3.8
Sheep	3	0.4
Companion animals[x]	57	7.8
Conservation and wildlife management	31	4.2
Horse	71	9.7
Llama	2	0.3
Meat and food science	26	3.5
Nutrition	9	1
Research[w]	134	18.3
Veterinary	156	21.3
Zoo and aquarium	31	4.2
Other[v]	66	9.0

[z] Positions excluding animal agriculture

[y] Animal industries represented 147 (20.0%) of internships completed.

[x] Includes positions in behavior and training, animal therapy and service, and kennel and shelter work.

[w] Forty-eight percent of research internships were supported through departmental and college funding initiatives to promote research opportunities within the undergraduate curriculum.

[v] Included positions in business (n = 36), education (n = 3), extension (n = 19), human health (n = 5), pharmacy (n =2), and politics (n =1).

Table 5: Summary of responses to selected statements from The Ohio State Universities Animal Sciences department 2009-2010 graduating senior survey

Statement	n	Response, % Yes	No	SE
My internship was valuable in helping me to decide what I want to do with my life.	90	94	5.9	2.2
My internship employer offered me a full-time position after the completion of my internship.	90	29	71	4.2

Chi-square analysis for distribution of responses $P < 0.001$

(20.0%), and research (18.3%) (Table 4). Within animal industries, dairy cattle internships dominated (40.8%). Previous reports have reflected on the increased number of students enrolled in animal sciences with career interests in veterinary medicine (Lyvers Peffer, 2010), which is likely to contribute to the decisions to pursue an internship in this field. The number of internships conducted in food animal industries, however, was surprising. Less than 10% of animal sciences students enrolled in introductory courses reported career interest in food animal production (Lyvers Peffer, 2010). The decision to pursue internships in this area likely reflects either a means to diversify animal experiences in preparation for veterinary school admissions or shifting career interests. Participation in undergraduate research experiences was expected. The benefits associated with undergraduate research have been extolled in reports elsewhere (Bauer and Bennet, 2003; Lopatto, 2003) and involvement generally aligns with students decisions for postgraduate education (Lopatto, 2004).

Student Perception Internship Value

According to Neapolitan (1992), internships are valuable experiences for solidifying career choices by clarifying expectations of the profession. Students who are indecisive as to career choice report gains in certainty of career decisions following completion of an internship (Neapolitan, 1992). In the current study, 94% of survey respondents rated the internship as valuable to decision-making and their future and 28.6% of respondents were offered full-time employment by the internship organization ($P< 0.001$; Table 5). Post-graduate career success is a primary aim of undergraduate programs and internships are an important tool to this end. Assessments of undergraduate internship completion and employment at graduation show that internships are one of the most valuable experiences toward early career success (Callanan and Benzing, 2004; Krouse et al., 1999). This association reflects not only the benefits of internships on the student, but the direct value to employers as well. An increasing number of employers are using internships as recruiting tools. Interns bring new perspectives to an organization and deliver current knowledge, while employers gain access to highly motivated individuals and are given the opportunity to evaluate their employment potential within the context of the company (Hurst and Good, 2010). According to the National Association of Colleges and Employers (2011), 40% of new college hires will stem from internship and co-op programs. Less than 30% of respondents in the current study reported full-time employment offers. Although these findings may be confounded by the students' academic rank at the time of the internship, data are in agreement with previous reports where 33% of interns report job offers (Fenwick and Gartin, 1990).

Summary

The benefits of internships toward enhancing traditional classroom instruction are well documented. This study discusses the instructional strategies that are available to guide students in self-directed learning and reflection to ensure academic integrity of internship programs and demonstrates that such programs can be administered online. While animal sciences students pursue internships across diverse professions, the majority elects to complete internships locally and only limited numbers of students complete multiple internships for academic credit. The perceived value of an internship toward helping students elucidate their future goals warrants integration of internships in college curricula.

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Identifying Faculty's Knowledge of Critical Thinking Concepts and Perceptions of Critical Thinking Instruction in Higher Education[1]

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Abstract

This study was done to identify patterns in college of agriculture and life sciences faculty's understanding of basic critical thinking concepts and person perceptions of critical thinking instruction. The objectives of this study include, identifying patterns in faculty's knowledge of critical thinking concepts and identifying patterns in faculty's perceptions of critical thinking instruction in higher education. This quantitative study was performed to analyze patterns in responses of faculty participants. The participants included 61 self-selected faculty with teaching appointments in a college of agriculture and life sciences at a southern land grant institution. The data was collected using a compilation of three instruments: a critical thinking basic skills test, a "perceptions of critical thinking instruction" questionnaire, and a short demographic segment. The online data collection software, Qualtrics, was used to collect the data. The overall conclusion was that faculty's knowledge of perceptions and concepts of critical thinking is severely lacking. Not one question, in any section, was answered completely correctly. It is recommended that faculty participate in further education to understand the concepts of critical thinking.

Introduction and Theoretical Framework

Thinking is a natural process, but when left to itself, can often be biased, distorted, partial, uninformed and potentially prejudiced; excellence in thought must be cultivated (Duron et al., 2006). Students are able to think critically on their own, but this skill needs to be strengthened and reinforced by teachers. Furthermore, the way material is presented has a large effect on whether or not critical thinking takes place. Most teachers use a lecture format in their classrooms, but this popular approach does not encourage critical thinking by the students (Duron et al., 2006). To encourage critical thinking, the passive receipt of information must change, teachers must give up the perception that students cannot learn unless a teacher covers the material (Choy and Cheah, 2009). This being said, it is important to consider how much influence a teacher's perception of critical thinking has on the student's ability to learn and think critically.

In 2004, higher education associations and leaders of institutional accrediting bodies decided that critical thinking was one of the six major intellectual and practical skills students should understand (AAC&U, 2004). However, Lauer (2005) claimed that, "teachers may not know how to incorporate critical thinking into their lessons." Yet, based on traditional methods, faculty lean too heavily on traditional lecture and PowerPoint; this may be the reason teachers have difficulty incorporating critical thinking into their classes. Research has shown that the nature of the discipline does not matter and that students have to learn to read deeper into topics and think critically about the knowledge given (Rhoades et al., 2008). Without the correct concepts and perceptions of critical thinking, the teacher may believe they are encouraging or teaching critical thinking when they are not. This study was developed to determine the extent of knowledge faculty members, with teaching positions, have about critical thinking, as well as their current perceptions about critical thinking instruction.

[1]The University of Florida Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study.
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Critical thinking is defined by Facione (1990) as "purposeful, self-regulatory judgment, which results in interpretation, analysis, evaluation, and inference, as well as explanation of evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based." Another definition of critical thinking, in regards to agricultural education, is by Rudd et al. (2000), and states, "critical thinking was a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely."

Whittington and Newcomb (1993) found that although teachers have positive attitudes and aspirations to teach at higher, critically thinking levels, they may not actually be doing so. One reason behind this incongruence is that teachers may not understand how to teach at higher levels or even what strategies teaching at a higher level may include. Intentionality is the power of minds to be about, to represent, or to stand for, things, properties and states of affairs (Jacob, 2010). Intentionality comes into play with the idea that teachers may not teach what they do not think they can explain. Their intention may be to teach at a higher level, which would include critical thinking, when really, the perception of the knowledge they have of this subject is incomplete.

There is little information empirically established to determine not only the perception of faculty about critical thinking instruction, but also the actual knowledge faculty has about critical thinking concepts. This is an important step in beginning the process of determining a model of assisting faculty in providing the best quality critical thinking instruction in their classrooms.

Purpose and Objectives

The purpose of this research was to identify patterns in college of agriculture and life sciences faculty's understanding of basic critical thinking concepts and personal perceptions of critical thinking instruction.

The following objectives provided a foundation for the study and were to:

1. Identify patterns in faculty's knowledge of critical thinking concepts and
2. Identify patterns in faculty's perceptions of critical thinking instruction in higher education.

Methods

To accomplish the objectives and fulfill the purpose of the study a mixed-methods approach was utilized. Quantitative methods were used to collect responses and qualitative, content analysis methods were used to analyze patterns in responses of faculty participants. The researchers determined that this approach was appropriate for this study, considering its developmental nature.

Responses, collected through an online assessment, were recorded for 61 self-selected faculty with teaching appointments within the college of agriculture and life sciences at a southern land grant institution. The participants were identified through email requests of faculty with teaching appointments. There is a total of 376 faculty with teaching appointments who represent 17 academic departments, with emphases in both social and bench sciences at the institution. Upon initial review of the data four responses were determined to be unusable, resulting in a total of 56 usable responses.

The assessment used in the study was a compilation of three instruments, a critical thinking basic skills test (Elder et al., 2007), a perceptions of critical thinking instruction questionnaire (revised from Choy and Cheah, 2009), and a short demographic segment. Using the Qualtrics online data collection software, the researcher set parameters for each section of the assessment.

The first segment was specifically designed to measure an individual's knowledge of basic critical thinking concepts as designed by Elder et al. (2007). The International Critical Thinking Basic Concepts and Understanding Test included three parts with a total of 26 questions. Part one, On the Nature of Critical Thinking, had ten true/false questions designed to gauge an individual's familiarity with specific critical thinking statements. The second part, On the Nature of Critical Thinking II, included six multiple-choice questions to determine the accuracy of an individual's knowledge of critical thinking. Part three, On Recognizing Important Distinctions in Critical Thinking, utilized a matching technique, whereby respondents had to match statements with terms related to critical thinking. There were a total of ten terms to match with six statements, including "none of the above." Examples of questions are provided in Table 1. A key was provided to determine the accuracy of each response.

The second segment was revised from a list of questions first proposed by Choy and Cheah (2009). The original list contained eight open-ended questions to gauge faculty's perceptions of critical thinking and critical thinking instruction. The revised questionnaire was comprised of 15 Likert-type questions using a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument, which was reviewed by content

Table 1. On the Nature of Critical Thinking

Statement	True	False
Critical thinking is useful only in Western Cultures (False)	1 (1.8%)	5 (98.2%)
As people grow older they naturally develop as critical thinkers (False)	18 (40%)	27 (60%)
Critical thinking is self-disciplined (True)	36 (80%)	9 (20%)
Critical thinking enables one to think more deeply	46 (82.1%)	9 (16.1%)
One should not analyze sympathetically points of view that are disgusting and obviously false (False)	3 (5.4%)	53 (94.6%)
If a statement is unclear we benefit by asking what our purpose is in saying it (True)	54 (96.4%)	1 (1.8%)
Implications are conclusions you come to in a situation (False)	18 (40%)	27 (60%)
Critical thinking is important in learning to read well (True)	40 (91%)	5 (9%)
Critical thinkers use subjective standards to assess thinking (False)	16 (35%)	29 (65%)
Critical thinkers learn to ignore their emotions when making important decisions (True)	24 (53%)	21 (47%)

experts for face validity, was analyzed using statistical software for internal reliability, as well. Questions included in this segment were analyzed and found to have a Cronbach's Alpha Coefficient of .70. This coefficient was determined sufficient due to the developmental nature of this segment as addressed by Penfield (2002).

Content analysis includes collecting data and using classifications to identify patterns and frequencies among the respondents. Concepts from each piece of the assessment were reviewed by the researchers for pattern in response and theme. Each concept was identified individually by the researchers and then discussed to determine consistency between the researchers. The questions of the assessment served as the codes in which patterns of responses were identified.

Findings of the content analysis are provided for each of the research objectives outlined for this study. Because of the developmental nature of the research, the findings are in no way intended to be generalized beyond those individuals participating in the study.

Findings

Objective 1

Objective 1 was to identify patterns in faculty's knowledge of critical thinking concepts. This was accomplished through a systematic review of individual responses on the 3-part International Critical Thinking Basic Concepts and Understanding Test (Elder et al., 2007).

The first section of the International Critical Thinking Basic Concepts and Understanding Test included 10 true/false questions regarding "On the Nature of Critical Thinking." Of the ten questions, there was not a single question in which all respondents answered correctly; however, there were consistencies in which questions were answered among all respondents. The statements and responses are shown in Table 1.

There were 21 respondents who incorrectly answered false to the statement, "Critical thinkers learn to ignore their emotions when making important decisions." Similarly, 18 responded true to the statement, "Implications are conclusions you come to in a situation" which was incorrect. For the statement, "As people grow older they naturally develop as critical thinkers," 18 responded true when in fact the statement is false. Lastly, 16 respondents who believed "Critical thinkers use subjective standards to assess thinking" was a true statement when it is false.

In the next section of the assessment, there were a total of six questions to determine familiarity with critical thinking concepts when presented with alternative responses. Again, there was not a single question where the all respondents answered correctly; however, there were some general patterns in response. The statement, "It is important to clarify thinking whenever," had the most consistency in response with 50 respondents identifying correctly that the statement referred to all provided options ("You are explaining something to someone," "Whenever someone is explaining something to you," You are analyzing an article or chapter"). The next question which had the least varying amount of response related, "Fair-minded thinking is" to "Integrally connected with intellectual empathy" where 40 of 54 respondents answered it correctly. The other respondents varied in answer. There were 40 of 53 respondents who answered, "Depth in reasoning best relates to" correctly with "All of the above" ("Complexities in the issue," "Logical interpretations," "Clarifying the issue").

The remaining two questions were answered with a larger degree of variation. There were 31 respondents who answered, "One main requirement of fair-minded critical thinking is" correctly as, "To analyze thinking into its most basic components." Yet, there were 16 who responded, "To identify every aspects of one's thinking." The last statement of this section, "Critical thinkers assess thinking in order to" had 26 respondents who answered correctly, "Determine what thinking to accept and what to reject;" however, 18 responded, "Take their thinking apart and examine it."

The third section of the basic concepts assessment

analyzed respondents' ability to correctly identify the basis of critical thinking terms. Respondents were provided with six choices to relate to ten different terms. The idea that there are specific concepts identified as "An important obstacle to critical thinking" had the greatest number of correct responses. The following terms were correctly identified, "Close-mindedness" (50/50), "Self-deception" (44/48), "Distrust in reason" (40/50), and "Fixity of belief" (39/50). "Bias in thinking" also, "An important obstacle to critical thinking" was correctly identified by 37 of 50 respondents; however, nine identified the statement as, "A basic component of thinking that we need to identify in understanding the structure of thinking." "Point of view" a statement correctly identified as, "A basic component of thinking that we need to identify in understanding the structure of thinking" by 25 of 49 respondents was incorrectly identified 24 responses, with six respondents selecting either, "An important ability for thinkers to develop in learning to think critically" or "None of the above." Likewise, there were 11 of 49 respondents who identified "Math puzzles" as "An important ability for thinkers to develop in learning to think critically" when in reality it did not relate to any of the provided statements.

The last group of statements showed the greatest variability in answer by respondents. There were 23 of 51 respondents who identified, "Clarity" as "An important ability for thinkers to develop in learning to think critically," 11 who selected, "An important trait for thinkers to develop to become reasonable and fair," and 8 who selected, "A basic component of thinking that we need to identify in understanding the structure of thinking." The correct answer, "An important standard that helps us judge the worth of thinking" was only selected by nine participants.

The term "Liberalism" was correctly identified by 22 respondents as "None of the above," yet, 12 responded "An important obstacle to critical thinking" and six "An important trait for thinkers to develop to become reasonable thinkers" with the two incorrect responses being in opposition to one another. The last concept, "Contrasting" was correctly identified by only one respondent, as "None of the above," with incorrect responses ranging from, "A basic component of thinking that we need to identify in understanding the structure of thinking" (11/47), to "An important trait for thinkers to develop to become reasonable and fair" (14/47), and "An important ability for thinkers to develop in learning to think critically" (20/47).

Researchers identified patterns existing specifically with the complexity of concepts related to critical thinking. In that, the more complex the concept the more likely a respondent would incorrectly identify the answer. Additionally, the more likely a concept was identified as congruent with beliefs, "Liberalism" the more likely they would identify with term with that mindset. Also, if a term could be defined or was associated with a variety of concepts like, "Clarity" the more difficulty respondents had in identifying it as associated with critical thinking.

Objective 2

The second objective of the study was set to identify patterns in faculty's perceptions of critical thinking instruction in higher education. Six statements showed respondents either "Agreed" or "Strongly Agreed" with its intent. These are summarized in Table 2. Eight individual statements indicated respondents showed a greater range of response, those are summarized in Table 3. One statement was split, but with the majority (38/51) "Agreeing" or "Strongly Agreeing" – "It is my responsibility to thoroughly cover all course material with students in order for them to learn the subject matter."

Patterns in responses for this section of the study

Table 2. Statements with "Agree" or "Strongly Agree"

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
Critical thinking engages students' higher order thinking (analysis, synthesis, and evaluation)	35 (69%)	16 (31%)	0	0	0
Critical thinking encourages students to become independent thinkers	33 (65%)	17 (33%)	1 (2%)	0	0
Critical thinking encourages students to become active learners	31 (62%)	19 (38%)	0	0	0
Critical thinking can be used to achieve better learning outcomes	31 (61%)	19 (37%)	1 (2%)	0	0
Critical thinking will allow students a better understanding of course topics	27 (53%)	22 (43%)	2 (4%)	0	0
I believe that it is my responsibility to promote critical thinking in my courses	20 (39%)	27 (53%)	4 (8%)	0	0

[z]note 48 of 51 responses were usable

Table 3. Statements with Varying Responses

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
Critical thinking is a method of thinking which would help students enjoy the learning process	17 (34%)	23 (46%)	9 (18%)	1 (2%)	0
Critical thinking should always include a reflective component	18 (35%)	22 (43%)	8 (16%)	2 (4%)	1 (2%)
I am aware when students use critical thinking in my courses	7 (14%)	31 (61%)	12 (24%)	1 (2%)	0
I look for specific evidence of critical thinking by students in my courses	8 (16%)	28 (57%)	12 (24%)	1 (2%)	0
I have the skills necessary to promote critical thinking by students in my courses	7 (14%)	27 (53%)	11 (22%)	6 (12%)	0
I think that students have barriers to critical thinking, regardless of the strategies I use	8 (16%)	25 (49%)	12 (24%)	6 (12%)	0
If required, I could implement critical thinking into my courses	12 (24%)	27 (53%)	10 (20%)	2 (4%)	0
In order for me to fully implement critical thinking into my courses I would need additional support	8 (16%)	25 (50%)	10 (20%)	6 (12%)	1 (2%)

[y]note 48 of 51 responses were usable

showed that participants held more favorable opinions on the statements which were most closely associated with student's development of critical thinking. However, when the statement was focused more closely on the faculty member's role in critical thinking instruction there was greater variance in response

Conclusions, Implications and Discussion

Based on the information in the findings section, faculty tested in this study are lacking knowledge about critical thinking. This reinforces Lauer's (2005) statement purporting that faculty may not have all the tools necessary to incorporate critical thinking into their courses. When taking into consideration that none of the questions in the survey were answered correctly by all participants, one may believe that faculty need more instruction when it comes to critical thinking. In both objectives there were different consistencies in the answers. One statement in section one of objective one "Critical thinking enables one to think more deeply," was answered false when it is actually true. Statements like this were often answered incorrectly. There are many reasons why this could happen. Faculty may have assumed that the answers were more difficult than they really were. Likewise, the perception of critical thinking is often different then what is actualized and this is reflected in Rhoades et al. (2008) comment that every teacher thinks they are teaching critical thinking. Another reason is that the study was not taken completely seriously. Finally, teachers may not have had formal education themselves when it comes to critical thinking.

When faculty do not understand critical thinking, it is almost impossible for them to teach their students to think critically. It is important to teach students critical thinking skills so they can excel in education. Critical thinking is an important component to post-secondary education.

To address the problem of lack of knowledge by faculty, there are steps that can be taken to educate them. Osborne (2011) provided the challenge catalyzing the need to further investigate the extent to which faculty developmental interventions work in improving the teaching and learning process. With this baseline research, the conversation can continue to grow and seminars based on critical thinking instructional strategies may be developed. Encouraging faculty to include critical thinking components into their lectures will help educate both faculty and students about the value of critical thinking.

With this being said, the outcome of this study shows that faculty's critical thinking knowledge is lacking. Future studies should further investigate critical thinking knowledge in faculty. Specific tests of faculty critical thinking disposition and skill will assist in determining how faculty are prepared to teach critical thinking, beyond what their current knowledge level is. Also determining the current strategies faculty are using to teach critical thinking in the classroom may assist with identifying the quality of critical thinking instruction. This paired with the perceptions of students about the strategies will give a much more robust picture of the state of critical thinking instruction in higher education.

As the needs of students change along with the needs of industry, so will the transferrable competencies that are taught. This initial look at critical thinking basic skill and current perceptions will allow for a

more targeted approach when designing workshops and literature for critical thinking instruction. The better the teaching strategy, the better the outcome; understanding how to bridge these two ideas will determine the how successful faculty are at teaching important transferrable competencies.

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Supporting Online Group Projects[1]

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Abstract

Group work has been used to enhance student learning in online classrooms. It has been also found to create a sense of community, thereby contributing to increased learning and satisfaction. However, educators who work in online settings may struggle with how to effectively structure group projects to maximize the effectiveness of this teaching strategy. This paper focuses on specific teaching strategies the authors recommend to help facilitate successful group projects in online settings. These recommendations are based on the results of a research study conducted by the authors to explore "How do students define their roles and responsibilities in online group projects?" Results showed the difficulty students had with understanding how to make group projects work in an online setting and thus, specific strategies are recommended to support effective group work. These strategies include structured assignments to allow a climate of collaboration, use of preliminary assignments to help students understand group roles and styles, faculty and peer input into grade assignment for group projects, use of online tools to help gage group participation and determine additional intervention strategies when needed, and using a multi-stage process to help students solve problems that can arise during group work. Instructors need to be aware of the challenges specific to social task development and effectively use online platform tools, assignments and activities to scaffold and facilitate student learning and community building.

Supporting Online Group Projects

Literature Review

Much of problem-based work is accomplished in group settings. This is particularly true in colleges of agriculture where faculty strive to model collaborative approaches in their USDA and other research projects. Undergraduate and graduate students who are fortunate enough to work with faculty members in research settings are often exposed to the importance of group approaches to solving complex, important problems. However, many students do not have or do not choose to avail themselves of such research opportunities. Consequently, it is unclear whether or not students value or understand group approaches in non-research settings: i.e. classrooms. Working in group settings may be further complicated in distance education environments. As online courses continue to grow through such groups as AG*IDEA (AG*IDEA, 2011), problem-based work in the form of online group projects will likely continue to grow as well.

Group projects and other group activities are important active learning strategies that contribute to a feeling of community and connectedness (Ouzts, 2006; Rovai, 2002). Social connectedness enhances student satisfaction and learning in face-to-face classes and online (Brett and Nagra, 2005; Dawson, 2006; Donaldson and Graham, 1999; Fisher et al., 2004-2005; Menchaca and Bekele, 2008; Slagter van Tryon and Bishop, 2009). Specific social tasks may also be important to the success of online groups. Hewson and Hughes (2005) identified five social tasks they felt were important to group formation: making oneself known, developing an identity within the group, getting to know others, discovering and contributing to the communication etiquette of the group, and developing supportive relationships within the group may also play a role in group formation. This article will share recommendations for educators based on the results of a research project that was conducted to answer the answer the question, "How do students define their roles and responsibilities in online group projects?"

Methods

This paper reports on the results of a research project that utilized quantitative and qualitative

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methodologies. Institutional review board (IRB) approval was solicited and received for the initial study in March 2007 and for the continuance in 2008. The study was classified as a survey procedure and as such was considered exempt both times.

The research team developed a survey based on items modified from Ouzts (2003), Rovai (2002), and Bonk and Wisher (2000). Additional items, were added by the researchers to further explore the community constructs and to create social task items based on the work of Hewson and Hughes (2005). The survey (Cameron et al., 2009) included open ended questions and was deployed to 127 students in six different online classes through a university-based survey tool with a 47% response rate. Both lower division and upper division courses were included, and all courses had online group projects as part of the course requirements. Students included freshmen through seniors. The age range of respondents was 19-62 years, with the average age at 29; 93% were female and Caucasian; 45% were on campus students taking online classes, and 55% were distance students. In addition, chat logs and discussion threads were downloaded from the class course shells.

Survey results were analyzed using SPSS with a focus on descriptive statistics. Student comments to the survey as well as chat logs and discussion threads related to the online group projects were coded for themes and issues. Multiple data sources and the use of multiple investigators provided triangulation (Lincoln and Guba, 1985). All three authors independently coded the results, then met to discuss the findings and collapse the codes (Garrison et al., 2006).

Results

Quantitative Results

Results revealed few significant relationships between each of the five social tasks and student perceptions of a sense of community. Students felt that social tasks were important for making oneself known (88%), discovering etiquette within the group (80%), developing supportive relationships within their online groups (75%), getting to know others (63%), and developing an identity within a group (59%). While these social tasks may play a role in the formation of online groups, they did not appear to be related to creating a sense of community. Instead, students' responses indicated that they focused more on completing the group task than on seeing projects as creating community in order to enhance learning (Cameron et al., 2009).

Qualitative Results

Four themes were identified: testing the waters, apologies as being nice, tag – you're it, and struggling to find one's role (Williams et al., 2011). Testing the waters is a method students use to check in with each other and to test their ideas prior to making commitments related to roles and processes. Apologies as "being nice" is a strategy that students employ to show concern for others and to avoid creating conflict or to preempt negative feedback or anger. "Tag-you're it" describes a process groups use to assign leaders by default. The first one who posts an idea is seen as the leader by the group, whether they had intended to take that role or not. Struggling to find one's role reflects processes used to discover, understand and clarify individual roles within a group without clearly stating or defining specific roles.

Students created roles as they went through the process of working on their group projects. Six roles emerged:

•Leader – facilitates the work of the group and keeps the group on task,

•Spoiler – participates very infrequently, tries to change the direction of the group, then fades out again,

•Coat-tails – tries to act like a participant, but does no work,

•Wannabe – tries to control the group without taking responsibility when there is already a leader,

•Agreeable enabler – goes along with all suggestions, even when tasks shift because leadership is problematic, and continues to do the work, and

•Supportive worker – understands assignment criteria and group dynamics, follows through, and takes initiative to ensure group success, but is not the group leader.

Not all of the roles above help develop the social tasks identified by Hewson and Hughes (2005) as important to group formation, nor do they contribute to the success of the group from a process, product or learning standpoint. What then can instructors do to help support students in their understanding of group roles, essential social tasks, and the importance of group projects to their future success?

Implications

Group work is often used in face to face classes to enable students to successfully work in teams, preparing them for the world of work. However, faculty may be hesitant to use this pedagogical technique in online settings. Our study has shown that students may view social tasks and the creation of a sense of community as superfluous, not realizing that they are the foundation

of successful groups. In addition, they may not be aware that the strategies they use to create roles and approach tasks are not optimal for learning. There is an argument that students may know successful strategies that they can employ when approaching online group projects or automatically transfer skills from face to face class experiences to the online setting. In addition, online classes frequently have a greater age span than face to face classes. Faculty members and students need to be aware that different generations have different learning styles and values that impact roles and approaches to social tasks. For example, any online class could include Boomers (1946-1964) who tend to be team and process oriented, Generation Xers (1965-1982) who are characterized as being self-reliant and not fond of rules, and Millenials (1982-present) who value the openness of online classes but often prefer anonymity to closeness. (Oblinger and Oblinger, 2005; Skiba and Barton, 2006; Windham, 2005).

Recommendations for Practice

Faculty members can use specific techniques to support effective small group dynamics and group formation, and make processes more visible to students. The approaches suggested below have the potential to enhance the online group experience for students and faculty alike.

• **Structure the task so it allows a climate of collaboration and true engagement by the students (Illera, 2001).** If the students perceive the task/product as just one more thing they have to do for the teacher rather than something that they help design or as an authentic assessment experience with a real audience for their work, they will not take the group assignment seriously. The assignment must be meaningful.

• **Create a preliminary assignment to help students understand group roles and styles well before they begin a group task.** Such a strategy would fit into the best practices for online learning, presenting stimulus materials, suggested by Hirumi (2002).

• **Decide whether or not to assign roles.** Assigning roles is frequently used as part of the cooperative learning strategy developed by Johnson and Johnson (1979) for small group tasks. They expanded this notion, adding the use of cooperative learning and technology in the college classroom (Johnson et al., 2006). Instructors should decide whether students will create roles as they go through the group assignment process, or whether the students will be assigned roles (De Weaver et al., 2008; Schellens et al., 2005; Zhu and Alkins, 2009). Both strategies have merit, and the faculty member may want to alternate between the two or only use one.

• **Make participation by group members visible.** Many instructors worry about grading for group projects and being able to tell whether or not students participated equally. One strategy to make participation visible is to use planning threads in a unit that stay open for the duration of the project. The thread becomes an area where students communicate with each other about all aspects of their project. The faculty member can see how often each student posts, what their contributions are, whether the students are talking through all aspects of their project including problem resolution, and answer any direct questions posed. Another similar mechanism is for the instructor to create chat rooms for each group. Each chat session produces a chat log that the instructor can read (in this case in real time rather than asynchronously) while giving the group members another means of communication.

• **Use an online document sharing area or wiki outside of the course shell so that the faculty member and students can share documents for handouts, presentation materials, and drafts of their projects.** This makes participation and roles visible to the instructor. It can also help students develop trust in one another because they can see the materials posted, the date when each item is posted, and make comments on or changes to documents for all group members to see.

• **Provide a mechanism to individualize grades.** Faculty members may be concerned about giving all the students in a group project the same grade. We feel that should not be the goal in online group projects. One way to help students understand the consequences of being a spoiler or coat-tails is to establish a grading process whereby students evaluate their group members, and faculty members use participation as a component of the group project grade. One example (used by

Table 1: Sample Individual Student Scoring Rubric for a Group Project

Grading Rubric: Children's Rights Project (50 points)	
	All ten principles of the UN Declaration of Children's Rights are illustrated. Examples used clearly illustrate the principles. Links are included to enhance written material on web page. (10 points)
	Group project shows depth of understanding of subject matter. Material included clearly shows why each principle is important, and why the "village" chose to make it a priority. (20 points)
	Group ideas are communicated clearly and effectively. Web page has appropriate graphics, working links, and professionally communicated information. (10 points)
	Group project shows coordination and communication as a unit. Planning threads and chats show evidence of what each member did to equally contribute to the project. (10 points)

students to rate each group member and by the instructor) can be seen in the grading rubric in Table 1 used by the lead author in her Multicultural Influences on Children and Families course. Using this method means that all students in the group will not necessarily receive the same grade.

Another option is to use a more specific student feedback form as shown in Table 2. Students rate each other on a number of criteria using a five point Likert scale where a rating of one indicates below expectations, poor or infrequent and a rating of five indicates above expectations, very well, or all of the time for participation. After completing the rubric, students are required to provide written comments justifying their scoring of themselves as well as their group members.

Table 2: Sample Student Peer Evaluation Rubric

GROUP MEMBER RATING FORM						
			Group Members #s			
	EVALUATION CRITERIA	Self	#2	#3	#4	
1.	Frequency of group meeting attendance or outside communication					
2.	Comes to group meetings prepared for tasks					
3.	Completes assigned tasks on a timely basis					
4.	Is willing to assume fair share of work					
5.	Performs a meaningful role in the group					
6.	Exhibits a positive attitude					
7.	Works compatibly with members of the group					
8.	Shows sensitivity to others' feelings and opinions					
9.	Willingness and ability to resolve conflicts					
10.	Encourages others to participate in creative ways					
11.	Overall quality of work					
12.	Overall contribution to the team					

• **Post a guide for successful group processes.** As our research has shown (Williams et al., 2011) negative roles can frequently emerge within groups. Poor experiences frequently make students and faculty members dread group work. We recommend posting the following guide to successful group projects that ends with a multi-stage process whereby students know steps to take to resolve issues:

• **Define the goal of the project clearly.** What needs to be achieved? When it is a class project, this should be clearly spelled out in the project description and/or grading rubric. If something isn't clear, get it clarified with the instructor right away before you proceed to step two!

• **Define the essential tasks.** What tasks need to be done to bring the project to a successful completion? Define these and make the list together, and do it before you start deciding who does what. It's important to have a roadmap that you all agree with before beginning. Put these in writing so everyone has the same information at the same time.

• **Identify each participant's role.** Who is going to be responsible for what? Use each other's strengths to the best advantage as any successful team does. Ask yourselves: Do we need a team leader who'll keep things and individuals on task? Do we need a recorder? A researcher or more than one? Someone good at graphics? Think broadly and be sure the roles fit the essential tasks you have identified, and that each person is making an equal, important contribution. Add these to the written essential tasks and be sure all group members have them.

• **Set a realistic timeline that allows the project to be done in time (and with time to fix, redo, or create drafts that the group reviews).** Create the timeline so that everyone knows when their task must be completed, when the group is going to meet, when the feedback needs to be given, and when the finished project needs to be submitted. Put it in writing.

• **Create a written record after every group meeting.** For an online class, specify how (email, chat room, threaded discussion, phone call). For a face-to-face class, specify where and when. Doing so insures that everyone has a record of what was done, what still needs to be done, what each group member is responsible for at the next meeting, and when the next meeting will take place. If there is a problem with a group member, it also provides a written record in case someone says they didn't know what their task was, etc.

• **Agree that if a problem develops, it will be solved in a respectful manner.** Don't allow problems to become personal. Focus on problems, not people. Keep the project goal in mind. Celebrate successes and contributions of each member.

• **Use the following "Divorce Procedures" if they become necessary.** But just as in real life, view the "divorce" as a last resort. It is not intended as an easy out! Our department came up with a protocol that should be used. We don't feel that it's right when there is a group grade for everyone not to participate equally. So here are the "Divorce Papers" for an online class:

1. If someone isn't participating, they need to be called on it by the other members. Try to find out why. Get the person's help to solve the problem.

2. If this persists, call a chat group meeting and invite the instructor to mediate. He or she will try to help get things back on track.

3. If the problem is still not going away, the group needs to notify the instructor that they are "divorcing" the person. When that occurs (and it should only be used as a last resort) the person must complete the project alone and be graded separately.

• **Encourage group presentations.** Many online course platforms and web conferencing software, such as Illuminate, make the presentation of group projects possible. This helps make assessment more authentic, since classmates, the instructor, and invited guests can attend the presentation session. For example, in the eCollege platform that we use, there is a Class Live function where attendees can use headsets with microphones to ask questions or can use an area to type comments and questions, and the presenters can use headsets and have the use of a white board where they can display PowerPoint slides while they orally go through the presentation.

Summary

Online group projects can be an effective teaching and learning tool. As our research and suggested teaching strategies show, students can learn successful strategies for group participation that will serve them well in their online and face-to-face courses while preparing them for the world of work. When students are not supported by their instructors, they can develop maladaptive skills that hurt the group project process and potentially cause feelings of dread or avoidance when they are put into group situations. Instead, instructors should apply best practices gleaned from current literature on pedagogy, technology, and adult learning to online group projects.

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Examining the Teaching Behaviors of Successful Teachers in a College of Agricultural and Life Sciences

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Abstract

The purpose of this study was to explore the teaching behaviors of successful teachers in a college of agricultural and life sciences. Five successful teachers were identified by nomination from the director of the Teaching Resource Center or winning a teaching award such as the University of Florida's College of Agricultural and Life Sciences teaching award or the NACTA Teacher Fellow's award. In consultation with each teacher, a minimum of two class sessions were identified for video recording. Teaching behaviors were assessed to determine the learning activities used, the cognitive levels reached, and the teacher immediacy (or rapport) behaviors exhibited. This group of successful teachers shared teaching beliefs that indicated they were highly sensitive to student needs. They used lecture and questioning most frequently in their classes and most of the teachers also used cooperative learning activities. This group of teachers commonly taught in a way that engaged students at higher cognitive levels. These successful teachers also created a psychologically inviting learning environment by exhibiting frequent positive verbal and nonverbal teacher immediacy behaviors.

Introduction

"During the next ten years, colleges of agriculture will be challenged to transform their role in higher education and their relationship to the evolving global food and agricultural enterprise" (National Research Council, 2009, p. 1). As a key piece of the mechanism for this transformation, the National Research Council recognized a need to prepare teachers in colleges of agriculture to teach effectively so that graduates are ready to help solve complex global problems. This sounds like a reasonable recommendation, however, it begs the question, what does effective teaching in the agricultural sciences look like?

Given that the teacher is key to teaching effectiveness, a logical place to start examining teaching effectiveness is teaching beliefs. Teaching involves two domains: (a) teachers' thought processes (beliefs), and (b) teachers' actions followed by their observable effects (Clark and Peterson, 1986). The teaching activities chosen by a teacher can develop into a pattern of behavior and thus be predictable. A potential means for improving teaching effectiveness is for teachers to understand their predilections toward a teaching style (Heimlich, 1990). According to Heimlich (1990), sensitivity and inclusion are the two key dimensions that describe the teacher's beliefs related to their thoughts and actions. Sensitivity relates to understanding learners' needs, while inclusion refers to the amount of control the students have over their learning within the teacher's classroom. A recent study of the teaching beliefs of successful teachers in the College of Agricultural and Life Sciences at the University of Florida revealed that 91% and 77% scored high for the dimensions of sensitivity and inclusion, respectively (Giorgi and Roberts, 2011).

Another aspect of teaching effectiveness is the level to which teachers are able to encourage students to think critically about the subject matter. This is often operationalized as the cognitive level at which teachers teach (Whittington, 1995). Whittington and

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colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1995, 1998, 2000) have shown that teachers in colleges of agriculture ascribe to teach at higher levels of cognition but generally teach at lower. Ewing et al. (2011) found that student cognition was positively influenced by teacher discourse and negatively influenced by the use of lecture during class sessions. Whittington (1995) wrote, "Mastering the higher order thinking of which Bloom speaks is one of the most significant activities of life" (p. 46). She also said professors conduct class "at lower levels of cognition 98% of the time" (p. 37) and thus infrequently use the higher cognitive levels of application, analysis, synthesis, and evaluation in class.

Another facet of teaching effectiveness is the manner in which teachers interact with students, often examined as rapport or teacher immediacy. Teacher immediacy is one way of measuring the psychological connection between a teacher and student (Christophel, 1990). However, this topic is just beginning to receive attention in the agricultural sciences. Velez and Cano (2008) examined the relationship between teacher immediacy and motivation in undergraduate agriculture students. Results confirmed the relationship between student motivation and verbal and nonverbal immediacy. Further results revealed a moderate positive relationship between nonverbal immediacy and expectancy–value motivation. Expectancy–value motivation is a motivation theory that postulates students are more motivated by tasks in which they expect success and value the activity (Velez and Cano, 2008). Additionally, Velez and Cano (2008) examined differences in immediacy with regard to teacher type and found that immediacy does play a role in the college classroom, which is consistent with prior immediacy research that has primarily been conducted in the arena of communications education.

Teaching effectiveness is also influenced by the learning activities that teachers elect to use in a given class session. Most of the literature on this topic has focused on the impacts of specific learning activities instead of the actual learning activities that are utilized in college classrooms. In a study that examined the actual learning activities that occurred in the classroom, Whittington (1997) noted that teachers predominantly used lecture with poor–quality visual aids and attempted to ask questions, typically phrased as "are there any questions?" (p. 41). Additionally, the term active learning has been used to describe a variety of learning activities that engage learners. Hiller and Tyre (2009) examined the active learning strategies used in a wildlife management course and reported that lecture, coupled with cooperative learning and inquiry resulted in most students (77%) showing gains in knowledge. Getter and Rowe (2008) examined the use of a discussion technique, Think-Pair-Share. Their results showed no difference in learning, but did reveal that students enjoyed the experience more.

Although the research literature begins to paint a picture of teaching effectiveness in the agricultural sciences, there is still considerable need to identify replicable teaching behaviors that could be used as a benchmark of effectiveness. One approach to provide this information would be to identify teachers that could be used as models of success. The purpose of this study was to explore the teaching behaviors of successful teachers in a college of agricultural and life sciences.

Methods

This study employed a case–study approach (Gall et al. 2003) to examine the classroom teaching practices of a selected group of teachers in a college of agricultural and life sciences deemed to be successful teachers, identified through multiple indicators of success, including nomination from the director of the Teaching Resource Center or winning a teaching award such as the University of Florida's (UF) College of Agricultural and Life Sciences (CALS) teaching award selection and the NACTA Teacher Fellow's award. This case consisted of five faculty, four of which have received teaching awards at the college level or higher and one faculty member that is widely recognized through CALS as an innovator in the classroom. A description of each person is provided below.

Teacher 1

Teacher 1 is a white male in his early 60's. He holds the rank of professor in forestry, specializing in fire ecology. He is a NACTA Teacher Fellow and the recipient of 2004-05 CALS Undergraduate Teaching Award. He has worked at UF since 1986, where he typically teaches four undergraduate and two graduate courses per year. He served as graduate teaching assistant at North Carolina State University while working on his PhD. In addition to his experiences as a graduate teaching assistant, he attributes participation in a variety of teaching–related workshops in helping him learn how to teach. Teacher 1's observed class was a combination graduate and upper–division undergraduate class designed for students in the major. There were approximately 14 students enrolled in the class and the classroom had fixed desks that would accommodate approximately 40 students.

Teacher 2

Teacher 2 is a white male in his late 40's. He holds the rank of associate professor in agricultural economics, specializing in agricultural sales. He is a NACTA Teacher Fellow and was the recipient of the 2001-02 CALS Undergraduate Teaching Award. Teacher 2 was hired at UF in 1998 and typically teaches four undergraduate and two graduate courses per year. He was a graduate teaching assistant at Michigan State University while working on his PhD. He credits a variety of activities in shaping his teaching abilities, including coursework, workshops, independent reading, and consulting with teaching experts. Teacher 2's observed class was an upper–division undergraduate course that had a mixture of students from inside and outside the major. There were approximately 105 students enrolled in the class. The lecture hall was equipped with fixed desks that would accommodate approximately 200 students.

Teacher 3

Teacher 3 is an African-American female in her mid-30's. She holds the rank of assistant professor in family studies, specializing in family structure. She was selected to receive the Undergraduate Teaching Award in 2008-09. She was hired at UF in 2005 and typically teaches six undergraduate courses per year. She served as a graduate teaching assistant while earning her PhD at Florida State University. She credits a variety of activities in developing her teaching abilities, including coursework, workshops, independent reading, and consulting with teaching experts. Her observed class was an upper-division undergraduate course with a mixture of students from inside and outside the major. There were approximately 88 students enrolled in the class. The lecture hall had fixed desks that would accommodate approximately 160 students.

Teacher 4

Teacher 4 is a white male in his early 30's. He is an assistant professor in agricultural economics, specializing in agribusiness. He was the recipient of the 2010-11 CALS Undergraduate Teaching Award. He has worked at UF since 2006, typically teaching four undergraduate classes and two graduate classes per year. While working on his PhD at Purdue University, he worked as a graduate teaching assistant. He attributes coursework, workshops, independent reading, and consulting with teaching experts as things that have influenced his teaching. His observed class was an upper-division undergraduate course for students within the major. There were approximately 43 students enrolled in the class. The lecture hall had fixed desks that would accommodate approximately 100 students.

Teacher 5

Teacher 5 is a white female in her late 40's. She holds the rank of lecturer in agronomy, specializing in plant production. She is widely recognized as an innovator in the classroom. She has been through Process Oriented Guided Inquiry Learning (POGIL, www.pogil.org) training and began implementing those practices in her classes. She was hired at UF in 2008 and typically teaches five undergraduate and two graduate courses per year. Teacher 5 earned her PhD at the UF in Plant Pathology, but was not a graduate teaching assistant. She indicated that workshops, independent reading, and consultations with experts have all influenced her teaching. Her observed course was an upper-division undergraduate class with a mixture of students from a variety of majors. There were approximately 38 students enrolled in the class, which was held in a classroom with movable desks accommodating approximately 40 students.

Data Collection

The Institutional Review Board at University of Florida approved the activities undertaken as a part of this research and signed informed consent was obtained from each participant. Data were collected during the Fall 2009 and Spring 2010 semesters. When each teacher was recruited to participate in this study, they provided some background information about their prior teaching experiences and also completed the Van Tilburg-Heimlich Teaching Belief Scale (Heimlich, 1990). This self-report assessment is used to identify a teacher's underlying philosophy and approach to teaching. The Van Tilburg-Heimlich Teaching Belief Scale uses two scales, sensitivity and inclusion, to categorize teachers as Experts (low sensitivity, low inclusion), Facilitators (low sensitivity, high inclusion), Providers (high sensitivity, low inclusion), and Enablers (high sensitivity, high inclusion). According to Heimlich (1990), Experts are focused on the subject and efficiency in content delivery. Providers are learner-centered and focus on teaching effectively. Facilitators are teacher-centered and focus on the educational processes. Enablers are "learning-centered," focusing on the learners and the process (p. 10).

The teaching behaviors of these teachers were explored using observational techniques. In consultation with each teacher, a minimum of two lecture class sessions were identified and then video recorded by the researchers. A high-definition video

camera was placed in the rear of the classroom to capture the actions of the teacher. The video recordings were converted to an appropriate format and loaded in to the Noldus Observer© software suite for analysis.

Data Analysis

The Noldus Observer© software suite allows visual appraisal of the video recordings using user-defined indices. For this project, the teaching behaviors of these teachers were assessed with three different instruments (described in greater detail below). The first was a researcher-developed instrument to describe the actual learning activities used in the class session. The second was the Florida Taxonomy of Cognitive Behavior (Brown et al., 1968). The third was a modified version of the Immediacy Behavior Scale (Christophel, 1990).

When conducting observational research, the quality of observational data is critical (Gall et al, 2003). Gall et al. (2003) express three key elements that must be considered to establish reliability. Criterion-related observer reliability is the extent that an observer's ratings agree with a known expert (Gall et al., 2003). Intra-observer reliability is the extent that an observer is able to consistently code an observation (Gall et al., 2003). Inter-observer reliability is the extent that two raters are able to agree on ratings (Gall et al., 2003). Criterion-related observer reliability was accomplished through training of each observer and then periodic comparisons with the ratings of the lead researcher, a nationally recognized scholar on teaching methods. Intra and Inter-observer reliability were established using a system of multiple raters, with two researchers focusing on each aspect of the observation.

A total of six researchers were used to analyze the data. Each rater had at least two years of teaching experience and was trained by the lead researcher on the specifics of what they were asked to assess. Each researcher coded the video independently and then compared ratings after each class session. This allowed continuous benchmarking for consistency. If discrepancies were found, the pair of observers went back and jointly re-analyzed the periods of time in which the discrepancies were noted and came to agreement.

Instrumentation

Learning activities were described using a researcher-developed instrument based on the model developed by Roberts et al. (2010). This model categorizes learning activities on a continuum from teacher-centered to social learning to student-centered activities. The learning activities included lecture, demonstration, questioning, discussion, cooperative learning, inquiry, and individualized application. The teacher-centered learning activities were lecture and demonstration. Lecture is characterized by a transmittal of information from the teacher to students. Demonstration involves the teacher showing students how to do something. The social learning activities were questioning, discussion, and cooperative learning. Questioning consists of the teacher asking questions to individual students. Discussion involves students talking with each other and the teacher. Cooperative learning involves students working together to accomplish an educational task. The student-centered learning activities included inquiry and individualized application. Inquiry was characterized by students working individually or cooperatively to solve problems or discover new information. Individualized application involved students working independently to learn the material.

The Florida Taxonomy of Cognitive Behaviors (FTCB) was used to determine the cognitive level reached during instruction (Brown et al., 1968). This rating tool is based on Bloom's Taxonomy of the Cognitive Domain (Bloom and Krathwohl, 1956) and has widely been used in the agricultural sciences to assess cognitive level of instruction (Whittington, 1997; 1998). The instrument contains 55 different teaching actions spread out over a modified version of Bloom's Taxonomy. Lower cognitive levels included knowledge, translation, and interpretation. Higher levels included application, analysis, synthesis, and evaluation. Cognitive levels were continually assessed throughout each class session.

Teacher immediacy was assessed using a modified version of the Immediacy Behavior Scale (Christophel, 1990). The original version of this instrument was designed to allow students to rate their teachers on a 1 to 5 rating scale for 20 verbal behaviors and 14 nonverbal behaviors. The instrument was modified by the researchers to allow determining the frequencies that each behavior was observed. Therefore, immediacy behaviors were noted each time they were demonstrated by the teachers. Example positive verbal behaviors included using personal examples, addressing students by name, praising students, and referring to the class as "our" class. Example negative verbal behaviors included criticizing students, referring to the class as "my" class, and calling on students who did not want to talk. Example positive nonverbal behaviors included gesturing while talking, moves around classroom, smiles at students, and uses a variety of vocal expressions. Example negative

Table 1. Learning Activities used by Five Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida

			Learning Activity				
Teacher	Class Session (Duration[a])	Class Size	Lecture Time[b]	Questioning Time[b]	Discussion Time[b]	Cooperative Learning Time[b]	Individual Application Time[b]
1	Session 1 (44:14)	14	30:23 (69%)	13:51 (31%)	–	–	–
	Session 2 (63:27)		33:03 (52%)	30:24 (48%)	–	–	–
2	Session 1 (48:58)	105	29:01 (59%)	10:00 (20%)	5:04 (10%)	4:53 (10%)	–
	Session 2 (94:47)		47:34 (50%)	33:40 (36%)	–	4:13 (4%)	9:20 (10%)
	Session 3 (86:37)		53:12 (61%)	5:39 (7%)	18:07 (21%)	9:39 (11%)	–
3	Session 1 (82:37)	88	40:19 (49%)	7:47 (9%)	–	34:31 (42%)	–
	Session 2 (93:59)		36:31 (39%)	24:31 (26%)	15:23 (16%)	14:35 (16%)	2:59 (3%)
	Session 3 (98:13)		52:59 (54%)	31:32 (32%)	10:50 (11%)	–	2:52 (3%)
4	Session 1 (47:31)	43	24:40 (52%)	22:51 (48%)	–	–	–
	Session 2 (50:07)		–	–	–	50:07 (100%)	–
	Session 3 (105:51)		14:10 (13%)	12:21 (12%)	–	79:20 (75%)	–
5	Session 1 (97:50)	38	38:13 (39%)	0:14 (0%)	–	59:23 (61%)	–
	Session 2 (50:31)		40:16 (80%)	9:10 (18%)	–	1:05 (2%)	–

Note. Demonstration and inquiry were not used during any of the observed class sessions. [a]Duration refers to the total amount of time in that class session.

[b]Time refers to the amount of class time spent on that learning activity.

nonverbal behaviors included sitting or standing behind the desk/podium, looks at board while talking to the class, and using a monotone/dull voice. For a complete list, consult Christophel (1990).

Results

In terms of teaching beliefs, Teachers 2, 3 and 5 were Enablers (Heimlich, 1990), characterized by high sensitivity and high inclusivity, focusing on both the learners and the learning process. Teachers 1 and 4 were Providers, characterized by high sensitivity and low inclusivity, focusing on the learner and their own effectiveness.

A summary of the observations from the five teachers for the 13 class sessions is presented in Table 1. Teacher 1 only used two types of learning activities. Teacher 2 used at least four different learning activities in each of the observed class sessions. Teacher 3 used the greatest variety of learning activities. She used three or more different learning activities in each class session. Teacher 3 was the only teacher to use five learning activities in the same session. Teacher 4 was the only teacher that did not lecture or ask questions during a class session. Teacher 5 used the same set of learning activities each time she was observed.

A summary of the observed cognitive levels is presented in Table 2. Teacher 1 was able to reach higher cognitive levels in both of the class sessions he

Table 2. Observed Cognitive Levels of Five Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida Determined by the Florida Taxonomy of Cognitive Behaviors

		Highest Cognitive Level[1]
Teacher 1	Session 1	Analysis
	Session 2	Analysis
Teacher 2	Session 1	Synthesis
	Session 2	Application
	Session 3	Analysis
Teacher 3	Session 1	Application
	Session 2	Application
	Session 3	Application
Teacher 4	Session 1	Analysis
	Session 2	Application
	Session 3	Analysis
Teacher 5	Session 1	Application
	Session 2	Application

[1]Potential cognitive levels included knowledge, translation, interpretation, application, analysis, synthesis, and evaluation.

was observed. Teacher 2 also reached higher levels of cognition, but a different level in each class session. Teacher 2 reached the highest level of all the teachers, synthesis. Teacher 3 reached the same cognitive level in each class session. Teacher 4 reached analysis in two sessions and application in the other session. Teacher 5 reached the same cognitive level in each class session.

A summary of teacher immediacy behaviors is presented in Table 3. In terms of teacher immediacy behaviors, all five of the teachers exhibited more positive behaviors than negative behaviors. Teacher 1 most frequently exhibited positive verbal behaviors and least frequently exhibited negative verbal behaviors. Teacher 2 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative nonverbal behaviors. He exhibited the most positive nonverbal behaviors of all the teachers. Teacher 3 most frequently exhibited positive verbal behaviors and least frequently exhibited negative verbal behaviors. Interestingly, Teacher 3 exhibited more positive verbal behaviors and negative nonverbal behaviors than any of the other teachers. Teacher 4 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative verbal behaviors. Teacher 5 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative verbal behaviors. She was the only teacher that did not exhibit any negative verbal behaviors in a class session.

Summary

Teacher 1

Teacher 1 exclusively used lecture and questioning as his learning activities and was fairly balanced between the two activities. He was able to reach the analysis cognitive level during each class session. He consistently exhibited a moderate level of both positive verbal and positive nonverbal teacher immediacy behaviors. As noted earlier, Teacher 1 was a Provider, characterized by high sensitivity and low inclusion.

Teacher 2

Teacher 2 used lecture, questioning, discussion, cooperative learning, and individualized application. He used four different learning activities in each of the observed sessions. He used lecture and questioning more frequently and for a greater duration than the other learning activities. Teacher 2 reached higher cognitive levels in each of the observed class sessions and was the only teacher to reach the synthesis level. Teacher 2 exhibited a high number of positive verbal and positive nonverbal teacher immediacy behaviors in each class session, although the frequency varied somewhat by each session. As mentioned earlier, Teacher 2 was an Enabler, characterized by high sensitivity and high inclusion.

Teacher 3

Teacher 3 used lecture, questioning, discussion, cooperative learning, and individualized application. She used at least three different learning activities in each class session and was the only teacher to use five different learning activities in a class session. Teacher 3 used lecture and questioning most frequently and for the greatest amount of time. Teacher 3 reached the application cognitive level in each of the observed class sessions. Overall, she exhibited the greatest number of teacher immediacy behaviors (positive and negative). The number of teacher immediacy behaviors exhibited varied greatly by class session. She had the greatest number of positive verbal behaviors and positive nonverbal behaviors in the same class session. She also exhibited more negative nonverbal behaviors than the other teachers. As presented earlier, Teacher 3 was an Enabler, characterized by high sensitivity and high inclusion.

Table 3. Observed Teacher Immediacy Behaviors of Five of Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida Determined by the Teacher Immediacy Scale

		Teacher Immediacy Behaviors			
Teacher	Class Session	Positive Verbal Frequency	Negative Verbal Frequency	Positive Nonverbal Frequency	Negative Nonverbal Frequency
1	Session 1	99	16	48	21
	Session 2	96	14	51	18
2	Session 1	112	30	232	34
	Session 2	207	48	180	34
	Session 3	132	2	117	0
3	Session 1	64	2	24	6
	Session 2	362	54	282	72
	Session 3	252	10	142	30
4	Session 1	117	6	143	16
	Session 2	19	2	1	0
	Session 3	89	6	105	10
5	Session 1	66	14	90	12
	Session 2	75	0	149	4

Teacher 4

Teacher 4 used lecture, questioning, and cooperative learning. Each of his observed class sessions was different, with the first using lecture and questioning, the second using only cooperative learning, and the third using lecture, questioning, and cooperative learning. He was the only teacher to use a single learning activity (cooperative

learning) in a class session. He was able to reach higher cognitive levels in each class session. He exhibited moderate levels of positive verbal and positive nonverbal teacher immediacy levels, while exhibiting very few negative teacher immediacy behaviors. As noted earlier, Teacher 4 was a Provider, characterized by high sensitivity and low inclusion.

Teacher 5

Teacher 5 utilized lecture, questioning, and cooperative learning in each of the observed class sessions, although the proportion of each varied in each session. She was able to reach the application cognitive level in both class sessions. She exhibited the fewest positive and negative verbal teacher immediacy variables. She also exhibited the fewest overall negative verbal and nonverbal teacher immediacy behaviors. As presented previously, Teacher 5 was an Enabler, characterized by high sensitivity and high inclusion.

Discussion

As a group, these successful teachers all exhibited a high level of sensitivity, which was consistent with previous research on teacher beliefs (Giorgi and Roberts, 2011). In addition, this group used a variety of learning activities in each class session, although they did use lecture and questioning most often. This is consistent with what Whittington (1997) found, however this group of successful teachers seemed more effective in asking questions and were able to engage students at higher levels of cognition. Four of the five teachers also used cooperative learning. This group of successful teachers also reached higher levels of cognition in every class session, which was different than what Whittington and her colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1998) had consistently found and perhaps a reason why this group has been recipients of numerous teaching awards.

Based on the observations of this group of successful teachers, a few promising characteristics and teaching behaviors emerged that are likely worthy of emulating. First, this group was highly sensitive, likely revealing a very student–friendly persona. Second, this group used lecture and questioning most frequently, reaching higher levels of cognition with both activities. This contradicts what Whittington and her colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1998) found, perhaps because this group of teachers only lectured for very short durations, interspersed with questioning. Moreover, most of the teachers also used cooperative learning activities in at least one class session, effectively reaching higher levels of cognition each time. Third, these teachers created a psychologically inviting learning environment by exhibiting frequent positive verbal and nonverbal teacher immediacy behaviors.

While the methodology used in this study does not allow for widespread generalizability, the results do reveal some promising behaviors that likely should be attempted in other settings and by other teachers. Other colleges of agriculture and related sciences should consider using the Florida Taxonomy of Cognitive Behaviors, the Teaching Belief Scale, and the Teacher Immediacy Scale as diagnostic tools to help individual teachers explore their own teaching and improve practice. Additionally, colleges that have extensive doctoral education programs should consider using these tools to help graduate students prepare for their future roles as faculty members.

Effective teaching involves a complex set of behaviors that are difficult to capture in a single research study. To gain a better understanding of this phenomenon, the teaching behaviors of additional successful teachers should be explored. Finally, to be able to give more specific suggestions about which types of learning activities should be used, the impacts of each learning activity should be explored in detail.

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Using Second Life to Educate in Agriculture: A Review of Literature

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Abstract

Second Life (SL), a 3-D virtual world developed by Linden Lab in 2003 (Linden Research, 2009a), has become an educational tool across disciplines. The integration of virtual environments into the traditional classroom setting as well as distance education programs is one mechanism of encouraging immersion. Due to the limited amount of research on the use of virtual worlds in agriculture, the authors used an integrative literature review to establish a basis for further research in the topic area. This study focused on reviewing current literature on SL, critiquing SL as an educational tool, and evaluating agriculture's presence in SL. SL is a relatively new tool that can provide students with the opportunity to use technical skills they learned in class, interact using asynchronous and synchronous communication, and participate in real-world simulations that would otherwise not be feasible. SL can actively engage students and provide them with opportunities to be immersed in the educational experience. The authors concluded that agriculture has been slow to adopt virtual education such as SL as an educational tool and more research is needed regarding effective and efficient use of virtual environments in the agricultural classroom.

Introduction

In 2005, the Association of American Colleges and Universities and its more than 1,100 cooperating institutions began an initiative, Liberal Education and America's Promise, to help college students gain a higher quality education (AAC&U, 2007). It is the goal of an institution of higher learning to provide students with a quality education at an affordable price; furthermore, it is the obligation of the institution to provide students with the knowledge they need to perform well and succeed in a competitive world (AAC&U, 2007). Therefore, AAC&U (2007) identified learning outcomes to guide and facilitate higher education, which included written and oral communication skills, critical thinking skills, knowledge of society and change, and practical and application skills. Because of the continued need to provide students with a foundation for success and a quality robust education (AAC&U, 2007), some educators are looking outside the box into a new world of education—virtual worlds (Jacobson et al., 2008).

The use of technology for instruction is of particular importance to agriculture students. Both graduates and employers agree that agriculture professionals should be competent in computer skills such as *"word processing, presentation graphics, spreadsheet analysis, database management, technical graphics, Internet use and electronic mail"* (Johnson et al., 2000, p. 27). Although students need to possess at least some of these basic skills for many of their classes, the instructor generally requires only limited use of instructional technology (Cox et al., 2011). In fact, Boyd and Murphrey (2001) found that agriculture students were interested in taking courses via distance education, even if they had no previous experience with this technology. In addition, technology has been used to successfully teach agricultural leadership courses at the university level, where "web-based students and the traditional students did not differ in their self-perceptions of how much they learned" (Koch et al., 2005, p. 78). Thus, it is critical to embrace new technologies and enable agriculture students to increase learning and experience through the use of new technologies such as SL.

To do this, individuals, learning institutions, governments, and profit and nonprofit organizations are using Second Life, a 3-D virtual world developed

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by Linden Lab in 2003 (Linden Research, 2009a), for both recreational and educational purposes (Kumar et al., 2008; Linden Research, 2009a) because it is flexible and more advanced than other virtual worlds (Linden Research, 2009a). SL has become an educational tool educators are using to bring the real world to the classroom (Bowers et al., 2009; Johnson, 2006). As more educators see the benefits of SL, it may become a more widely used teaching tool (Atkinson, 2008). *"Linden Labs has dedicated staff members whose focus is on how SL can be used for RL [Real Life] education."* (Baldwin, 2009, p. 32)

SL users create an avatar designed and manipulated to the users' preferences that will move and gesture similar to a human (Atkinson, 2008; Baldwin, 2009; Hargis, 2008; Hemp, 2006; Johnson, 2006; R. Martinez, 2007). Between July 2010 and September 2010, more than 750,000 SL users spent 105 million hours participating in SL activities and traded more than $150 million in Linden dollars—the SL currency (Linden Research, 2011). Therefore, SL becomes not only a place to make new friends but also a market place where users can buy, build, and create their own property (Atkinson, 2008; Hemp, 2006; Johnson, 2006; Kumar et al., 2008; Linden Research, 2009a; Pence, 2007-2008; Yellowlees and Cook, 2006). SL provides users the opportunity to use their creative minds and critical thinking skills as they build a virtual environment and become part of their second life (Baldwin, 2009; Foster, 2007). Users can communicate synchronously and asynchronously, transform their avatars into extravagant characters by using the multitudes of clothing designs and body styles (Atkinson, 2008; Hemp, 2006; Yellowlees and Cook, 2006), take part in virtual events, and build their own social networks and islands all in a separate life online (Baldwin, 2009; Hemp, 2006).

Theoretical Framework

Kearsley and Shneiderman's (1998) Engagement Theory was used as the theoretical framework for this study. Kearsley and Shneiderman (1998) theorize that, to learn, students must be engaged in meaningful, worthwhile activities while interacting with other students. Although such learning can occur without technology, technology enhances learning in a way that is hard to accomplish otherwise. The most engaging activities occur in an authentic setting while working on project-based, group assignments. Working in groups provides students with a diverse working environment, which helps them adapt to working in a diverse culture (Kearsley and Shneiderman, 1998). *"Students are intrinsically motivated to learn due to the meaningful nature of the learning environment and activities."* (Kearsley and Shneiderman, 1998, p. 20) SL provides students the opportunity to participate in authentic, collaborative settings on project-based assignments that promote learning through engagement, which are noted by Kearsley and Shneiderman (1998) as important components of the Engagement Theory.

Purpose and Objectives

Creating an educational environment that fosters learning and promotes hands-on activities and student engagement is important in agriculture. Therefore, this study reviewed the literature of incorporating Second Life into agriculture courses to enhance the traditional college learning experience and increase student engagement. The complexity of agricultural practices and mechanics can make teaching with case studies difficult; however, SL simulations can help bridge the gap between the classroom and real-world, hands-on experience. *"We believe that by utilizing the affordances of the Second Life platform to create experiences that are infeasible or impossible in the real world, educators can create superior learning experiences to those which do not offer virtual components"* (Mason, 2007, p. 14). Furthermore, the authors chose an integrative literature review on using SL to enhance the agriculture classroom and engage students in agricultural education. To accomplish this, the authors identified three objectives:

1. Review current literature on SL;
2. Critique the literature on SL as an educational tool; and
3. Evaluate agriculture's presence in SL.

Methods

SL is relatively new and few studies have been published; therefore, the authors of this study chose an integrative literature review to establish a basis for further research in the topic area. An integrative literature review requires researchers to do an extensive search of the literature and explain the need for a literature review (Torraco, 2005). *"The integrative literature review is a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated"* (Torraco, 2005, p. 356). According to Torraco (2005), researchers can use an integrative literature review to analyze and address fresh topics.

Because SL did not debut until 2003, the majority of the literature found was published within the last 10 years. The researchers used published articles to locate additional sources used in the research. Peer-

reviewed and non-peer-reviewed articles were used in the study because minimal peer-reviewed articles related to using SL in education and agriculture were available.

This study used Second Life, virtual worlds, technology-enhanced education, Second Life in education, Second Life in agriculture, Second Life as an educational tool, and barriers to Second Life as the keywords to search the literature base. Additionally, Google Scholar, Texas A&M University Library, Linden Research website, ProQuest database, Journal of Extension, Journal of Agricultural Education, and NACTA Journal were searched to establish the literature review.

Results

Second Life in Education

The mass amount of online social networking sites and desire for instant feedback have, without a doubt, impacted the way people communicate and interact with others around the world and, quite possibly, impacted and changed the way educators teach this generation of college students (R. Martinez, 2007; Rhoades et al., 2008; Walker, 2009a). Educators must communicate and interact with their students on a familiar level, which includes various types of new media and technologies (R. Martinez, 2007). According to Jarmon et al. (2009), SL "contributes to the facilitation of life-long learning"; "has the potential to generate feelings of co-presence and connection among participants in and outside of virtual worlds"; and "provides a context for considering how new technologies have the potential to enrich the lives of older adults" (p. 221). Therefore, SL provides users the chance to collaborate with others and share experiences through online engagement (Jarmon et al., 2009). Because of the flexibility, engagement, and collaboration opportunities of 3-D virtual worlds, such as SL, educators see virtual worlds as a way to further enhance the educational experience of on-campus and distance education students (Bowers et al., 2009; Jarmon et al., 2009; Johnson, 2006).

Although some may perceive SL as a game, the atmosphere is conducive to learning and to conducting virtual world educational simulations (Hargis, 2008). Advantages and flexibility within SL provides users a variety of educational settings and online learning centers. More than 700 institutions around the world have already taken advantage of this environment (Linden Research, 2009a, 2009b). The massive response to and use of SL by higher education institutions confirms that the virtual world successfully combines technology with education (EDUCAUSE, 2008).

The implementation of SL in education has occurred successfully in numerous disciplines (Boulos et al., 2007). Universities including Harvard, a SL educational pioneer (Zhang, 2007), and Stanford use SL to teach courses in campus buildings replicated in the virtual world (Atkinson, 2008; Baldwin, 2009; Hargis, 2008; Johnson, 2006; Macedonia, 2007; Zhang, 2007). Additionally, Elon University, in Elon, North Carolina, hosts a writing-intensive course in SL (Atkinson, 2008). Students at Johnson and Wales University use the business plans they write for a course and implement them in SL, which gives the students a chance to test their plans and discover positives and negatives of the plan (Mason, 2007). Virtual worlds have helped students understand business by role playing different business scenarios (Foster, 2007).

Furthermore, the medical field has benefitted from the use of SL by teaching students about real-life conditions, medical practices, and health awareness (Boulos et al., 2007). Yellowlees and Cook (2006) evaluated the use of SL to educate people about psychosis hallucinations. They recreated a SL replication of the inpatient medical facility of the University of California, Davis, Medical Center and used actual patient hallucinations descriptions taken from audio and digital scripts. Throughout the simulation, participants encountered a variety of hallucinations, including voices, newspapers, guns, etc., ending with a survey to identify their experience in the simulation. More than 69% of visitors viewed the simulation as increasing their knowledge of both auditory and visual hallucinations, and more than 82% encouraged their friends to experience the simulation (Yellowlees and Cook, 2006). Yellowlees and Cook (2006) use the hallucinations simulation to help medical students understand what patients suffering from psychosis experience to enhance future patients' treatment. Because SL is still a new technology, Linden Lab has provided educational institutions with the opportunity to explore the virtual world with free land for a semester (Baldwin, 2009; Johnson, 2006).

Institutions are not alone using SL as an educational tool. Libraries, museums, and historical sites are recreating similar experiences for virtual world users (Atkinson, 2008). *"While virtual worlds are not new, development of teaching and learning within those environments may provide innovative opportunities to engage learners in highly social and interactive online experiences"* (Atkinson, 2008, p. 17).

At the University of Michigan-Dearborn, the School of Management used SL to add to the experience of the traditional college classroom and connect students to information technology (Johnson,

2006). The School wanted something more than just another trend; they wanted a complement to students' education. SL provided students the feel of a campus in an online atmosphere (Johnson, 2006). According to Hargis (2008), SL is an enhancement to traditional curriculum; it gives students an opportunity to experience the coursework at another level. Baldwin (2009) hypothesized that *"…using a virtual world such as SL would enable my students to gain experience that [they] might not otherwise have, giving them meaningful material about which to write and consequently improving student writing on both low and high-risk assignments"* (p. 16). However, Murphy et al. (2005) wrote that, although new technologies have given students more variety and options when taking online classes, written communication may always be the chosen form because it has been the primary means of communication in the past.

Rhoades et al. (2008) documented that many students use blackboard and online learning technologies in the classroom and more common new media including Facebook in their personal lives. However, few students have yet to adopt such technologies as SL in their personal lives let alone their academic lives (Rhoades et al., 2008). Yet, today's students live in a world full of virtual environments (Macedonia, 2007). Students are actively using new technologies; therefore, educators need to identify opportunities to incorporate such technologies in the classroom (Rhoades et al., 2008). The Internet is a widely used social network, but some students may find it hard to view new technology as a way of learning and not just as a means of social communication (Rhoades et al., 2008). Using new technologies in the classroom can assist institutions in the preparation of students for career areas where they are required to use new technology and can attract students who are looking for a program using cutting-edge technology (Rhoades et al., 2008; Walker, 2009a). Baldwin (2009) claimed that SL is a legitimate educational tool: *"It is my responsibility, as an instructor, to tap into these different modes of literacy and learn to meet the students where they are comfortable in order to challenge them to go beyond their comfort zone"* (p. 35).

Cornell University, the University of Maryland, the University of Tennessee, and Utah State University created a Virtual Field Trip that combined interacting, learning, and exploring (Jacobson et al., 2008). The Virtual Field Trip designers created a web-based, 3-D environment using a variety of media including maps, photos, video, etc. (Jacobson et al., 2008). Although a Virtual Field Trip does not give students the hands-on experience they would gain if they physically visited the site and explored the culture and environment, it does give them the opportunity to learn through different types of media within a virtual world and visualize what it would be like to visit the location (Jacobson et al., 2008). Virtual Field Trips provided a comfortable atmosphere for students to interact with each other while learning through a 3-D educational exercise (EDUCAUSE, 2008).

Additionally, Jacobson et al. (2008) explained that the Virtual Field Trip was not designed to teach the basics of the course but rather add an additional structure that helped the students understand issues related to soils and development. The 3-D environment had museums and agriculture interest areas for students to visit and gain more insight into Mexican culture and its contribution to both traditional and nontraditional agriculture. Likewise, students could stop at the library to pick up information about Mexico's history. Students were encouraged to picture themselves in Mexico and experience it as if they had taken a field trip to the country (Jacobson et al., 2008).

Students can sit in a classroom and learn about a particular subject, but when they immerse themselves into a simulation, they become familiar with the experience and begin to understand it (Weusijana et al., 2007). SL allows student to learn through first-hand experience instead of learning about something in textbooks, case studies, etc. (Weusijana et al., 2007). L. Martinez et al. (2007) followed up with the students and instructors in a study at a university in Mexico and found that students were satisfied with learning in SL, but thought SL was slower than the traditional classroom.

Furthermore, Atkinson (2008) looked at the different types of communications in SL and ways for students in online classes to participate in asynchronous and synchronous communication. Alarifi (2008) and Lucia et al. (2009) revealed that SL fosters successful synchronous communication and social interaction while keeping students motivated to learn simultaneously. Atkinson (2008) and Zhang (2007) found that virtual worlds use different types of media (e.g. ranging from voice and email communication to classroom material distribution) to communicate and enhance the students' experience. Educators provide students with information via note cards, images, landmarks, and URL links to improve the learning environment and simulate a traditional classroom (Alarifi, 2008; Atkinson, 2008; Johnson, 2006). According to Girasoli and Hannafin (2008), asynchronous audio/visual communication used in educational settings allows students the chance to

formulate what they are trying to say and lessens the anxiety of speaking face-to-face with peers. While audio/visual tools arouse critical thinking skills and motivation in students, the true possibilities of computer-supported learning have yet to be discovered (Girasoli and Hannafin, 2008).

A 2008 New Media Consortium Survey of Educators in Second Life reported that more than 70% of the 358 respondents are now using SL in the classroom, which is up from 54% in 2007 (Levine, 2008). Additionally, 12% reported that they have taught a class fully in SL, which was also up from 2007. Furthermore, educators reported being more familiar and experienced with SL than they were in 2007, and 24% reported that educational activities in SL were a positive experience for them (Levine, 2008). Bowers et al. (2009) surveyed post-secondary instructors currently using SL as an educational tool, or who had used it in the past, to determine the value of SL in an educational environment. Of the 251 instructors contacted, 162 responded representing 25 disciplines, and about half of the respondents taught in the area of communications, education, or computer technology (Bowers et al., 2009). Of the 162 respondents, more than 90% plan to use SL again in the classroom. It was noted that instructors who used SL as the main source to carry out a class liked it better than the instructors who used it only as an addition to a class (Bowers et al., 2009).

According to Bowers et al. (2009) and Walker (2009a), students often work with case studies, etc. because it is not feasible to teach real world experiences in a traditional classroom setting. Mason (2007) stated that SL can help students overcome problems in the classroom because they can do projects otherwise not feasible due to limited resources. Furthermore, SL provides students an opportunity to be creative and work hands on with different types of scenarios. They can explore and integrate old and new knowledge and formulate new ideas and perceptions (Hargis, 2008; Mason, 2007). *"... [A]n effective authentic learning project provides students with challenging, collaborative, multidisciplinary problems, along with support to meet these challenges."* (Mason, 2007, p. 15)

Use of Second Life in Distance Education

According to Linden Research (2009b), SL has become a path to creating a new type of distance learning environment. SL encourages students to participate, provides distance education students a sense of belonging and interaction with classmates, and provides students the opportunity to practice using technical skills in an environment unlike any other (Baldwin, 2009; Linden Research, 2009b; L. Martinez, 2007; Walker, 2009a). It is a means to mix the traditional on-campus classroom setting with distance education to provide students with a strong interactive classroom (Alarifi, 2008; Johnson, 2006). According to Foster (2007), SL enhances communication among students especially in a distance education course and makes them more eager to learn. *"... [I]ts [SL] application in distance education still looks very promising to many educators and researchers because of its unique features and associated benefits brought by the virtual reality tool"* (Zhang, 2007, p. 3).

Even though distance education students in the counseling program at Regent University in Virginia were satisfied with the interaction provided, faculty and staff felt the program needed more application and practice. Therefore, Regent faculty built a "simulated counselor training facility" (Walker, 2009a, p. 4) in SL because it provided students with much more intense interaction where they could communicate immediately (Johnson, 2006; L. Martinez et al., 2007). Distance education in virtual worlds gives students the opportunity to explore new technologies and interact with their peers, which is often lost in a traditional distance education setting (Walker, 2009a). Often times, because of the constraints of a distance education program, counseling students do not have the opportunity to practice their techniques in an instructor-controlled environment. Virtual environments lessen this problem because students can carry out the counseling simulation in a SL environment (Walker, 2009a). Because distance education has become an educational norm in today's society, it is important to discover ways students can interact with other students in particular classes and still get the same quality of education via distance (Walker, 2009a).

Alarifi (2008), Joseph (2007), Levine (2008), and R. Martinez (2007) each stated that collaborating, networking, and building of new knowledge is a benefit in SL. In SL, students can interact with people from around the world and collaborate on projects with experts from other disciplines (Alarifi, 2008). Additionally, students are able to gain knowledge of other cultures and become more diverse by networking with a variety of people (Pence, 2007-2008; Zhang, 2007). SL gives students the opportunity to create a distance-learning environment and experience that only face-to-face interaction could provide before virtual worlds were introduced (Walker, 2009a). *"Do not underestimate the distance learning potential of Second Life, especially when used in conjunction with voice and web-based tools."* (Joseph, 2007, p. 12)

Agricultural Presence in Virtual Education

A review of the Journal of Agricultural Education, the North American Colleges and Teachers of Agriculture Journal, and the Journal of Extension revealed limited research published regarding the use of SL as an educational tool in agriculture.

Rhoades et al. (2008) found that agriculture students do use technology such as email in typical and atypical classroom settings but few of them use new technologies such as SL. However, more than 10% of the 317 agricultural students implied that they wanted instructors to integrate SL into the classroom. Although students claim they wanted to use SL in the classroom (Rhoades et al., 2008), very few agricultural programs reported use of technologies to teach course materials.

Schroeder-Moreno (2010) reported the use of a student lounge and a farm tour in teaching an agroecology course online. Woods (2010) described the use of SL to teach the topic of foodborne hazards using a virtual kitchen that was created on an eXtension SL island named Morrill Island. The author reported that participants expressed that they had a positive experience and the educational content was useful (Woods, 2010). While there is only limited published research of the use of SL by agricultural Extension, it should be shared that eXtension maintains two islands within SL.

Boyd et al. (2006) studied the use of a virtual simulation focused on international development where students were requested to make decisions at each stage of the simulation. The virtual simulation activity and the required follow-up reflection affected student's learning (Boyd et al., 2006). Additionally, Rhoades et al. (2009) examined a virtual approach to teaching greenhouse agrisciences courses using a simulation that involved the use of multimedia materials and found that students were satisfied with the approach and improved student competencies. However, it is important to note that in both of these cases the virtual approach described is different than the immersion experience that occurs through the use of SL as a virtual world.

Kloepper et al. (2010) used SL as an educational tool in an Introduction to Animal Science course at Redlands Community College in El Reno, Oklahoma. Because RCC does not have a poultry program, it collaborated with Auburn University to create Eagle Island and teach introductory animal science students about the poultry industry (Kloepper et al., 2010). Students tour the poultry processing facility and learn about food safety. Students can visit the "Virtual Chicken Museum," "Egg Processing Facility," and "Research Unit" (Kloepper et al., 2010, p. 45-46) in 3-D to learn more about the female poultry reproductive organs and poultry production. Students are expected to communicate, to gather information throughout the simulation, and to ask the Auburn faculty questions about the poultry industry (Kloepper et al., 2010).

According to Jacobson et al. (2008), because of the changing needs in today's undergraduate population, educators face the obstacle of modifying courses and programs to accommodate students. To increase the enrollment in agronomy programs across the nation and implement the learning goals outlined in the Liberal Education and America's Promise initiative (AAC&U, 2007), instructors are working to connect natural sciences and courses that attract and retain a wide variety of students in agriculture (Jacobson et al., 2008). For example, Jacobson et al. (2008) used Virtual Field Trips to familiarize students with the impact of urbanization and agriculture production while incorporating connections to social issues, and The Ohio University uses SL to teach users about food selection based on the health impacts (Boulos et al., 2007).

Barriers to Using Second Life in Education

The opportunities of SL are many, but to evaluate the effectiveness of the tool in the education realm, the opportunities of the platform must be compared to the barriers (Warburton, 2009). Atkinson (2008) and Warburton (2009) reported that SL could be overwhelming at first because it is advanced and anything goes. Baldwin (2009) compared it to visiting a foreign country because of all the things to learn about the culture of SL; however, most new technologies have experienced the same type of judgment (Atkinson, 2008). Barriers include technical difficulty, identity, culture, collaboration, time, economic, standards, and scaffolding persistence and social discovery (Warburton, 2009). Technical issues can be a barrier hard to overcome in SL because a wide variety of technical difficulties can occur including the Internet connection, hardware, graphic cards, avatars, and navigation (Alarifi, 2008; Warburton, 2009; Zhang, 2007). If students experience technical difficulties, they can be disconnected from not only SL but also class discussion (Martinez et al., 2007). Moreover, although some may consider SL to be among the social networks, the social aspects of the platform are not as friendly as one might think (Warburton, 2009). Unlike Facebook and other social networks, connecting with and making friends is not as easy in SL (Warburton,

2009). Furthermore, identity and security issues can be a barrier because users have the freedom to change their appearance and alter their identity, which could create communities of uncertainty and frightened users (Alarifi, 2008; Hargis, 2008; Johnson, 2006; Warburton, 2009). As with any new technology, SL has barriers and disadvantages to its adoption; however, the use of SL as an education tool may depend upon how the educators adopt the technologies and not on the usability of the new technologies (Atkinson, 2008).

Discussions/Conclusions

Three-dimensional virtual worlds are bringing possibilities to the classroom that educators may have never considered. Just as counseling educators use virtual worlds to create and recreate traditional counseling settings (Walker, 2009a), colleges of agriculture could use SL to teach agriculture, conduct real-world simulations, and imitate research without leaving the classroom or lab. However, few educators of agriculture have chosen to embrace and utilize SL at this point. Many opportunities exist for educators to use SL as a technology supplement to the classroom (e.g. participate in virtual tours around the world, prepare for study abroad trips by researching and exploring specific parts of the world, join real-world simulations, interact with experts from various agriculture programs through synchronous and asynchronous communication, explore the internal organs of livestock animals through virtual replications, or learn about extension, crops, and plants at the state fair in SL). Agriculture, broadly defined, has been slow in its adoption of SL even though multiple disciplines use SL as an extension of the classroom. Chemistry professors have islands designated to display molecular models where students can explore and experiment with science while other professors teach English in SL.

Agriculture's use of SL, either inside or outside of the classroom, is limited. Perhaps educators in agriculture do not see the benefits of SL in education and, therefore, are slow to adopt the technology. Although SL can be used in many facets of agriculture, one can argue that not all programs within agriculture may benefit from the use of SL. However, many programs could use the technology to add value to the classroom.

The literature review reported in this study offers a new perspective regarding the use of SL as an educational tool for agriculture. The perspective includes consideration of the following aspects: faculty and student adoption rates, effectiveness of SL, availability of hardware and software, and efficiency of SL. If universities implement virtual worlds such as SL, they need to consider faculty and student adoption, effectiveness of SL in education, availability of hardware and software, and cost. Faculty and students must view the new technology as useful and be ready and willing to adopt it (Johnson, 2006), and universities must be willing to incur the cost affiliated with full implementation of a product that will broaden their courses and include SL in the curriculum (Alarifi, 2008; Johnson, 2006). Alarifi (2008) and Zhang (2007) found that the technicalities of SL are high and, because of the lack of university support, it could be hard to implement SL on campus. However, Pence (2007-2008) noted that even with lack of support educators can take advantage of the educational tools in SL. Nevertheless, Jacobson et al. (2008) concluded the Virtual Field Trips designed to enhance student learning about urbanization and agriculture production was worth the cost because of the educational benefits the students obtained. Institutions can address SL security and adaptation to culture by providing students with orientation and online learning sessions (Alarifi, 2008; Atkinson, 2008; Baldwin, 2009). Additionally, according to Alarifi (2008), Hargis (2008), and Johnson (2006), SL islands can be secured so that only enrolled students and faculty can enter a particular island.

A limited amount of research is available regarding the use of SL as an educational tool, and a minimal amount of literature was found on using virtual education in agriculture. Not enough research has been done to show evidence that virtual worlds and new technologies such as SL have a place in the educational world (Walker, 2009a). Consequently, more research needs to be conducted on the effectiveness and use of new technologies (Rhoades et al., 2008). Research should be conducted on using SL across the agriculture discipline and the need to integrate new technologies, such as SL, into the agriculture classroom to enhance student engagement and participation. Additionally, research needs to be conducted on how instructors integrate SL into the curriculum (Alarifi, 2008; Bowers et al., 2009; Walker, 2009b). Colleges of agriculture across the country could use SL simulations in class and evaluate acceptance by faculty and students of such integration. As SL is integrated into courses, the opportunity for experimental research comparing SL to traditional methods, i.e. role play and case studies, will be available. Furthermore, researchers should explore students' learning styles in SL and compare them to student learning styles in traditional learning environments.

Technology has changed and continues to change in today's society (Alston and English, 2007). Faculty and staff at agricultural institutions need to stay abreast of the changing technology and find new ways to integrate new technologies into the classroom. Exposing students to new technologies and new media, such as SL, could assist students in building their experience (Rhoades et al., 2008). *"As the 'net generation' enters into higher education, it is our challenge as educators to be prepared to offer students the type of engaging education that will not only help them learn but will also help them in their search for a career"* (Rhoades et al., 2008, p. 177).

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Acknowledgements: This project was supported by Higher Education Challenge Grant no. 2009-38411-19768 from the USDA National Institute of Food and Agriculture.

Engaging Under-Represented Youth in Food, Agriculture and Natural Resources through Pre-College Residential Summer Programs[1]

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Abstract

Since 1982, the College of Agriculture and Natural Resources has offered pre-college, residential summer programming to increase the number of under-represented students pursuing post-secondary education and earning degrees in food, agriculture and natural resources (FANR). In 2003-2008, pre-and-post surveys were conducted for participants in the one-week Agriculture and Natural Resources Institute for Multicultural Students (AIMS) Program and the six-week Multicultural Apprenticeship Program (MAP) to assess (1) each program's effect on participants' perceptions of (a) higher education and (b) FANR and (2) to assess whether the programs differed in their effect on students. A pre-survey was administered to explore perceptions that parents of under-represented students have about FANR. The AIMS participants gained an enhanced understanding of what it is like to be in college and greater understanding that careers in FANR extend beyond working on a farm. The MAP participants gained an increased understanding of those areas, but also grew in their understanding of (a) courses needed for college; (b) the college experience; and (c) their general understanding of FANR. While both programs positively influenced students, the influence was greater in the longer, more intense program. Overall, parents encouraged their students' interests in FANR.

Introduction

Increasing the number of under-represented students in food, agriculture and natural resources (FANR) has been a concern of the College of Agriculture and Natural Resources (CANR) at Michigan State University (MSU) since the early 1980's. Changing U.S. demographics and employment needs in the food, agriculture, and natural resources system (FANRS) heighten the need to recruit students from all racial and ethnic segments of the U.S. population and to increase recruitment of women (APLU, 2009; Hill et al., 2010; Goecker et al., 2010; National Research Council, 2009). Historically, minorities and women have been under-represented in these disciplines and that remains unchanged today (APLU, 2009; Foster and Henson, 1992; Hill et al., 2010; Moss, 2011; National Research Council, 2009; Warren and Alston, 2007).

Estimates indicate that between 2010 and 2015 there will be approximately 54,400 annual job openings in the U.S. FANRS for new graduates (Goecker et al., 2010). Only 53,500 graduates are expected to be available annually for these positions, and only 55% of those graduates are expected to have earned degrees from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine (Goecker et al., 2010). Allied disciplines like biological sciences, engineering, health sciences, business, and communication are expected to provide the remaining 45%, although employers prefer graduates from the colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine, because they tend to have stronger interests in FANRS and greater work experience in these disciplines (Goecker et al., 2010).

A National Research Council (2009) report presented several recommendations for achieving diversity and for increasing student numbers in agricultural education. One encouraged colleges and universities with agricultural programs to reach out to K-12 students and teachers to expose them to

[1]The authors acknowledge and thank the College of Agriculture and Natural Resources for its continued support of pre-college programming, the College of Veterinary Medicine for its equal partnering with CANR for financial support of pre-college programming, Dr. Murari Suvedi for statistical analysis of the data, and the MSU Office of Inclusion and Intercultural Initiatives for its initial funding of the Kaplan ACT program.
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agricultural topics and careers. The need is two-fold: to increase the number of under-represented students who enroll in and graduate from college and to increase the number who study disciplines in FANRS. Many pre-college programs seek to address college recruitment of under-represented students (Harkness et al., 2011; Perna, 2002, 2006; Perna and Titus, 2005; Strayhorn, 2010, 2011; Walsh, 2011) and some programs have the added emphasis of exposing students to agriculture (Esters, 2007; Gale, 2002; Larke and Talbert, 1993; Reese, 2005).

Objectives

The objectives of this study were to:

(1) Assess the effect of AIMS and MAP on perceptions that under-represented students had about (a) higher education and (b) food, agriculture and natural resources (FANR).

(2) Assess whether or not the MAP and AIMS programs differed in their effect on student perceptions about higher education and/or FANR.

(3) Explore attitudes that parents of under-represented students had about FANR.

Theoretical Framework For Recruiting Under-Represented Pre-College Students to Higher Education and FANR

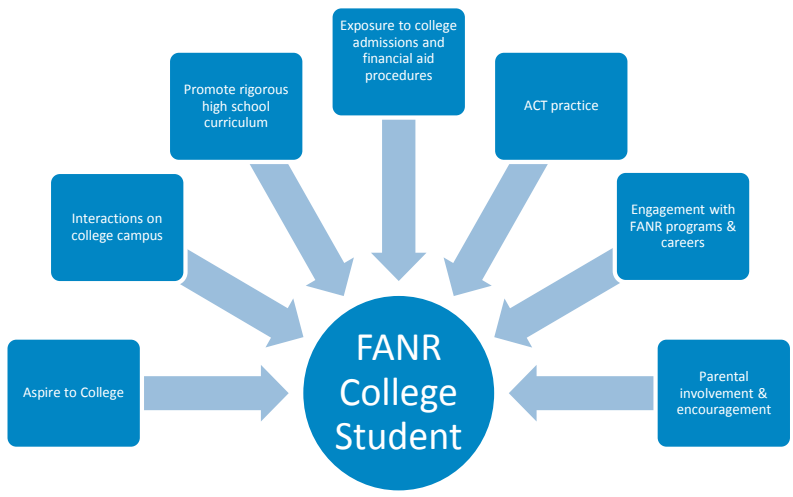
Perna (2002) identified 11 critical predictors for college enrollment for under-represented students, the first five of which were addressed by a fourth of pre-college programs: (1) developing student desire to attend college; (2) fostering college tours, visits or fairs; (3) promoting a rigorous high school curriculum; (4) including parental involvement "to facilitate predisposition and choice;" (5) initiating involvement with students by the 8th grade in order to attract students early in their K-12 experience; (6) promoting college awareness or exposure with regard to admissions processes and financial aid; (7) development of academic skills; (8) promoting parent college awareness; (9) providing parent FAFSA (Free Application for Federal Student Aid) information and participation using the form; (10) SAT/ACT training; and (11) providing tuition or scholarships. Many of the preceding critical components also were identified by other research (Choy, 2002; Harkness et al., 2011; Perna, 2006; Perna and Titus, 2005; Reese, 2005; Strayhorn, 2010b, 2011).

The important role of parental involvement and encouragement is stressed by Strayhorn (2010a) with regard to math achievement by Black high school students, Perna and Titus (2005) with regard to the effect that different types of parental involvement have on college enrollment depending upon ethnic/racial groups, and Strayhorn (2010b) with regard to the effect of parental involvement and encouragement on college enrollment of under-represented students.

Lynch (2001) reported personal decision (83%), former teachers and a college faculty member (55%), and parents (53%), as the three most influential factors affecting a minority student's decision to select a major in agriculture at Virginia Tech. Additionally, 46% of the participants previously had been in a high school or college summer agricultural intern program. Prior experience in agriculture was identified by Wildman and Torres (2002) as the most influential reason for selecting a major in agriculture. Esters (2007) reported that high school grade point average and influence of the female guardian were the most important determining factors of whether or not urban agricultural education students enrolled in a post-secondary agriculture program. An agriculture summer research internship program for minority high school and college students at Iowa State University (Gale, 2002) resulted in encouragement of 49% of the 60 students to pursue careers related to agriculture. Study of a four-week residential high school summer enrichment and agricultural literacy program for gifted and talented students at Virginia Tech (Cannon et al., 2006) indicated that students gained in knowledge and perceptions of the agricultural industry, but the program did not influence participants' career choices. Medicine/physician was the career choice most selected by participants.

The theoretical framework for this study (Figure 1)

Figure 1. Schematic of theoretical framework upon which the research is based.



was grounded in the concept that the following factors influence under-represented pre-college students to pursue higher education and/or FANR careers: (1) developing student desire to attend college; (2) fostering visitation of and interaction with various MSU programs; (3) promoting a rigorous high school curriculum; (4) promoting college awareness and exposure to admissions and financial aid procedures; (5) providing ACT practice; (6) providing interaction with food, agriculture and natural resources programs and careers; and (7) parental attitudes about FANR (Perna, 2002; Lynch, 2001; Perna 2002; Perna and Titus, 2005; Strayhorn, 2010b; and Wildman and Torres, 2002).

Program Description and Methods

The Michigan State University Institutional Review Board approved the study protocol and all participants and their parents or guardians provided written informed consent prior to participation in the study.

Interchangeable Use of Terms FANR and ANR

The Department of Food Science and Human Nutrition, which contains the disciplines of food science and dietetics, is part of CANR. Additionally, key disciplines in CANR such as crop and soil sciences; animal science; horticulture; and agriculture, food, and resource economics are intricately linked to food production, storage, distribution, processing, and/or utilization. Food science, the key disciplines, and the natural resources disciplines at MSU historically have been referred to collectively as agriculture and natural resources (ANR). Consequently, AIMS and MAP participants were exposed literally to careers in food, agriculture, and natural resources. The term food, agriculture, and natural resources (FANR or its variants) has increased in usage nationally since 2009 (APLU, 2009 and National Research Council, 2009). Thus, ANR and FANR are used interchangeably in this paper, even though ANR was used when the research was initiated in 2003. The term FANR is preferred, because it more visibly communicates the inclusion, in this study, of the food-related disciplines. Tables in the text refer to ANR, since that wording was used when the surveys were conducted.

Multicultural Apprenticeship Program (MAP)

The MAP, previously known as Minority Apprenticeship Program, began at MSU in the summer of 1982. The program was designed to (1) introduce under-represented pre-college students to careers in FANR, (2) inform participants about the MSU admissions process and college preparatory coursework, (3) introduce participants to college life, and (4) recruit participants into majors in the CANR. After passage of proposal 2 in Michigan in November 2006 prohibiting recruitment on the basis of race, ethnicity or gender, item number one above was changed to attracting students from urban areas. This six-week residential program paired students with mentors in CANR, the Michigan Department of Agriculture, and/or Michigan Department of Natural Resources to work on research projects and interact with faculty, staff, and students from the mentor's unit from 8:30 a.m. to 4:00 p.m. each weekday. Participants attended interactive evening workshops and seminars on leadership development, FANR careers, personality styles assessments, admission to MSU, financial aid, and instructions on giving PowerPoint presentations. Students took field trips to the forest and bird sanctuary at the Kellogg Biological Station, a MSU research field station with a focus on fundamental and applied research in ecology and agriculture.

Recreational activities included canoeing; picnics; local amusement venues; and attending the campus Pow Wow, a gathering of American Indians that involved traditional dance and singing, socializing, and honoring Native culture. Since the inception of MAP, students have earned weekly stipends of $45 to $75 and within the last eight years have been required to save 50% of the summer stipend in a bank account. At the closing event for the summer program, each participant gave a five-minute oral presentation before peers, mentors, and parents explaining their MAP experience; research projects, findings and research skills acquired; seminars they valued the most; field trips; and social activities throughout the summer.

Application to the program included a transcript, two letters of recommendation, and completion of six essay questions. Students were selected by a committee of CANR faculty, staff, and administrators and the program was coordinated by the CANR Office of Academic and Student Affairs. Approximately, 25 students per year were selected from a national pool of students, although most applicants were from Michigan and were entering grades 10 through 12.

ANR Institute for Multicultural Students (AIMS)

Initiated in 1994, AIMS (previously known as ANR Institute for Minority Students) was a one-week residential program that gave high school students a broad exposure to FANR. Participants engaged in

demonstrations, FANR-related field trips, and other hands-on activities that introduced them to careers in FANR and college life. Interactive evening seminars educated students about high school college preparatory course work, MSU admissions requirements, and information about the FAFSA process. Approximately, 15 students in grades 9 through 12 were selected each year based upon an application process very similar to that of MAP.

The ACT Test

The ACT program was initiated as an additional tool to assist participants in gaining admission to college, preferably MSU. In summer 2004, year-long access to online ACT preparatory programs became available to students in AIMS and MAP Students in MAP were required to spend six hours each week on the ACT, and AIMS students spent one hour each night of their campus stay. Both MAP and AIMS participants were encouraged to use the program regularly throughout the ensuing school year. The Kaplan online ACT program was used the first year, but Bridges Test Gear has been used since 2005. Mention of programs does not constitute endorsement.

Procedures

The study was conducted from 2003-2008 and included AIMS and MAP students and their parents. Pre- and post- survey data were collected from students and pre-survey data from parents. All pre-survey data were gathered at the close of orientation sessions of AIMS and MAP. Post-survey data were collected at the completion of each program. Student pre-and post-surveys consisted of three sections (1) five questions on students' knowledge and perceptions of college, (2) eight questions about FANR, and (3) a demographic section including gender, academic level, ethnic/racial group, information about residential locale, and level of diversity in their home community. A five-point Likert scale including (1) strongly agree, (2) agree, (3) undecided, (4) disagree, and (5) strongly disagree was used for the first and second sections of the student surveys and for the parent survey.

The survey instruments were developed by the AIMS and MAP program director along with the associate dean for undergraduate programs in the college. Survey questions were based upon goals the college set for the programs and were not tested prior to initial administration of the survey. Cronbach's alpha analysis was conducted (Garson, 2011; Santos, 1999) to assess reliability of the survey instrument. The Cronbach's alpha of 0.62 for student survey questions about higher education, and 0.73 for student survey questions about FANR suggested that the instruments were valid (Garson, 2011; Santos, 1999), but the alpha of 0.53 for the parent survey is lower than the normally accepted value of 0.60.

All participants in the programs, a total of 207 during the survey period, were asked to participate in the pre- and post-surveys. Parents or guardians (N = 165) accompanying participants to the orientation programs each year were asked to complete a survey during the orientation for each program.

Statistical Analysis

Data were analyzed by IBM SPSS Statistics 19, formerly named Statistical Package for the Social Sciences. The Independent Samples T-Test was utilized when comparing two means. One-way ANOVA was utilized when comparing more than two means, followed by Tukey B mean analysis when the F value was significant at $P \leq 0.05$. Using SPSS, composite scores were calculated for the sections "perceptions of higher education" and "perceptions of FANR" by averaging the mean response for each item in that section and composite scores were analyzed as the other data. In order to complete the objectives of the study, student survey data were analyzed across programs, between programs, and within programs. Since no post-surveys were given to parents, standard deviation is indicated for parent pre-survey responses.

Results and Discussion

Demographic Profile of AIMS and MAP Students

Both programs were successful in attracting under-represented students (Table 1): 68 and 11%, respectively, African American and Hispanic/Latino students in MAP and 75 and 6%, respectively, African American and Hispanic/Latino students in AIMS. Attracting under-represented students is not unusual for programs that target this group (Gale, 2002; Larke and Talbert, 1993; Moss, 2011). However, it is significant that MAP and AIMS maintained their ability to do this after passage of Michigan's Proposal 2, which some feared would decrease inclusion of under-represented groups in university-related programs.

The majority of participants in both programs were females (Table 1), similar to other pre-college programs (Anderson and Kim, 2009; Gale, 2002; Moss, 2011; and Warren and Alston, 2007). Although Perna (2002) recommended initiating involvement with students by their 8th grade year, the majority of MAP and AIMS students were entering the 11th and 12th grades (Table 1), as is often the case with agriculturally-related pre-college programs (Gale, 2002; Larke and Talbert,

Table 1. Description of participants in MAP and AIMS summer pre-college programs. 2003 – 2008. otal N = 119 for MAP and 88 for AIMS.

Characteristic	MAP N	AIMS N
Ethnic/Racial Category		
African American/Black	81	66
Asian American/Pacific Islander	6	2
Hispanic/Latino	13	5
Native American/American Indian	6	1
White/Caucasian	6	7
Mixed/Biracial	4	5
Other	3	1
Unreported	--	1
Gender		
Female	71	59
Male	48	29
Grade Level		
9th	--	8
10th	19	27
11th	45	31
12th	54	22
Unreported	1	1
Diversity of Home Community		
All from same race as you	9	13
Mostly the same race as you	48	35
Mostly from different racial/ethnic background than you	38	20
Almost all from different racial/ethnic background than you	24	19
Unreported	--	1
Home Community		
Rural/Country	6	8
Suburban/Town	40	27
Urban/City	72	52
Unreported	1	1

1993). Approximately 50% of students came from diverse communities, and the majority were from urban areas (Table 1). The programs succeeded in attracting students who normally may not have been exposed to FANR.

Perceptions of Higher Education

When pre- and post-survey data were analyzed across programs (Table 2), there was a significant increase in student understanding of the process for applying to college and of what it is like to attend college. Further analysis indicated that post-survey changes in these areas were due primarily to perceptual changes by students in MAP (Table 2). After participation in MAP (Table 2), students were more knowledgeable about high school course work needed for college preparation, the college application process, and college life. In comparison, AIMS helped students learn more about college life, but had no significant effect in other areas (Table 2). Students expressed a strong desire to attain post-secondary education at the outset in both programs and that remained unchanged.

Post-survey composite scores were significantly different for perceptions of higher education across programs (Table 2) and for MAP (Table 2). Although both AIMS and MAP students believed they had the knowledge and ability to attend post-secondary education, the AIMS students were less certain than MAP students in pre- and post-surveys (Table 3). The data suggest that MAP students had a greater change in their perceptions of higher education than AIMS students in all areas except desire to attend college and knowledge about the process of applying to post-secondary institutions (Table 3). The MAP students were on campus five weeks longer than AIMS students and worked more intensely with the ACT preparation program, possibly accounting for some of the differences in post-survey results between the two programs.

Perceptions of Food, Agriculture and Natural Resources

Across programs, students gained a greater understanding that working on a farm is only one aspect of ANR (Table 4), having a career in ANR does not mean working for low wages or salaries, wildlife management is part of ANR at MSU, and concluded that learning about ANR is not boring. However, pre- and post-survey analyses within programs (Table 4) showed that the overall change was primarily because of changed perceptions by MAP students (Table 4) where significant differences existed between pre- and post-responses for five of the seven items in this section and for composite data. In contrast, the only

Table 2. Pre- and post-survey responses regarding perceptions of higher education by MAP and AIMS students. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey
	N = 207	N = 172	N = 119	N = 92	N = 88	N = 80
I plan to attend college or vocational school	1.07	1.05 NS	1.07	1.00 NS	1.07	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.23	1.19 NS	1.17	1.12 NS	1.32	1.27 NS
I know the classes to take in high school to prepare for college or vocational school	1.68	1.55 NS	1.62	1.34***	1.76	1.80 NS
I know the process of applying to college or vocational school	2.05	1.76***	2.03	1.66***	2.07	1.88 NS
I know what it is like to be in college	2.33	1.47***	2.29	1.34***	2.40	1.63***
[z]Composite score	1.68	1.48***	1.63	1.35***	1.75	1.62 NS

NS, *** Indicates non-significance or significant difference for means between columns across programs or between columns within a program at P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

Table 3. Comparison of pre- and post-survey responses between MAP and AIMS students, regarding perceptions of higher education. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	MAP	AIMS	MAP	AIMS
	Pre-Survey		Post-Survey	
	N = 119	N = 88	N = 92	N = 80
I plan to attend college or vocational school	1.07	1.07 NS	1.00	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.17	1.32*	1.12	1.27*
I know the classes to take in high school to prepare for college or vocational school	1.62	1.76 NS	1.34	1.80***
I know the process of applying to college or vocational school	2.03	2.07 NS	1.66	1.88 NS
I know what it is like to be in college	2.29	2.40 NS	1.34	1.63**
[z]Composite score	1.63	1.75	1.35	1.62***

NS, *, **, *** Indicates non-significance or significant difference for means between columns comparing programs for pre- or post-surveys at P ≤ 0.05, P ≤ 0.01, or P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

significant change for AIMS students with regard to ANR perceptions was the increased understanding that working on a farm is only one facet of ANR (Table 4). The longer, more involved experiences of MAP appeared to help students develop a more positive perception about ANR. Fortunately, both MAP and AIMS students entered the programs with the understanding that protecting the environment is valuable and that ANR is science-based.

Perceptions as Affected by Grade Level, Gender and Type of Residential Community

Only a few pre- or post-survey responses varied by grade level, gender, or type of residential community (Table 5), similar to findings by Newsom-Stewart and Sutphin (1994) regarding lack of gender differences. Initially, 9th graders were less confident than other students that they had the knowledge or ability to attend college, but 9th graders' response did not differ from the response of students in other grade levels by the conclusion of the programs. Females were less confident about having the knowledge or ability to attend college than were males and this did not change by the end of the programs (Table 5). Given current information, it is not possible to tell if a greater number of female mentors would have changed the view of female participants. The AIMS and MAP program staff were approximately 50% female and included individuals from various racial backgrounds as was the case with many of the evening seminar presenters. However, departmental faculty and graduate students who served as mentors were almost all white males, a constraint that was beyond the control of the director of AIMS and MAP. Palmer et al. (2010) credited the racial composition of historically Black colleges and universities as being important in helping facilitate academic achievement of black males, citing role models as an example. Hill et al. (2010) cited instances where girls thought boys were better at specific tasks than they and offered suggestions that may be categorized as changing the climate for girls.

Students from rural communities initially indicated significantly less knowledge about the process for applying to college or vocational school than did urban or suburban youth, but the gap closed by the end of the programs (Table 5).

It is important to understand student perceptions of FANR and to document practices that change any misperceptions that dissuade career interest in FANR. Both programs positively influenced the perceptions

Table 4. Pre- and post-survey responses of MAP and AIMS participants regarding perceptions of agriculture and natural resources. 2003 – 2008.
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey
	N = 207	N = 172	N = 119	N = 92	N = 88	N = 80
A job in agriculture or natural resources means working on a farm	3.71	4.16***	3.71	4.30***	3.69	4.01*
It does not take much knowledge/ability to work in agriculture or natural resources	4.01	4.12 NS	3.98	4.27*	4.06	3.94 NS
Actions to protect the environment waste time and money	4.37	4.43 NS	4.34	4.38 NS	4.41	4.49 NS
People in agriculture and natural resource jobs earn less money	3.72	3.98*	3.76	4.11***	3.68	3.84 NS
Agriculture and natural resources are not science based	4.24	4.36 NS	4.27	4.41 NS	4.21	4.29 NS
Managing wildlife is not part of agriculture and natural resources	4.18	4.37*	4.12	4.36*	4.25	4.39 NS
Learning about agriculture and natural resources is boring	3.72	3.92*	3.67	4.00*	3.79	3.82 NS
[z]Composite score	4.00	4.19***	3.99	4.26***	4.02	4.10 NS

NS, *, *** Indicates non-significance or significant difference for means between columns across programs or between columns within a program at P ≤ 0.05 or P ≤ 0.001, respectively, according to Independent Samples T-test.

[z]Composite scores were calculated by averaging the mean of all responses in each column.

Table 5. Pre- and post-survey responses by grade level, type of residential community, and gender. 2003 – 2008. Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

"I have the knowledge/ability to attend college or vocational school"

	Pre-Survey		Post-Survey	
Grade Level	**N**	**Mean**	**N**	**Mean**
12th	76	1.20 b*	58	1.26 NS
11th	76	1.20 b	63	1.14
10th	48	1.26 b	41	1.12
9th	8	1.75 a	7	1.43
Gender				
Male	77	1.14 b*	58	1.14 b*
Female	130	1.39 a	112	1.28 a
Type of Community				
Urban/City	122	1.98 b**	101	1.71 NS
Suburban/Town	67	2.00 b	58	1.81
Rural/Country	14	2.79 a	11	1.91

NS,*,**Nonsignificant difference or means followed by different letters indicate significant difference within columns at $P \leq 0.05$ and $P \leq 0.01$, respectively, according to Tukey B.

that under-represented students had about FANR, but MAP had a more pronounced effect than AIMS.

Parent Perceptions of Food, Agriculture and Natural Resources

Since parents play a major role in a child's selection of a course of study in college (Esters, 2007; Lynch, 2001), the survey sought to explore parental knowledge and attitudes about FANR. Parents expressed a positive attitude (Table 6) towards supporting their child's decision should the child choose to pursue a career in ANR, although they were less certain that their children had such an interest. Parents agreed that AIMS and MAP provided more than a "camp" experience, interpreted to mean AIMS and MAP were more than an experience away from home for their children, and parents asserted they would refer other parents to AIMS or MAP. Parents had little knowledge about academic programs in ANR. Parents were undecided about the statements that ANR had low paying jobs, that there were not many jobs in ANR, and that agriculture deals mainly with farming. Given the influence parents have in selection of students' college career choices (Esters, 2007, Lynch 2001, Perna and Titus, 2005), it is crucial to help parents better understand career opportunities in FANR.

Parental comments to open-ended questions were extremely positive for AIMS and MAP (Table 7) and provided excellent information for use in marketing and recruiting students for these programs. Such information is vital as ANR competes, for outstanding students, with other disciplines often considered to be more "prestigious." Comments demonstrated that parents encouraged their children to explore careers in ANR, even though the parents were not familiar with these careers and that parents wanted the college exposure for their children and the opportunity for them to prepare for the ACT test. Future research should ask more specific questions concerning parental perceptions of FANR, inquire where the parents obtained their knowledge about FANR, and inquire about their preferred method of obtaining additional information about FANR if desired. Likewise, future research needs to assess parental attitudes towards higher education, an aspect that was lacking in this study.

Table 6. Perceptions of higher education and of agriculture and natural resources by parents of students in the MAP and AIMS . 2003 – 2008. Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Question	Mean	S.D.
Would support child's decision to pursue career in agriculture or natural resources	1.38	0.61
I am knowledgeable about different academic programs in agriculture and natural resources	2.64	0.98
My child is interested in pursuing a career in agriculture or natural resources	2.48	0.86
The program is more than a camp experience for my child	1.39	0.78
Careers in agriculture offer low paying jobs	3.69	0.84
Careers in natural resources offer low paying jobs	3.71	0.84
There aren't many jobs available in agriculture	3.84	.088
There aren't many jobs available in natural resources	3.84	0.90
Agriculture deals mostly with farming	3.81	0.94
I would refer other parents to this program	1.43	0.77

Table 7. Examples of parental responses to open-ended pre-survey questions about AIMS and MAP.

Question: "Why did you choose this program for your child?

Year	Program	Response
2004	AIMS	"I had another child participate in the AIMS program. After her week here she decided she wanted to attend college."
2006	MAP	"I was part of this program many years ago. It was a wonderful program and I thought he would get a lot out of this program."
2008	MAP	"We chose this program because my child is dedicated to study of agriculture and natural resources and animal science. Her dream is to attend 'MSU'. She loves this school and what they have to offer."
2008	AIMS	"How she needs to plan better in high school, i.e. classes, grades, test scores and to know what colleges are looking for and what she needs to do."
2008	AIMS	"Highly recommended by a friend."
2008	AIMS	"Loves sciences, animals, wildlife, and wanting exposure to degrees. MAP? next year" (sic)

Question: "What do you expect your child to gain from this program?"

Year	Program	Response
2006	MAP	"I want her to come out of this experience knowing more about agriculture as well as experiencing how students live and learn at college."
2008	AIMS	"Knowledge in all areas and degree opportunities here at MSU. ACT advancement. Social experience."
2008	MAP	"I expect for him to prepare himself for the ACT exam. I expect for him to learn about different fields in agriculture and natural resources."

The AIMS and MAP incorporated five of the 11 critical components proposed by Perna (2002): students' aspirations to attend college; visits to various CANR and MSU programs, centers, and institutes; promoting rigorous course work in high school; promoting college awareness with regard to admissions and financial aid processes; and providing practice for the ACT exam. Efforts to affect decisions about careers in FANR included multiple exposures to FANR careers and disciplines, close interaction with faculty and/or graduate students, and exploration of parental attitudes about FANR (Cannon et al., 2006; Esters, 2007; Gale, 2002; and Lynch, 2001).

Summary

Both AIMS and MAP positively affected student perceptions of higher education and FANR, but MAP had a more pronounced effect than AIMS. Students in the shorter-length residential program (AIMS) had an increased knowledge of what it is like to be in college and recognized that careers in FANR are not limited to working on a farm. Students in the six-week residential program (MAP) had an increased understanding of what classes are needed in high school to prepare for college and the process for applying to college, and had a clearer understanding of what it is like to be in college. The MAP participants understood that a career in FANR means more than working on a farm and that a great deal of knowledge and ability are needed to work in FANR. Additionally, MAP participants understood that careers in FANR are not low paying jobs, that wildlife management was part of FANR, and thought that learning about FANR was not boring. Parents were positive in their attitudes towards AIMS and MAP and towards encouraging their children if they were interested in FANR, but parents had limited information about career opportunities in FANR. There is an urgent need to recruit a larger and more diverse pool of students to meet workforce demands in FANR. Results suggest that pre-college programs such as AIMS and MAP have the potential to play an important role in helping to address that need and in promoting higher education for participants from under-represented groups. This held true even in the environment created by Proposal 2, an environment which could have limited the inclusion of under-represented groups. Results also suggest that six-week programs are more effective than one-week programs in accomplishing these goals.

Recommendations

This research is only one step in an important process to assess the impact that pre-college programs in FANR may have upon the pursuit of higher education and on the pursuit of careers in FANR by under-represented students. The MAP and AIMS programs have existed long enough to provide excellent data to determine the extent to which their alumni have graduated from post-secondary institutions and/or studied FANR. Future studies should assess the number of AIMS and MAP students, beginning with 1982 participants, who (1) have graduated from majors in the CANR at MSU, (2) have graduated from other majors at MSU, (3) have matriculated at and/or graduated from other post-secondary institutions throughout the nation, (4) have earned graduate or professional degrees, and/or (5) are currently enrolled in post-secondary education. Future work also should compare ACT scores of AIMS and MAP students at the beginning of the summer, end of the respective program, and end of the year-long ACT access period. These additional research components are essential in helping to assess whether these pre-college residential programs have achieved the ultimate goal of recruiting, retaining, and graduating under-represented students in FANR.

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Identifying Strategies for Diversity Inclusive Agricultural Education Programs

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Abstract

While schools across the United States are witnessing an influx of students from diverse backgrounds, the need to address the issue of diversity inclusion among teachers is critical for equitable schools. This study explored and analyzed Texas agricultural education teachers' (n = 232) perceptions on proposed solutions to increase diversity inclusion in agricultural education programs. Using a web-based questionnaire, descriptive statistics were used to report demographic and personal characteristics while mean scores were used to assess teachers' perceptions on the proposed solutions. Teachers agreed that: *"Agricultural education teachers should become familiar with the students of color represented in their classrooms in order to promote an atmosphere of acceptance and cooperation"*; *"educators, parents, and policymakers must develop strategies to address the different learning styles of all students;"* and *"teaching materials should reflect a diverse society in agricultural education."*

Introduction

The number of students from different racial and ethnic backgrounds in schools throughout the United States has increased considerably as diversity has become progressively more reflective in public education. In a national report on the condition of education, Planty et al. (2009) reported 24% of all public school students attended schools where the combined enrollment of students of color was at least 75%, compared with 16% of public school students in 1990-91. Equally, the numbers of students with disabilities are spending up to 80% of their instructional time in regular education classrooms (Biddle, 2006; National Center for Educational Statistics, 2007). Irvine (2003) stated, *"most teachers now in classrooms and in teacher education programs are likely to have students from diverse ethnic, racial, language, and religious groups in their classrooms during their careers"*. The increasing diversity of students and the homogenization of non-diverse public school teachers suggest that more and more educators will teach students from diverse backgrounds (Wang, 2006). Because of the changing demographics of students in public schools, the agricultural education profession has begun to reexamine its mission as the profession understands that future teachers of agricultural education will be from a broader than ever diversity of individuals. Current and future teachers of agricultural education must be prepared in terms of philosophy, pedagogy, and curriculum to embrace the complexities of an increasingly diverse student population, and actively work on preparing this population for a positive matriculation in agricultural education programs.

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Agricultural education programs in public schools are experiencing an increased diffusion of students from a variety of backgrounds (Kantrovich, 2007; LaVergne et al., 2008). With this rapidly occurring shift, researchers have conducted numerous studies to examine the relationship in which this phenomenon has impacted the profession (Giffing et al., 2010; LaVergne et al., 2008; Roberts et al., 2009). Additionally, the presence of diversity in agricultural education has prompted researchers to recommend greater emphasis in recruitment initiatives to national organizations such as the National Council and National FFA (Kantrovich, 2007; LaVergne, 2008).

In a study concerning recruitment efforts of Hispanic students, Roberts et al. (2009) discovered that agricultural education programs and the National FFA Organization can indeed be appealing to non-traditional students. The researchers noted that through a successful implementation of six intervention strategies, guided by Rogers (2003) theories of diffusion of innovations, an increased number of Hispanic students enrolled in agricultural education programs and participated in FFA activities. *"The analysis of this experience demonstrated that when provided with encouragement, recognition, and resources, agricultural education teachers can enroll Hispanic students and engage them in meaningful FFA activities"* (Roberts et al., 2009, p.10). Similarly, in a case study of successful agricultural teachers' experiences in recruiting African American students, LaVergne et al. (2008) discovered six recruitment strategies that were implemented to counter negative agriculture perceptions. These strategies included: alternative agricultural courses (e.g., canine science, veterinarian technology), making connections of everyday life to agriculture (e.g., bridging the connection between the foods and agriculture), knowledge of various cultures of non-traditional students, modern technology in agricultural based facilities, cross-curriculum recruiting, and community awareness of the local agricultural programs.

Addressing the importance of meeting the needs of students with learning disabilities in agricultural education also has garnered some attention. Pense et al. (2010) reported that a redesigned curriculum should be considered. The researchers declared, "if the curricular needs of specific learning disabilities students in the agricultural education classroom are not met, the agriculture industry risks losing 25% of the future workforce" (p.115). Additionally, the researchers suggested that further studies should investigate ways to train and further develop agricultural educators on accommodating the needs of students with learning disabilities. In additional research, Stair et al. (2010) sought to identify instructional strategies that high school agricultural education teachers used when working with students with disabilities. According to the researchers, strategies used by teachers included providing hands-on opportunities for students, reading a student's Individualized Educational Plan (IEP), modified testing, increased time spent with students, close observation during hands-on activities, not penalizing spelling errors, and strategic assigning of group work or student collaborations. The researchers also noted that these findings would suggest that agricultural education teachers may need additional training in order to effectively administer the recommended suggestions.

Given the increasing mixture of students in agricultural education classrooms, a lack of an assortment of resources concerning the issue of diversity can exacerbate the difficulties that many agricultural education teachers have with the recruiting and retaining of underrepresented groups in agricultural education programs. The ability of agricultural education teachers to teach a wide variety of students is vital to the success and practicality of the profession. Although the aforementioned studies have provided an excellent example of research in practice, additional resources for concrete solutions to diversity inclusion still exist. This study sought to add tangible solutions for diversity inclusive agricultural education programs.

Conceptual Framework

Through a review of literature, a conceptual framework was developed (LaVergne et al., 2008) based on theories associated with Bank's (2008) dimensions of multicultural education, Salend's (2008) principles of inclusion, and Gay's (2000) culturally responsive teaching. Diversity inclusion is an educational philosophy that embraces all students by engaging them in educational programs regardless of their race, ethnicity, or exceptionality (LaVergne, 2008). The concept mirrors a practical, human development approach not only to the educational but also social well-being that calls for more than removing the barriers or fears of a culturally responsive classroom. It requires teachers to be dedicated in bringing about actions to create a diversity inclusive classroom. It is the proactive approach of recognizing and accepting differences and ensuring that every student in the classroom can be successful (LaVergne, 2008).

Underlying the concept is the assertion that diversity inclusion is a frame of mind, more than a list of strategies and recommendations, which

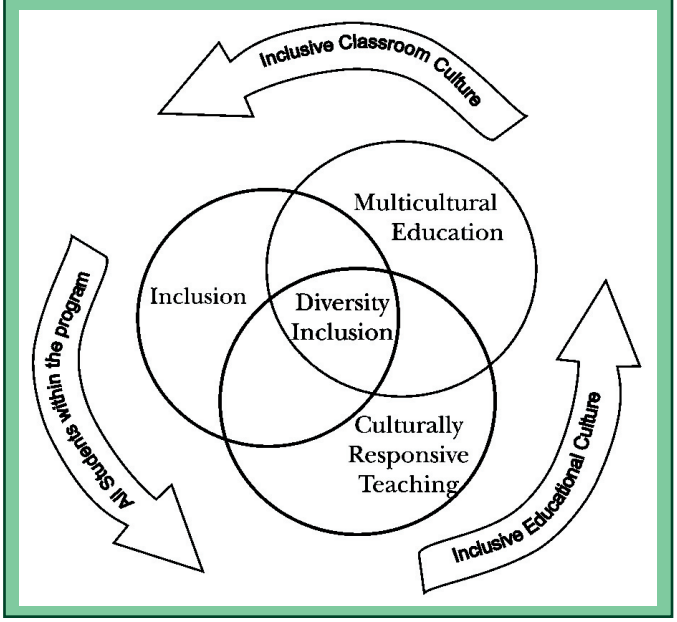
guides the educational beliefs of teachers. Diversity inclusive teachers are aware of their strengths and misunderstandings (LaVergne, 2008). They recognize how these strengths and misunderstandings influence their expectations for success and their interactions with the diversity of students in their programs. They recognize that the ultimate goal of a diversity inclusive classroom is not to achieve the cliché of a "one program fits all" model, but to create a program where their students have equal opportunities to benefit from everything that the program has to offer (LaVergne, 2008).

Because of its originality, previous research on diversity inclusion has generated trivial results. In a study of diversity inclusion of North Carolina secondary agricultural educators, Warren and Alston (2007) found that stakeholders, teachers, and students benefit from diversity inclusion in various ways. The researchers noted that diversity inclusion *"broadens the perspectives of teachers and students, a characteristic that will be greatly needed…"* (p. 76). Research exclusively on diversity has shown a positive impact on students' cognitive and personal development because it challenges stereotypes, broadens perspectives, and sharpens critical thinking skills (Banks, 2008).

While students with disabilities and the special education curriculum continue to be the principal focal point of inclusion, the term has been extended to include the increased cultural/linguistic plurality, coupled with other dimensions along which people may differ (e.g., socioeconomic status, geographical influences, gender, religious sect, etc.) (Salend, 2008). Conversely, local public schools now are educating millions of children with disabilities, and a growing number of them are enrolling in general education courses (National Center for Education Statistics, 2008). Over the past couple of years, meticulous studies have been conducted concerning teacher attitudes and perceptions towards the inclusion of students with disabilities in regular education classes (McLeskey and Waldron, 2007; Smith, 2007). Underlying the premise of these studies was the fact that the attitudes of teachers play an important role in the success of an inclusive program. If the goal of successful inclusion is in the best interest of the students, teachers, and parents, then the proper steps must be taken to ensure that success happens at all levels.

The Diversity Inclusive Program Model (Figure 1) is an illustration that aids in the visualization of the diversity inclusion concept. As previously mentioned, diversity inclusion encompasses multicultural education, inclusion, and culturally responsive teaching in a three-part model that highlights the critical infusion in which a diversity inclusive program should exist. Teachers that support a diversity inclusive program have an understanding of the benefits of diversity inclusion and the perceived barriers that may prevent underrepresented groups from enrolling. In addition, these individuals are constantly seeking possible strategies and solutions to increase underrepresented group participation in agricultural education. Advocates of diversity inclusive programs have become allies of those who understand that successful agricultural education programs will be determined by how prepared our agricultural educators are in teaching students of color and students with disabilities (LaVergne, 2008). The overarching goal of the program model is to formulate an inclusive educational and classroom culture by which all students experience program success.

Figure 1. The Diversity Inclusive Program Model (La Vergne, 2008).



Purpose and Objectives

The purpose of this study was to explore and analyze Texas agricultural education teachers' attitudes toward diversity inclusion in Texas agricultural education programs. The following objectives were identified to accomplish the purpose of this study:

1. Identify personal characteristics of the selected Texas agricultural education teachers;

2. Determine Texas agricultural education teachers' perceptions of proposed solutions to increase diversity inclusion in Texas agricultural education programs.

Methods and Procedures

The Texas A&M University Institutional Review Board approved this study (via exemption). As such, informed consent was obtained through returned emails from those participants willing to take part in

the study. Following Dillman's (2007) Tailored Design Method for survey implementation, the researchers implemented a questionnaire using a series of e-mails while using SurveyMonkey.com as the host Web site. The questionnaire was based on previous work by Warren and Alston (2007) concerning diversity and inclusion perceptions of North Carolina agricultural education teachers. Researchers acquired permission to use and modify the instrument. The instrument was modified slightly to coincide with the three constructs of the diversity inclusion model. As such, Part one consisted of 12 statements designed to gauge participants' perceptions on possible strategies or solutions that would promote diversity inclusion in agricultural education programs. Participants responded to each question using a four point Likert-type scale wherein 1= strongly disagree, 2= disagree, 3= agree, and 4= strongly agree. Part two consisted of eight items designed to collect demographic information on the agricultural education teachers. A statistical factor analysis was not conducted. Factors were determined conceptually by the research team, based on the borrowed instrument. Individual statements were identified conceptually as contributing to the construct. Then, Cronbach's alpha coefficient was calculated and reported to describe the internal consistency of the summated scale. The reliability analysis coefficient for the construct was .90. A panel of experts with expertise in diversity and inclusion established content validity. Construct validity confirmed that the questionnaire's score actually reflected the conceptual area that it was intended to measure. Evidence of construct validity was collected from the responses and suggestions from the panel of experts. A pilot test of 15 agricultural teachers, not included in the final survey population, provided input regarding the content and direction of the statements, which added to the accuracy and precise construction of the questionnaire.

The target population consisted of all Texas agricultural education teachers as listed by the Texas Education Agency during the 2006-2007 school year. Because of the unavailability of personal information from the Texas Education Association, access to all agricultural education teachers listed by Texas Education Association was not feasible. The accessible population of the study consisted of all Texas agricultural education teachers that had email addresses listed on the JudgingCard.com Website. At the time of selection, 1,500 Texas agricultural education teachers were listed. To ensure that all teachers listed on the website were agricultural education teachers in Texas, cross referencing was used with the Texas Vocational Agriculture Teachers Association membership roster to ensure validity (N= 1500). Using a sampling formula from Bartlett et al. (2001), researchers used a nonproportional stratified random sample to ensure that all ten administrative areas as defined by the Texas FFA Association would be represented proportionately in the study. Within each administrative area, researchers randomly selected 32 teachers (n = 320).

The questionnaire was administered using a series of e-mails. Participants received a pre-notice/introductory letter outlining the purpose and importance of the study and informing them that they would receive an e-mail in about one week with instructions on how to complete the questionnaire online. At the time of the first e-mail, 31 e-mail addresses were invalid. To obtain valid e-mail addresses, the researchers searched district websites and contacted school personnel. After this update, another e-mail was sent, and the e-mail address was deemed valid. For the remainder of the data collection phase, the researchers sent reminder e-mails every Monday until the study was concluded. In order to address nonresponse error, the researchers compared respondents to non-respondents by comparing participants who completed the questionnaire before the deadline (n =195) to

Table 1. Demographic Profile of Respondents (n=232)

Demographics	f	%
Gender[z]		
Male	170	79.1
Female	45	20.9
Race/Ethnicity[y]		
Asian American	1	0.5
Black/African American	2	0.9
Hispanic/Latino American	13	6.2
Native American	4	1.9
White/European American	191	90.5
School Setting[z]		
Rural	135	62.8
Urban	32	14.9
Suburban	48	22.3
Years of Teaching Experience[z]		
< 5	48	22.3
5-10	52	24.2
11-15	32	14.9
16-20	24	11.2
21-25	27	12.6
> 25	32	14.9
Preservice Diversity/Multicultural Training[z]		
Yes	68	31.6
No	147	68.4
Inservice Diversity/Multicultural Training[z]		
Yes	100	46.5
No	115	53.5
	M	SD
Age[x]	39.36	10.72

[z] Seventeen participants chose not to respond to this question.
[y] Twenty-one participants chose not to respond to this question.
[x] Twenty-three participants chose not to respond to this question.

those completed the questionnaire after the closing date (n =37) (Lindner et al., 2001). Using the cutoff date as the independent variable and mean scores as the dependent variable, independent sample t-tests revealed no statistically significant difference ($p < .05$) existed between respondents' mean scores on the construct, deeming the responding sample as a viable representation of the accessible population. The final return rate was 72.5%.

Results

Of the respondents, 170 were male, while 45 were female (Table 1). The majority (90.5%) of the respondents indicated that they were White/European American. The data also indicate that a large percentage (62.8%) of teachers taught in schools located in a rural setting. Regarding teaching experience, 52 (24.2%) indicated that they had between 5 and 10 years of teaching experience. Sixty-eight participants (31.6%) indicated that they received some form of diversity/multicultural training during their undergraduate matriculation while 147 (68.4%) indicated that they had not. One hundred participants (46.5%) indicated that they received some form of diversity/multicultural education outside of a college/university requirement.

The statement in which participants scored the highest mean score involving multicultural education was, "Teaching materials should reflect a diverse society in agricultural education " (M = 2.98, SD = .65) (Table 2). The statement in which participants scored the highest mean score involving agricultural teachers was: "Agricultural educators should encourage and strive to increase students' of color membership in FFA" (M = 3.09, SD = .67). In relation to statewide initiatives, respondents agreed that "For all students to achieve in school, educators, parents, and policymakers must develop strategies to address the different learning styles of all students" (M = 3.33, SD = .63), and "A state-wide support network for agricultural educators would enhance diversity inclusion in agricultural education" (M =2.72, SD = .73).

Conclusions

Overall, participants from the 10 teaching areas had a high rate of response using an Internet based survey method. This finding adds credence to the study conducted by Ladner et al. (2002) that concluded that web-based survey instruments provide valid and reliable methods of collecting data.

The majority of agricultural education teachers more than likely had not received diversity/multicultural training during their undergraduate careers (68.4%) or outside of a college or university requirement (53.5%).

Table 2. Proposed Strategies to Increase Diversity Inclusion in Agricultural Education Programs

Diversity Inclusion	Item	M z	SD
Multicultural Education			
	Teaching materials should reflect a diverse society in agricultural education.	2.98	.65
	Multicultural education can be used to increase the awareness of students of color in relation to diversity.	2.91	.62
	Multicultural education can be used to increase the awareness of students with disabilities in relation to diversity.	2.86	.66
	Multicultural education is a strategy that can be utilized to promote an attitudinal change toward diversity inclusion in agricultural education.	2.78	.70
	It is important for colleges and universities to incorporate more multicultural education classes in their preservice teacher preparation curricula.	2.68	.78
	Agricultural education teachers need training in multicultural education.	2.64	.77
Agricultural Teachers			
	Agricultural education teachers should become familiar with the students of color represented in their classrooms in order to promote an atmosphere of acceptance and cooperation.	3.42	.65
	Agricultural educators should encourage and strive to increase students' of color membership in FFA.	3.09	.67
	An increase in recruitment efforts by agricultural educators would enhance diversity inclusion in agricultural education.	2.95	.66
	Mentoring is a strategy that could be utilized to increase diversity inclusion in agricultural education.	2.92	.60
Statewide Initiatives			
	For all students to achieve in school, educators, parents, and policymakers must develop strategies to address the different learning styles of all students.	3.33	.63
	A state-wide support network for agricultural educators would enhance diversity inclusion in agricultural education.	2.72	.73

[z]Scale: 1.00 to 1.49 = Strongly Disagree, 1.50 to 2.49 = Disagree, 2.50 to 3.49 = Agree, 3.50 to 4.00 = Strongly Agree.

However, the decreased percentage between inservice and preservice diversity/multicultural training could indicate that Texas high schools are making conscious efforts to provide diversity/multicultural education to agricultural education teachers.

Respondents tended to agree with the statements regarding the benefits of diversity inclusion in agricultural education programs. This finding supports the idea that respondents do see the benefits of diversity inclusion in agricultural education programs. Because the scale addressed both students of color and students with disabilities, findings of this study support previous studies that found that general education teachers can have positive benefits on both students of color and students with disabilities (Finegan, 2004; Smith, 2007; Wood, 2007).

Respondents agreed that a lack of role models hindered the participation of students of color and students with disabilities in agricultural education. Given this information, efforts to recruit role models that would change the perceptions of these students about agricultural education potentially would benefit the profession. However, Scott and LaVergne (2004) discovered that individual influences did not play a significant role in students' perceptions of enrolling in an agricultural education course.

Texas agricultural education teachers believed that the lack of information about agricultural education has an impact on students' of color perceptions of agricultural education. Considering this finding, agricultural educators should revisit their recruitment efforts and, in turn, develop strategies that would foster a greater opportunity for students of color to create a positive perception of agricultural education. This finding adds relevance to studies such as Warren and Alston (2007) and Roberts et al. (2009), which examined the link between teachers and students in relation to the recruitment of diverse populations in agricultural education.

Multicultural education was viewed as a tool to increase the awareness of students of color and students with disabilities in relation to diversity inclusion in agricultural education programs. The finding affirms the critical need of developing culturally responsive teachers. Culturally responsive teaching is important for the success of students of color and students with disabilities in agricultural education (Gay, 2000; LaVergne, 2008). Furthermore, the continuation of ignorance about equitable pedagogy and cultural differences would be harmful to diverse students (Gay, 2000).

Mentoring was seen as a strategy to increase diversity inclusion in agricultural education programs. This finding supports what Banks (2008) called an empowering school climate and culture. Teachers, administrators, and parents must work collectively to make sure schools create an atmosphere that promotes diversity and inclusiveness. Teachers must understand that their goal to promote diversity inclusion is not an isolated mission but rather a school-wide effort.

Implications and Recommendations

Texas agricultural education teachers tended to have favorable attitudes toward diversity inclusion in agricultural education programs. Based on these findings, efforts should be made by agricultural education teachers to ensure that students of color and students with disabilities are persuaded to enroll in agricultural education courses. Beginning agricultural education courses such as Introduction to Agricultural Education (AGSC) 101 and 102 could provide excellent opportunities for these students to be introduced to agricultural education. Additionally, local FFA chapters could be utilized as a recruitment tool for students of color and students with disabilities. If, as the literature suggests, Texas agricultural education teachers do favor diversity inclusion, then respondents should promote and encourage greater participation of diverse students into agricultural education programs.

Based on the findings of this study, participants were not enrolling in diversity/multicultural courses at the undergraduate level. The high percentage of concurrence that diversity/multicultural training is not taking place could indicate that many preservice teachers may not be prepared adequately to serve a diverse mixture of students in agricultural education programs. Whether or not this detachment is from the unavailability of such courses (at one's institution) or from the lack of teacher educator departments incorporating a diversity/multicultural course component, the fact remains that the agricultural education profession must provide its teacher education students with this type of training. As such, the researchers recommend that these programs provide future agricultural education students with at least one diversity/multicultural education course preferably with a field experience component incorporated. As Talbert and Edwin (2008) stated, "through field experiences, students have many opportunities to gain practical experience in the field of agricultural education and at the same time be exposed to issues of diversity in their everyday activities" (p.59). Data of demographic trends in public schools imply that this type of training is warranted (Biddle, 2006; National Center for Educational Statistics, 2007; Planty et al., 2009).

Mentoring was seen as a strategy to increase diversity inclusion in secondary agricultural education programs. This finding supports what Banks (2008) called an empowering school climate and culture. Teachers, administrators, and parents must work collectively to make sure schools create an atmosphere that promotes diversity and inclusiveness. Given this fact and based upon previous research (Williams, 1992; Jones and Bowen, 1998; Osborne, 1994), agricultural educators should seek to identify diverse individuals to provide mentoring to underrepresented groups enrolled in agricultural education courses. By demonstrating evidence of a collaborative, trusting, and respectful relationship with potential mentors, Texas agricultural education teachers may enhance their recruitment and retention efforts of students of color and students with disabilities in agricultural education programs.

Because of the success of using a web-based survey, researchers should promote and encourage the use of the Internet as a reliable and valid tool for accessing a wide range of individuals for conducting social science research. Additionally, research of a qualitative nature should be conducted with agricultural education teachers to develop effective strategies to increase diversity inclusion in agricultural education programs. Case studies involving successful inclusive programs could provide strategies and recommendations to other teachers.

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Examining the Student Impacts of Three International Capstone Experiences

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Abstract

International experiences – semester-long study abroad, short-term study trips, internships, or integration of global issues into on-campus curricula –are widely accepted as a growing need for today's generation of students. This study examined the impacts of three short-term international capstone experiences on student knowledge and attitudes. On the first trip, a group of 15 College of Agricultural and Life Sciences (CALS) Ambassadors traveled to Egypt for 11 days in May of 2009. On the second trip, a group of nine students from the CALS Leadership Institute traveled throughout Costa Rica on a 10-day trip in August of 2010. On the third trip, a group of seven CALS Ambassadors traveled to China for 13 days in May of 2011. Participants from all three groups showed an increase in knowledge (actual and perceived) related to agriculture in the destination country and international agriculture in general. Changes in attitudes about international agricultural and international travel were mixed. Participants generally had more positive attitudes about traveling internationally, but expressed mixed attitudes about the importance of CALS students gaining international experience.

Introduction

Students today are faced with the challenge and opportunity of a culture influenced by media and technology that transcend traditional borders. Overwhelmed with media messages of international events, natural disasters, and political innuendo, students have the world at their fingertips; yet, many choose to distance themselves from learning about globally relevant topics and issues (Wingenbach et al., 2003). Collegiate programs, such as study abroad, focused study tours, and service-learning, offer students the opportunity to immerse themselves in a different culture for a period of time. Aiding in the accessibility of global awareness and understanding, international elements in curriculum development and experiential education activities have continued to grow in popularity and priority in higher education over the past two decades (Altbach and Knight, 2007; Moore et al., 2011). A 2008 NAFSA report mentioned, *"Despite the momentum and a widespread recognition among the American public of the importance and the educational value of study abroad, higher education institutions vary substantially in the degree to which they have committed to the advancement of study abroad as part of their internationalization efforts"* (p. 1). International activities have an important role for students within colleges of agriculture, as the networks of agricultural resources continue to expand around the globe (Connors, 2004). Responsibility lies with colleges and universities to adequately prepare agricultural students to enter a global society and diverse work environment (Zhai and Scheer, 2004). Students should develop leadership skills, experience other cultures and societies, and have a basic grasp on our global system, which will transfer broadly to various career trajectories in an expanding global market upon graduation (NAFSA, 2008). Addressing multiple facets of development for students and faculty, including professional skills, knowledge of international agricultural practices and cultural understanding, are key to creating a value-driven, meaningful experience.

Cross-cultural opportunities unveil the responsibility placed upon this generation as global citizens, including the challenge of connecting local and global. Universities must be at the center of developing transferable skills for not only future careers but also as global citizenship training; global awareness and understanding will pave the way for this generation of students to step up as leaders in the community and world (Battistoni et al., 2009; Hanson, 2010; Mayo et al., 2008; Moore et al., 2011; Munck, 2010). Although some students have a strong awareness and understanding of international agricultural issues, the changing nature of such issues demonstrates the

apparent need for such efforts to widen perspectives and knowledge (Wingenbach et al., 2003). Clearly, international awareness and experiences are valuable opportunities universities need to continue developing as the workforce demands for such skills, and one that students should explore to remain competitive in the job market (Acker and Scanes, 1998; Battistoni et al., 2009; Bender et al., 2009; Connors, 2004; Irani et al., 2006; Moore et al., 2011). This common agreement can fuel the process of determining the most effective and efficient means of skill development in an international experience, which can garner broader commitment from universities and create greater accessibility to students.

Building global citizens must be intentional and well incorporated in the curriculum and mission of universities (Etling, 1994; Hanson, 2010; NAFSA, 2008). Experiential learning activities, especially those including travel, offer a context for developing a broader understanding of international agricultural policies, products, and culture (Wingenbach et al., 2003). Experiential-focused programs enable students to be immersed into a different culture and make a lasting impact on a personal level (Tarrant, 2010). Specifically, Acker and Scanes (1998) emphasized the impact of such experiences:

The quality of all programs – education of undergraduates, development of the next generation of scientists as graduate students and post-doctoral fellows, research projects, extension programs, economic development of the state or region, and support of strategic goals of the agribusiness sector – is enhanced when they are pervaded by multiple international dimensions. (p. 59)

Integrating service-learning into an international experience enhances student interaction with the culture and community for a new level of learning through a service experience (Battistoni et al., 2009; Chieffo and Griffiths, 2004; Doyle et al., 2010; Munck, 2010; Tonkin and Quiroga, 2004). Etling (1994) emphasized, *"Citizens of the world need to understand that they can contribute to the local, district, state, regional, national, and global communities, to which they belong, in a concrete way-that they can make a difference individually and in groups"* (p. 79). An international service experience with an agricultural and life sciences focus provides the opportunity for students to gain the full benefits of international travel and grasp global citizenship.

Minimizing barriers to such experiences is an imperative consideration throughout the preparation stages of an international service and learning experience. Financial concerns, time commitment, and overall perceived barriers of attributes to be gained from the experience are the primary barriers to an international experience for students (Irani et al., 2006). It is imperative for participants to be properly prepared for such an experience to gain its fill benefits (Connors, 2004). Students should be aware of the various cultural aspects of the travel destination they will encounter, as well as a full understanding of the itinerary and expectations of them throughout the travel experience. With the comfort of knowing what is to come, students can focus on the whole experience and immersing into the culture to play an active role as a global citizen (Tonkin and Quiroga, 2004). With international connections infused into the curriculum as preparation for travel, students gain the knowledge to continue making connections back to curriculum while engaged in the international experience (Greenberg, 2008; Radhakrishna and Dominguez, 1999; Wingenbach et al., 2003). Time for processing and reflection may be necessary for a full realization of the value of an international experience or course (Irani et al., 2006). Just as minimizing barriers and preparation for travel are of great importance to the overall student travel experience, reflection on the experience once returning home is an important component in gleaning the most knowledge and cultural awareness to enhance student growth as a global citizen.

The existing literature paints a clear picture about the importance of conducting international experiences for collegiate students studying agriculture and related sciences. There are limited studies that examined the impact of these experiences, particularly short-term study trips. This study outlined the student impacts of three short-term study trips.

Methods

This descriptive case study used survey methods to examine three international capstone experiences: (a) College of Agricultural and Life Sciences Ambassadors' trip to Egypt, (b) College of Agricultural and Life Sciences Leadership Institute members' trip to Costa Rica, and (c) College of Agricultural and Life Sciences Ambassadors' trip to China. The University of Florida Institutional Review Board approved the activities reported in this research and signed informed consent was obtained from each participant. The population included the 31 student participants of these travel experiences; 15 students traveled to Egypt, nine students traveled to Costa Rica, and seven students traveled to China. Each experience was 10 to 13 days in length and included various cultural, agricultural, and iconic experiences to the area. The

results of this study are limited to those students who participated in these experiences.

All three groups of students were evaluated utilizing a pre- and post-travel instrument adapted from the work of Connors (2004), which assesses student knowledge of the destination country and attitude towards the international experience. The instrument contained nine fill-in-the blank knowledge questions; 16 items to assess attitudes about the international experience with a four point Likert scale; and seven background/demographic questions. Connors reported a KR20 of .73 for the knowledge assessment and a Cronbach's alpha of .74 for the attitude instrument. The instruments were administered face-to-face by the trip coordinator.

The first trip included fifteen students serving as ambassadors for the College of Agricultural and Life Sciences as they traveled to the Arab Republic of Egypt for 11 days in May of 2009 to develop a broader and more global perspective on agriculture education, production, processing and marketing systems. Students were asked to enroll in a three–hour study course that focused on Egyptian culture and customs, which provided an overview of the customs, religion and culture from an Egyptian prospective. Ambassadors were exposed to information including geography, people, and statistics as they relate to Egypt, along with history, government, politics, economy, agriculture, and the impact the United States Agency for International Development (USAID) has on agricultural education in the country. While in Egypt, students were asked to keep a detailed journal of their thoughts, perceptions and observations as they visited historical sites like the Great Pyramids of Giza, the Sphinx, the Valley of the Kings, Muhammad Ali Mosque, and the Luxor and Karnak Temples. In addition to making these historical stops Ambassadors met with students from Cairo University and El Qarna High School. While exploring secondary and higher education was of great importance, Ambassadors also visited an 8,000-acre family-owned farm that revealed the limited exposure Egypt has in the global market.

The second experience included nine College of Agricultural and Life Science students involved in the CALS Leadership Institute as they traveled to Costa Rica for ten days in August of 2010. Students were prepared for the travel experience through six class meetings leading up to departure, which overviewed the culture, agricultural practices, and role of eco–tourism in the country. The trip took the group to four locations in the country, including San Jose, Jaco, Arenal, and EARTH University. The students were exposed to the Costa Rican culture as they interacted with the people and local students, toured coffee and banana plantations, and participated in eco–tourism activities. A core component of the trip included working with EARTH University, where students helped to build a biodigestor for a Costa Rican family, learned about sustainable agricultural practices, and visited with staff and students. This international service and learning experience serves as a core component of the Leadership Institute.

The third experience included seven students serving as ambassadors for the College of Agricultural and Life Sciences as they traveled to the People's Republic of China for 13 days in May 2011. Students enrolled in a three-hour credit course to prepare for the international trip, which included education on the demographics, culture, religion, agricultural practices, geography, education, and government of the People's Republic of China. The group traveled to Beijing and Shanghai, as well as rural areas of the He Bei Province during the trip. Students had the opportunity to meet with peers at Beijing Agriculture University, experienced cultural elements including an acrobatic performance and dumpling dinner and fold dancing show, and visited the Great Wall, TianAnMen Square, and Forbidden City. An important component of the trip was to learn about various agricultural practices in the People's Republic of China, which comprised of vegetable/agricultural markets, a farming village, dairy farm and processing plant, the Kun Shan Agricultural Development Park, and a silk factory.

Results and Discussion

Egypt

Data were received from the fifteen students who participated in the Egypt travel experience. This group of students varied considerably on their previous international travel (see Table 1). One-third had never traveled internationally and 40% had traveled abroad for more than four weeks.

Table 1. Egypt Participants' International Experience prior to Trip

Previous International Experience	n	%
None	5	33
1–2 weeks	2	13
2–4 weeks	2	13
More than four weeks	6	40

Participants expressed more positive perceptions of international travel and the importance of learning about international agriculture (see Table 2). Notably, students had more positive responses to all but two of the statements following the trip. Students also improved in their understanding of the important role international experiences can play, as well as a greater comfort in the safety of international travel.

Table 2. Egypt Participants' Attitudes about International Experiences (N = 15)

	Percent Strongly Disagree Pre/Post	Percent Disagree Pre/Post	Percent Agree Pre/Post	Percent Strongly Agree Pre/Post
International travel is educational.	0/0	0/0	20/0	80/100
I am excited to learn about Egyptian culture.	0/0	0/0	27/20	73/80
I like learning about different cultures.	0/0	0/0	33/20	67/80
Knowledge of international agriculture will help me in my career.	0/0	7/7	67/60	26/33
Knowledge of international agriculture is important for all CALS students.	0/0	27/7	47/47	26/47
International experiences are an important part of CALS student activities.	0/7	7/0	67/13	26/80
I am worried about the quality of water in Egypt.[a]	0/0	27/20	53/53	20/27
It is important to study information about a foreign country prior to traveling there.	0/0	0/7	33/33	67/60
I am worried about being able to communicate with people in Egypt.[a]	0/13	27/67	53/20	20/0
International agriculture should be an integral part of CALS undergraduate studies.	7/0	20/7	53/53	13/40
I am worried about eating different types of foods while in Egypt.[a]	7/20	60/33	20/33	13/13
I am worried about crime while in Egypt.[a]	7/13	47/67	33/20	13/0
I am worried about my safety outside the United States.[a]	13/13	47/40	27/47	13/0
I am worried about using different currency while in Egypt.[a]	40/53	47/47	13/0	0/0
It is important to speak the language of the country you will be visiting.	7/13	67/53	20/27	7/7

[a]Negatively worded statements.

Participants also showed increases in their knowledge (perceived and actual) of Egypt, Egyptian agriculture, and international agriculture as a result of the trip. Increases where shown in basic knowledge of Egypt's geography and agricultural knowledge following the trip (see Table 3). Questions focused on the language, capital, geographic location, exports, bordering countries, primary agricultural exports, and provinces in the country. Beyond the recall of factual information, students also showed gains in their overall perceptions of knowledge about Egyptian agriculture and international agriculture in general (see Table 4).

Table 3. Egypt Participants' Knowledge

Question	Answer	Percent Correct Pre/Post
What is the primary language spoken in Egypt?	Arabic	67/100
What is the capital of Egypt?	Cairo	93/100
Where is Egypt located?	Northeast Africa	67/83
What is the currency in Egypt?	Egyptian Pound	13/100
What percentage of exports from Egypt are agricultural products?	11%	0/0
What countries border Egypt?	Libya, Sudan, Israel	13/40
What are Egypt's primary agricultural exports?	Cotton, Fruits, Vegetables	13/23
Egypt is bordered by what two bodies of water?	Mediterranean Sea, Red Sea	50/93
How many governorates (provinces) are there in Egypt?	27	0/0
Overall		35/60

Table 4. Egypt Participants' Self–perceived Level of Knowledge of Egyptian and International Agriculture

	Poor Pre/Post	Fair Pre/Post	Good Pre/Post	Excellent Pre/Post
Knowledge of international agriculture	27/7	40/47	27/47	7/0
Knowledge of Egyptian agriculture	73/0	20/7	7/86	0/7

Costa Rica

Valid results were received from all nine students who participated in the Costa Rica travel experience. This group of students also varied greatly in their previous international experience (see Table 5), although seven of the nine students had traveled internationally prior to this trip.

Changes in participant attitudes were mixed (see Table 6). Participants generally had a more positive attitude toward international travel as an educational experience and improved in their perceptions of the important role international experiences can play, as well as a greater comfort in the safety of international travel. They expressed mixed results about the importance of international experiences for CALS students.

Participants improved in overall knowledge of Costa Rica's basic geographical and agricultural product knowledge following the trip (see Table 7) on topics such as the language, capital, geographic location, exports, bordering countries, primary agricultural exports, and provinces in the country.

Table 5. Costa Rica Participants' International Experience prior to Trip

Previous International Experience	n	%
None	2	22
1–2 weeks	2	22
2–4 weeks	0	0
More than four weeks	5	56

Table 6. Costa Rica Participants' Attitudes about International Experiences (N = 9)

	Percent Strongly Disagree Pre/Post	Percent Disagree Pre/Post	Percent Agree Pre/Post	Percent Strongly Agree Pre/Post
International travel is educational.	0/0	0/0	0/0	100/100
I am excited to learn about Costa Rican agriculture.	0/0	0/0	0/11	100/89
I like learning about different cultures.	0/0	0/0	22/22	78/78
Knowledge of international agriculture will help me in my career.	0/0	0/0	11/0	89/100
Knowledge of international agriculture is important for all CALS students.	0/0	0/0	33/44	67/56
International experiences are an important part of CALS student activities.	0/0	0/11	33/33	67/56
I am worried about the quality of water in Costa Rica.[a]	22/22	44/56	33/22	0/0
It is important to study information about a foreign country prior to traveling there.	0/0	0/0	22/22	78/78
I am worried about being able to communicate with people in Costa Rica.[a]	11/0	56/78	33/22	0/0
International agriculture should be an integral part of CALS undergraduate studies.	0/0	11/0	33/33	56/67
I am worried about eating different types of foods while in Costa Rica.[a]	67/78	11/22	22/0	0/0
I am worried about crime while in Costa Rica.[a]	44/33	11/44	44/22	0/0
I am worried about my safety outside the United States.[a]	33/44	56/44	11/11	0/0
I am worried about using different currency while in Costa Rica.[a]	56/67	44/33	0/0	0/0
It is important to speak the language of the country you will be visiting.	0/11	44/44	33/22	22/22

[a]Negatively worded statements.

Table 7. Costa Rica Participants Knowledge

Question	Answer	Percent Correct Pre/Post
What is the primary language spoken in Costa Rica?	Spanish	100/89
What is the capital of Costa Rica?	San Jose	78/89
Where is Costa Rica located?	Central America	100/100
What is the currency in Costa Rica?	Colon	67/100
What percentage of exports from Costa Rica are agricultural products?	70%	22/11
What countries border Costa Rica?	Nicaragua, Panama	67/89
What are Costa Rica's primary agricultural exports?	Coffee, Bananas	56/67
Costa Rica is bordered by what two bodies of water?	Caribbean Sea, Pacific Ocean	33/67
How many provinces are there in Costa Rica?	Seven	33/56
Overall knowledge		62/73

More broadly, students also expressed an increase in self-perceived knowledge of international agriculture, and specifically to Costa Rican agricultural practices (see Table 8).

Table 8. Costa Rica Participants' Self–perceived Level of Knowledge of Costa Rican and International Agriculture

	Poor Pre/Post	Fair Pre/Post	Good Pre/Post	Excellent Pre/Post
Knowledge of international agriculture	22/0	67/33	11/67	0/0
Knowledge of Costa Rican agriculture	44/0	56/22	0/44	0/33

China

Data were received from the seven students who participated in the China travel experience. Previous international travel experience varied with this group of students (see Table 9). One individual had never traveled internationally, while three had traveled for 2–4 weeks and the remaining three students had traveled for more than 4 weeks.

Data showed that participants expressed more positive attitudes about international travel and the importance of learning about international agriculture (see Table 10). They perceived themselves as having a better understanding of the important role international experiences can play, as well as an increased feeling of the safety of international travel.

Participants also showed increases in their perceived and actual knowledge of China, Chinese agriculture, and international agriculture in general. Increases where shown in basic knowledge of China's geography and agriculture following the trip (see Table 11). Participants also expressed an increase in self–perceived knowledge of international agriculture, and specifically to Chinese agricultural practices (see Table 12).

Table 9. China Participants' International Experience prior to Trip

Previous International Experience	n	%
None	1	14
1–2 weeks	3	43
2–4 weeks	0	0
More than four weeks	3	43

Table 10. China Participants' Attitudes about International Experiences (N = 7)

	Percent Strongly Disagree Pre/Post	Percent Disagree Pre/Post	Percent Agree Pre/Post	Percent Strongly Agree Pre/Post
International travel is educational.	0/0	0/0	14/0	86/100
I am excited to learn about Chinese agriculture.	0/0	0/0	29/71	71/29
I like learning about different cultures.	0/0	0/0	29/14	71/86
Knowledge of international agriculture will help me in my career.	0/0	0/0	57/29	43/71
Knowledge of international agriculture is important for all CALS students.	0/0	14/0	57/43	29/57
International experiences are an important part of CALS student activities.	0/0	0/0	43/29	57/71
I am worried about the quality of water in China.a	0/0	43/29	29/57	29/14
It is important to study information about a foreign country prior to traveling there.	0/0	0/0	29/43	71/57
I am worried about being able to communicate with people in China.a	0/0	14/57	71/29	14/14
International agriculture should be an integral part of CALS undergraduate studies.	0/0	14/0	43/29	43/71
I am worried about eating different types of foods while in China.a	0/0	43/72	29/43	29/0
I am worried about crime while in China.a	0/0	72/14	14/86	14/0
I am worried about my safety outside the United States.a	0/0	86/72	0/29	14/0
I am worried about using different currency while in China.a	0/14	72/86	29/0	0/0
It is important to speak the language of the country you will be visiting.	0/0	43/72	57/29	0/0

[a]Negatively worded statements.

Table 11. China Participants Knowledge

Question	Answer	Percent Correct Pre/Post
What is the primary language spoken in China?	Chinese-Mandarin	100/100
What is the capital of China?	Beijing	71/86
Where is China located?	Asia	71/100
What is the currency in China?	Yuan RMB	0/100
What percentage of exports from China are agricultural products?	9.6% GDP	0/0
What countries border China?	Mongolia, India, Vietnam, Laos, Burma, Nepal, Russia, Pakistan	71/86
What are China's primary agricultural exports?	Oil seeds	0/0
China is bordered by what two bodies of water?	Yellow Sea, China Sea, South China Sea	0/0
How many provinces are there in China?	22	0/0
Overall knowledge		35/52

Table 12. China Participants' Self–perceived Level of Knowledge of Chinese and International Agriculture

	Poor Pre/Post	Fair Pre/Post	Good Pre/Post	Excellent Pre/Post
Knowledge of international agriculture	43/0	29/57	29/43	0/0
Knowledge of Chinese agriculture	57/0	43/71	0/29	0/0

Summary

Based on the data collected it was concluded that participants from all three groups showed an increase in knowledge (actual and perceived) related to agriculture in the destination country and international agriculture in general. Changes in attitudes about international agricultural and international travel were mixed. Participants generally had more positive attitudes about traveling internationally, but expressed mixed attitudes about the importance of CALS students gaining international experience.

The results of these three trips would indicate that short-term study abroad experiences can be an effective pedagogical tool for increasing student knowledge of agriculture in a specific country and international agriculture in general. Changing students' attitudes appears to be more complicated, likely due to variations in specific activities on each trip and the specific students on each trip. Educators organizing similar trips should recognize increasing knowledge might be easy; while impacting student attitudes will likely be more complex.

Regardless of the challenges to implementing international educational programs, faculty should continue to embrace these activities. The current generation of collegiate students has been raised in a culture that embraces globalization and connectedness; yet, true understanding of other cultures and practices is limited among students. International educational experiences, including both short-term and long-term travel, immerse students into a culture and offer the opportunity for application of skills and development of personal understanding of global citizenship. Zhai and Scheer (2004) noted the trend of globalization in educational institutions driven by an interdependent global community. Altbach and Knight (2007) stressed, *"Internationalism will remain a central force in higher*

education, though its contours are unclear" (p. 303). As programs and experiences continue to develop, it is imperative that methodologies be reviewed to determine the most effective means of guiding students in an international experience to build transferable skills toward their future career and role as a global citizen (Suutari, 2002).

Although the immediate impact in knowledge and attitude is a positive improvement indicated through this study, additional research is needed to determine the significant role an international experience plays in career preparation and skill development. A longitudinal study is needed to evaluate the 'global readiness' of graduates to take on their role as a global citizen (Irani et al., 2006).

Additional areas recommended for future study relating to short-term international experiences include:

•Specific methods of preparation and follow-up or reflection should be studied to determine the most effective means of gleaning quality, applicable experiences from a short-term international experience.

•Transferable skill development through various activities and immersion experiences on a short-term international educational experience.

•A comparative analysis of service-based trips versus industry tour-based experiences.

•Effectiveness of an international service experience in meeting program-specific goals or outcome measures.

•Factors that influence the change in specific attitudes towards international experience.

•The long-term impacts on students who participated in these experiences.

•Identifying best practices for conducting short-term international experiences.

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Experiential Learning on the Internet: A Case Study of the Internet Agricultural Bank Simulation Game[1]

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Abstract

Few agricultural studies have studied experiential learning on the Internet. In this study, an experiential learning tool focused on agricultural banking was updated to serve as an Internet based simulation game (www.agbanksim.org). The game offers a "real world" experience in which management decisions affect institutions interacting in a geographic market, enhancing understanding of the complex, competitive environment within which commercial banks operate. In the past, agricultural lenders and students who played the software based game learned key financial, economic, and banking lessons. Questions arose as to whether participants playing Ag Bank Sim in a virtual environment would have the same positive increase in learning key concepts. Results of pre- and post-tests of Louisiana State University students in a senior-level capstone agribusiness strategic management course and Oklahoma State University students in an undergraduate agricultural finance course illustrate learning of key concepts as a result of playing the Internet based game.

Introduction

Experiential learning enhances student learning. Experiential learning takes a set of fundamental concepts and reinforces them by testing new scenarios via a concrete experience; then reflecting upon the outcome; and then repeating the process (Boehlje and Eldman, 1978). Many studies have found evidence that this method of learning does indeed enhance learning of a wide array of agricultural students. Whether these students are seniors taking a capstone agricultural course (Andreason, 2004), have no farm/agricultural background (Rhykerd et al., 2006), are college students participating in a lab or simulation setting (Wilson and Nelson, 2009; Ball et al., 2006; Peel et al., 1995; Blank, 1985), or are in high school (Balschweid, 2002), experiential methods were found to enhance student learning. Yet, most of these studies have been conducted in a standard classroom. Many classes are taught via distance education, and often delivered in a virtual world where the Internet serves as the 'classroom.' Thus, teachers need to know if the Internet either hinders experiential methods of instruction or can be used to enhance the experiential learning experience of students.

The objective of this study was to identify whether an experiential learning tool could be successfully delivered via the Internet. It was expected that using the Internet to facilitate an experiential learning tool would enhance student learning. This contention was based on studies that found multimedia use in the classroom enhanced learning objectives. McAndrews et al. (2004) found that a computer based program increased students' perceptions of learning key principles in an introductory agronomy class. A computer based financial model was found to increase student test

[1]Partial funding for this project came from the USDA-CSREES-Higher Ed Challenge Grant, Award Number: 2008-3841-19040
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scores compared to traditional methods of instruction (Melvin et al., 2004). Agricultural education students, using a computer-based tool, scored higher on a leadership concept exam as compared to the students not using the computer to enhance learning (Boyd and Murphrey, 2002). Students demand and are willing-to-pay a premium for educational material delivered using multimedia tools (Boyer et al., 2009).

To meet this study's objective, the Oklahoma Bank Simulation Game (OBSG), an established experiential learning tool that has been used successfully in a traditional classroom, was modified for Internet delivery as the Agricultural Bank Simulation Game (Ag Bank Sim). Results of the study suggest that the Internet was a platform that could enhance student-learning of class objectives. Students at Oklahoma State University (OSU) and Louisiana State University (LSU) played Ag Bank Sim and improved their understanding of key banking concepts as assessed through pre- and post-test scores. Students and banking executives commented that the game was easy and fun to use.

Background on the Agricultural Bank Simulation Game

The history of the agricultural bank simulation game is quite extensive. During the 1970s, OSU agricultural economics faculty, along with representatives from the Oklahoma Bankers Association (OBA), saw a need to train and educate the next generation of bank managers. From these training programs came the idea for a simulation game that would complement the training programs by enhancing the bank employees' understanding of the management decisions made in a bank. As a result, the OBSG was born. The OBSG is based on primary and secondary data collected from rural Oklahoma banks. From this data, statistical and simulation techniques were employed to develop a competitive market where agriculture is the predominant activity. Since the data reflects a rural competitive market, any student familiar with basic financial and economic concepts can play the game (i.e. the student does not have to be from Oklahoma or familiar with Oklahoma agriculture). Students unfamiliar with agriculture simply need to understand that the business of agriculture is much like any other business; some loans are short-term and others are long-term, depending on what the loan is used to finance. A detailed explanation of the game's econometric and theoretical models is available in Petermann et al. (1998).

While many bank simulation games exist, the OBSG distinguishes itself because of its simplicity. This is not to say the OBSG is so simple that real world lessons are lost, just that it keeps the game focused on key decisions (setting loan interest rates and deposit interest rates, buying and selling investments, hiring and firing loan officers, setting advertising dollars, etc.), allowing players to see the importance of basic banking, finance, and economic concepts. Learning is accomplished by assigning players/students to manage a bank, where they compete against two other student-managed banks. All banks make key decisions to generate as much profit as possible while also being a good community steward. Without becoming mired in the details, it is sufficient to say that the OBSG allows players to develop a fundamental understanding of what it takes to manage a bank.

The game and the lessons of the OBSG have been taught to a wide variety of students. Through a partnership with OSU, OBA has used OBSG in its Intermediate School of Banking for more than thirty years. Other outreach audiences include regulators with the Federal Reserve Bank of Kansas City and instructors at other academic institutions. At the university level, undergraduate students in the department of agricultural economics at OSU, at University of Minnesota and at LSU played the game in agricultural finance and strategic management classes.

Nearly all students from the various classes indicated the OBSG was successful, yet there were some significant disadvantages to the game. These disadvantages primarily stem from the fact the OBSG was limited to in-class instruction. The first disadvantage is that the OBSG took a lot of time to play. Students were required to spend a significant amount of class time making decisions. Then, the instructor had to input all decisions into a computer program to run the simulation. The other big disadvantage was that the students had to be in a classroom in front of the instructor to play the game. They did not have physical access to the user interface. Limiting the competitive environment to the classroom walls is a disadvantage, especially since financial markets and banks operate in a global environment.

To alleviate these disadvantages, the OBSG moved to a virtual environment, operated over the Internet and Ag Bank Sim was born. The name was changed to reflect its move to a more general environment with more students playing the game virtually. Efficiencies were gained because students spend their time working in groups to make and enter their decisions, which frees up the instructor's time allowing him /her to focus on answering player/student questions regarding the key decisions they must make. Moreover, undergraduate

students, from OSU and LSU, stated that a multi-institutional competition and the ability to have "real-time" decisions would greatly benefit the OBSG and better facilitate their experiential learning of the fundamental concepts taught in the OBSG.

Methods

To assess whether or not Ag Bank Sim would enhance student learning, a pre- and post-test were given to students to measure their understanding of banking principles: agricultural bank's primary source of loanable funds, factors that affect loan supply and demand, factors that affect the after-tax returns on investments, etc. The questions chosen for the pre- and post-test were selected based upon discussions between banking professionals and professors at OSU and LSU to reflect the aforementioned key concepts.

Table 1 contains the ten questions used in both the pre- and post-test. While all ten questions center on fundamental banking principles, each question has a slightly different emphasis on two general topics of finance and management. Questions 1, 2, 3, 5, 6, 9 and 10 have a larger emphasis on finance. These questions range from being able to calculate equivalent taxable yields on bonds (question 2) to sources of revenues and expenses (question 3 and 5) to financial ratios (question 10). The remaining questions focus on management decisions made at a bank. These management decisions include estimating loan demand (question 4), setting margins (question 7), and planning (question 8).

The same questions were administered on both the pre-and post-test to allow for the measurement of the impact of the agricultural bank simulation game on student learning. The test composed of both multiple choice and true/false questions which lend themselves well to quantitative data analysis.

Students who participated in this pre- and post-test were from OSU and LSU. In addition to varying students by university, different courses were used to test the ability of the Internet agricultural bank simulation game to teach fundamental banking and finance concepts. OSU students were enrolled in a junior-level agricultural finance course, while LSU students were enrolled in a senior-level, capstone agribusiness strategic management course.

To hold constant the method of instruction and explanation of the game across universities and classes, guest lecturers were used to administer and instruct the students while playing the game. These instructors were very familiar with the game, its concepts and how to play the game.

Before playing the game, the pre-test was administered, and scores were recorded. Then, following the game, the same test was administered as a post-test. Post-test scores for each participant

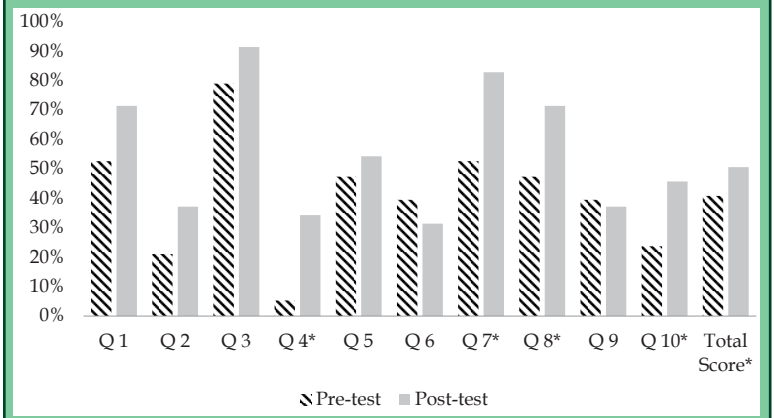
Table 1: Pre- and Post-Test Questions

Please select the choice that best answers each question.
Q1. An agricultural bank's primary source of loanable funds are: * a. Fed funds ***b. Deposits*** c. Investments d. Cash
Q2. Assuming the bank's marginal income tax rate is 35%, the equivalent taxable yield for a tax-free municipal bond that pays 4.75 percent interest is: a. 13.57% ***b. 7.31%*** c. 4.75% d. 3.09%
Q3. Employee salaries, number of loan officers, interest rates charged on deposits, and interest rates charged for loans affect net income of a bank. ***a. True*** b. False
Q4. Which of the following will not affect the amount of new agricultural production loans, that a bank could possibly make: a. Setting the amount of desired agricultural production loans to the maximum allowable amount b. The decisions made by other banks in the county c. Estimates on agricultural profitability ***d. Agricultural production loan charge offs (loan losses)***
Q5. For a bank, sources of revenue include Certificates of Deposit, Money Market Deposit Accounts, Negotiable Orders of Withdrawal, and Savings Accounts. a. True ***b. False***
Q6. When a bank does not have enough cash to meet operating needs and Federal Reserve requirements on deposits, Federal Funds are sold. a. True ***b. False***
Q7. The difference between the loan interest rate you charge customers on loans and the deposit rate you pay customers is essentially the banks: a. Return on assets b. A measure of liquidity ***c. Profit margin*** d. A measure of solvency
Q8. In order to avoid missing a revenue generating opportunity, it is important for a bank management team to do what at the beginning of every earnings period (monthly, quarterly, biannual, annual, etc…)? ***a. Estimate funds available for loans and investments*** b. Calculate the return on assets of all competitors c. Make sure the bank has cash funds in excess of the Federal Reserve requirement d. Write off all bad loans from the previous period.
Q9. When cash on hand exceeds the Federal Reserve requirement for a bank, no revenue is earned on this excess cash. ***a. True*** b. False
Q10. Which of the following ratios is used by the banking industry as a measure of liquidity? ***a. Loan to deposit ratio*** b. Operating profit margin ratio c. Times interest earned ratio d. Capital to asset ratio

*Correct answers are in bold and italics

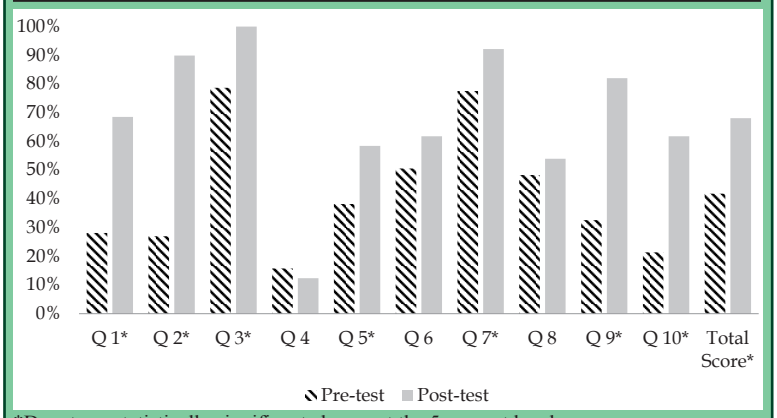
are compared with their pre-test scores to reach conclusions about the effectiveness of the game at improving understanding of bank management. In addition, results from the pre- and post-tests from both universities were used to inform the research on what areas of bank management students/participants needed more instruction and thus to improve the student/participant manual. To test if the post-test scores showed significant improvement for the students, a nonparametric pairwise t-test, the Wilcoxon Rank-sum Test, was used to examine statistical differences in the means for each question as well as overall scores (Siegel and Castellan Jr., 1988). For further information on how to obtain access to the game and how to best to play the game, please contact the authors as they have a prepared teaching note or go to the game's website at www.agbanksim.org.

Figure 1. OSU Agricultural Finance Course: Percent of Correct Reponses For The Pre- and Post-Test



*Denotes a statistically significant change at the 5 percent level

Figure 2. LSU Capstone Agribusiness Strategic Management Course: Percent of Correct Reponses For The Pre- and Post-Test



*Denotes a statistically significant change at the 5 percent level

Results

Statistical tests confirmed that students learned key banking and financial concepts by playing Ag Bank Sim. Regardless of the institution or class being taught, students exhibited a significant improvement at the five percent level in their overall test scores. Moreover, written student comments showed that they thoroughly enjoyed the Internet based game.

After playing Ag Bank Sim, OSU agricultural finance students demonstrated an increase in learning of key concepts. They demonstrated a statistically significant increase at the five percent level in their post-test total score compared to the pre-test total score (Figure 1.). Four individual questions showed a statistically significant increase at the five percent level from pre- to post-test score: questions 4, 7, 8, and 10.

Louisiana State University students also demonstrated an increase in test scores, despite the class not being focused on finance. These students were enrolled in a senior-level, agribusiness strategy capstone course. Even though finance was not the focus, these students' pre-test scores increased from an average failing score of 40 percent to an average passing score on the test of 70 percent (Figure 2). Moreover, seven of the possible ten questions showed a statistically significant improvement in test scores at the 5 percent level: questions 1, 2, 3, 5, 7, 9 and 10. It would appear that Ag Bank Sim did enhance OSU and LSU students understanding of key economic and financial concepts.

All students as well as banking executives commented on the virtues of playing the game on the Internet. One student's comment was especially noteworthy, *"I like being able to know where my bank stands after each round, because I want to win the game.* [Author's note: This feature was not available in the previous version]. *Getting the results quickly and having access to all previous decisions and results was helpful when my group decided on our strategies."* Also, a credit union president and CEO commented, *"The game does a good job of replicating the types of decisions banking executives make. The web base format of the game makes it much easier to play and understand when compared to other bank management games I have played."*

Conclusions

Through playing the agricultural bank simulation game, participants learn key financial, economic and banking lessons. In the previous version of the game, these lessons were limited to a series of in-person meetings. Moving the game to the Internet has reduced the need for in-person meetings, enhanced the student

and instructor experience and was shown to enhance learning of key objectives.

One implication of this paper is that the Internet can serve as a learning platform. Moving the agricultural bank simulation game from a classroom-grounded game to the Internet alleviated many time constraints. Also, it enhanced the participants view and opinion of the game. The transition to the Internet did not sacrifice learning objectives of the game. In fact, students from different backgrounds demonstrated an increase in their understanding of key game concepts.

Another implication of this Internet game is that the borders of the classroom have been expanded. The game was recently introduced to instructors via a webinar with virtual game-playing during the day, followed by a wrap-up webinar. This instruction method could also be adapted for students at other campuses or even employees of banks in rural areas to receive the classroom based instruction, while making decisions and playing the Internet based game. In fact, this idea was a key discussion point at the 2010 Agricultural and Applied Economics Association's Teaching Academy: The Use of Simulation to Stimulate Student Learning and Engagement. Many participants felt creating inter-university competition through the Internet Agricultural Bank Simulation Game would enhance student participation and interests. This contention is supported by the increase in the pre- and post-test scores from the OSU and LSU students. Similar results would be expected in a webinar or inter-university competition setting as observed with the pre- and post-test scores from OSU and LSU.

Future research should seek to examine how other classroom-based games, function in a virtual environment. Careful attention should be placed on factors that make those games different from the agricultural bank simulation game, especially if they fail to be successful as a virtual game. Noting those differences will help ensure that when the Internet is used as a platform for experiential learning, it will be used appropriately to strengthen classroom-learning objectives.

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Cooperative Learning Through In-Class Team Work: An Approach to Classroom Instruction in a Life Cycle Nutrition Course

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Abstract

Aimed at increasing higher level and critical thinking skills, professional and social skill development, and at engaging students in ownership of their learning, Cooperative Learning (CL) occurs when small groups of students work together to achieve a common objective. Through this qualitative examination, student reports revealed three dominant emergent themes related to the CL approach: "Real World" Preparation, Group Dynamics, and Variety Desired. Students wrote that the course described here was challenging and helped prepare them for future careers in which they would be required to work in groups to solve complex problems. In line with the instructor's goals, the CL environment appeared to simulate the challenges associated with group work in a professional setting while providing students feedback on their performance and opportunities to change their behavior in a supportive atmosphere. While student satisfaction was high in the course, they also desired a variety of teaching methods in the classroom (e.g. hands-on activities, guest speakers, whole class discussion), suggesting the CL approach should be paired with additional teaching strategies to optimize learning outcomes. Cooperative Learning could be used in a variety of courses to provide students structured opportunities to learn from each other and to improve their problem-solving abilities.

Introduction

Cooperative Learning

As instructors continually seek ways to engage students in their own learning while also leading them to reach higher levels of learning, Cooperative Learning (CL), sometimes referred to as Collaborative Learning, has emerged as a teaching strategy with the potential to do both. CL occurs when small groups of students work together to achieve a common objective (Gilles, 2007). Instructors use CL in a variety of ways, including one-day assignments, whole semester projects, in-class and out-of-class homework, and exams. Likewise, instructors have graded CL work as a group effort, based on individual performance, and through peer- and self-evaluation; others provide no grade at all for CL work (Leman, 2007; McKinney and Graham-Buxton, 1993; Murano and Knight, 1999; Sorensen et al., 1992; Sorensen and Lunde, 1993). Additionally, instructors have incorporated CL into traditional face-to-face, hybrid, and online courses (Doymus, 2008; Lynch, 2010; Sorensen and Lunde, 1993).

Following the social interdependence theory, Johnson and Johnson (1989) purport that successful CL must include five conditions: positive interdependence, individual accountability, promotive interaction, interpersonal skills, and group processing. Positive interdependence is defined as individuals working together to succeed; without all succeeding, none can succeed. Individual accountability occurs when students know that their contribution to the group is necessary for group success and that their individual performance will impact their grade. Promotive interaction is displayed through students working together to teach and learn from each other. Students in a group engaging in promotive interaction work to recognize when others in the group need more information to understand concepts, and they collectively seek to expand their knowledge through additional resources. Interpersonal skills, otherwise known as social skills, can be displayed through the acts of helping everyone in the group learn and get along. Finally, group processing occurs when students,

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as a group, reflect on their performance to determine how to improve for current and future success. When all five of these conditions exist in a group setting, students can work together in a successful CL environment (Johnson et al., 2007).

While some have not found CL to significantly improve academic achievement compared to traditional lecture-based classes (Kromrey and Purdom, 1995), many have reported academic gains related to CL (Bowen, 2000; Felder, 1995; Jaliliafar, 2010; Pray Muir and Tracy, 1999). In addition to academic achievement, CL fosters many different types of student learning and opportunities for student growth, including but not limited to: increasing higher level and critical thinking skills, professional and social skill development, and engaging students in ownership of their learning (Kesler, 1998; Lightner et al., 2007; Murano and Knight, 1999; Shimazoe and Aldrich, 2010; Sorensen et al., 1992).

Student Teams-Achievement Divisions

Instructors can apply numerous methods to divide students into CL groups, including random selection, self-selection, and Student Teams-Achievement Divisions (STADs). Heterogeneous instructor-assigned groups, like STADs, appear to be more conducive to student learning when no other research question is involved (Felder and Brent, 2001). In STADs, students are purposefully grouped based on previous academic performance to enhance the learning by all group members and to make the groups as comparable as possible (Slavin, 1978). Theoretically, because assignments and performance incentives are based on group outcomes rather than individual work, higher achieving students will help lower achieving students understand the course content. Additionally, by teaching lower achieving students the subject material, higher achieving students will reinforce their own learning and improve their performance as well.

To encourage group work and to discourage one student from completing the assignment for the group on his or her own, those students in STAD groups whose members collectively perform higher than expected on individual exams receive an incentive for their effort. Students who perform well on the exam but whose group members perform poorly do not. Therefore, only those groups whose members as a collective perform exceptionally on individual exams receive the incentive. Example incentives include verbal recognition in front of the class, a special prize, or bonus points on exams. These incentives are meant to motivate the group to work and learn together rather than as individuals. The book Cooperative Learning Methods provides detailed methods for determining grade expectations and exceptional performance as a group (Sharan, 1999).

The purpose of this study was to examine the impact of a Cooperative Learning environment in a life cycle nutrition course on student learning outcomes, including academic, professional, and personal growth. Through this qualitative examination, we explored the advantages and disadvantages of participating in a CL course as perceived by students.

Methods

The Course

The class was a junior/senior level 3-credit hour undergraduate course, with the option for enrollment at the graduate level, covering the nutritional needs during each stage of the human life cycle. Table 1 presents the components of student evaluations.

Modifying the procedures outlined by Sharan (1999), the instructor created a hybrid CL course in which lecture material was provided for review outside of class time and group assignments were completed during class time. To provide course content, the instructor used narrated PowerPoint slides to create five to 15 minute audio-recorded lectures. At the start of each unit, students reviewed approximately five to 10 lectures posted on the course website, as well as the assigned book chapters.

Almost every 75-minute class period was devoted to CL, implemented exclusively in the form of case studies. At the beginning of the semester, the instructor led a class discussion on how to complete a case study as a group; students then watched an online lecture on group work, presenting two approaches typically taken by students when completing a case study, along with the advantages and disadvantages of the approaches presented (e.g., the time commitment related to each approach versus quality of group learning and case study outcome). These two approaches included: 1) working together to answer each question (the preferred method) and 2) dividing the questions up among group members and then reviewing each other's work before submission. This lecture was developed based on the instructors' observations of previous groups working together in class. While students were encouraged to

Table 1. Weighting of Student Evaluation Components

Evaluation Component	Percent Contribution to Final Grade
2 Peer Reviews	10% (5% each)
7 Group Case Studies	35% (5% each)
3 Exams[z]	37.5% (12.5% each)
1 Cumulative Final Exam[z]	17.5%

[z]Exams included multiple choice, short answer, and case study-based questions.

prepare for their assignment outside of class and work as a group during class time to complete the work, students were allowed to choose their own approach to completing the case study.

Initially, students were divided into twelve STADs of four based on overall grade point average and performance in their introductory human nutrition course (Sharan, 1999). As groups of three to eight are commonly used in CL, the instructor chose teams of four members to promote meaningful interactions between all group members (Johnson et al., 2007). At the halfway point of the semester, the instructor switched to group assignments based on the students' exam averages in the course. This was done so that: 1) group members would provide unrestrained constructive criticism in their peer reviews without fear of retribution; 2) students who received criticism could change their behaviors in the new group environment, providing them an opportunity for a "fresh start"; and 3) all students would be forced to practice their group work skills with new and potentially very different group members.

Out of concern that graduate students might dominate group discussion and silence undergraduate participation, the instructor initially grouped them together. After determining that the undergraduate students appeared confident in their abilities, the instructor inserted the graduate students into the general pool when modifying groups mid-semester.

As part of the group learning process, on the first day of each unit the groups reviewed the assigned case study and its corresponding grading rubric and determined how they would function, including what rules they would follow (Felder and Brent, 2001). These rules included how case studies were completed and deadlines for individual assignments within the group. As indicated earlier, regardless of how the assignment was completed, all group members received the same grade for their group's case study.

Case studies took an average of four class periods to complete and were submitted to the instructor at the end of the last class period for the unit. A general description of question types included in each case study and the corresponding level of learning, using Bloom's Taxonomy (Bloom and Krathwohl, 1956), is presented in Table 2.

Table 2. Levels of Learning[z] for Each Question Type included in Case Studies

Question Type Included in Case Study	Corresponding Level of Learning[z]
Fact-based questions related to unit content	Knowledge, Comprehension
Assessing nutritional risk using appropriate tools	Application
Determining the most important problem areas related to nutritional risk while providing justification for answers	Analysis; Evaluation
Articulating and justifying recommendations for change	Synthesis

[z]Based on Bloom's Taxonomy of Education Objectives (Bloom & Krathwohl, 1956)

The instructor encouraged students to use technology to facilitate group work and assignment completion. In addition to their textbook and lecture notes, students brought their laptops to class and used the Internet to find credible resources to answer case study questions and Google Docs to organize assignments and allow multiple writers to edit materials simultaneously. To discourage ill students from coming to class while encouraging their active participation during class time, groups utilized Google Docs, video conferencing, instant messaging, and texting to communicate with the student from home.

To hold members accountable for their participation in completing the group assignment, students completed peer reviews twice during the semester. Using a seven-point Likert scale, with 1 equal to an extremely poor group member and 7 equal to an excellent group member, students rated each team member based on the following characteristics: arriving to class on time; arriving to class prepared; actively contributing to group work; providing useful, professional, and accurate information; respectfulness; staying on task; active participation in group meetings; and overall quality of the team member. Ratings were then averaged and converted to percentages to determine peer review grade (average rating of 7 equaled 100%). The combination of the two peer reviews was 10% of the final course grade. As a result, students with poor group performance could have lost one letter grade on their final grade. Additionally, groups were given the option to vote out a member, who was then required to complete the case studies on his or her own. (No student was voted out of a group in the semester in which this research took place.) As suggested by Shaman (1999), high achieving STADs received bonus points on their exams.

Evaluation and Analysis

At the end of the semester, 47 of the 49 students completed a survey about the strengths and weaknesses of the course. Of the class's students, 15 were juniors, 27 were seniors, and seven were graduate students; almost all of the students were either majoring or minoring in Nutrition. Forty-five of the 49 students were female. The survey responses were entered into a Word document, and the instructor and a graduate research assistant independently reviewed and qualitatively analyzed the data through directed content analysis (Hsieh and Shannon, 2005),

determining emergent themes within two broad categories: 1) positive components of the class and 2) things to change within the class. The two researchers then compared their findings and discussed them with a third investigator, coming to a consensus on the major relevant themes within the data. This study was deemed exempt by North Carolina State University's Institutional Review Board.

Results and Discussion

Analysis of survey data revealed three dominant emergent themes related to the CL approach: "Real World" Preparation, Group Dynamics, and Variety Desired.

"Real World" Preparation

Students felt their experiences in this CL based course prepared them for working in the "real world." They reported understanding the value of engaging in group work in order to gain skills needed in their future careers. One student wrote, *"Group work is valuable experience needed for the work force; this class provided a great opportunity for group work."* Students also reported an overall appreciation for the class because they enjoyed the CL experience from an academic and professional development standpoint. One student wrote, *"Allowing us to work as a team to complete a goal helps us prepare for our careers later in life. Overall, this is a great course and I have enjoyed it thoroughly."*

While they did not use the terminology of Bloom's Taxonomy, students also recognized and appreciated that the assignments completed as a group helped them achieve higher levels of learning, "put [their] knowledge to practice," and prepare them for the future. One student reported, *"I enjoyed the way that the class was centered around interactive learning in a group atmosphere. The case studies were very stimulating and caused me to really understand concepts and apply them to real world situations. I think this is good preparation for graduate school or on into developing a career [in] nutrition."* One student appeared to be able to identify an intended outcome of CL (to increase student learning and retention) when he/she wrote, *"The class was different than my other courses and retention is at least 80% better. Actually more courses, especially in nutrition, should be structured this way."*

Theorists and instructors often discuss the opportunities inherent in CL for student professional development, including achieving higher levels of learning and fostering interpersonal communication (Lightner et al., 2007; Shimazoe and Aldrich., 2010). To better prepare them for the adversity they will face, students should experience the challenges associated with their profession in the supportive environment of their coursework. This relatively low-stakes approach to professional development found in CL (i.e. the grade is on the line versus the job) can provide students with the skills necessary to help them succeed in the future.

Table 3. Additional Examples of Student Comments within Each Dominant Themes

Real World Preparation
"The [assignments] are very helpful because they allow you to solve problems and see what it would be like to have this type of career. Although it wasn't lab-based, the [assignments] made it seem like it was, because you constantly have to work with peers to solve problems."
"The ability to work in a group is crucial; this will be more helpful to students than they know!"
"The [assignments] are a valuable teaching tool. They force students to understand the material taught in online lectures, rather than just memorize. This uses application of the material for further understanding."
"I enjoyed the group work and having the responsibility on us…[The class] also promoted students to work together…The [assignments] were really helpful because it helped students apply their knowledge as opposed to just learning the information."
Group Dynamics
"It helped to view the material and ask my peers for assistance, because we could clear up misunderstandings we each had without the teacher's assistance."
"Taught me how to work in groups and coordinate/cooperate outside of class."
"Before this class, I always opted to work alone (even in high school my teachers would make exceptions for me on group assignments) but I actually enjoyed working as a group."
"At first, I did not like that we did not do any formal note taking or "learning" in the classroom. Once I got into the class and observed the way we learn, I changed my mind. Doing the homework in class with our groups offered time to discuss the chapters and to ask any question we needed."
"I liked that we switched groups! Kept me on my toes as far as being a productive team member."
"I really liked the group work in this class. I also thought the peer reviews were very nice. I think this makes up for group members who didn't participate like they should have. Overall, I thought this class was challenging."
Variety Desired
"A regroup/recap class every few weeks could help students retain more information."
"I would have liked a mini-lecture during class at least once a week. I prefer to listen to a professor sometimes."
"The only thing I would change about the course would be possibly allowing one day prior to tests for discussion."
"I believe the group discussions as a class were valuable since students have the opportunity to hear other's opinions outside of their group. One class discussion per teaching unit or module would be a great addition to this class to clarify information."

Students in this course attributed their professional development to working in groups, as well as completing the case study assignments. They wrote about this development generically and listed specific skills they gained as a result of the CL experience. Students discussed higher levels of learning in their writing and demonstrated it in the work presented in their case study assignments. Additionally, students explicitly explained how group work affected their interpersonal communication skills, a construct crucial to CL success. See Table 3 for additional quotes related to each theme.

Furthermore, others have demonstrated that students can both enjoy the CL experience while using higher level thinking (Murano and Knight, 1999). The current study reinforces this notion through student self-report. While students do not always need to like their course work, increased student satisfaction and enjoyment in their classes is associated with increased engagement and student learning outcomes (Carinin et al., 2006).

Group Dynamics

The CL structure in this course sought to promote the idea of group work in a job-like setting, that is to say, during a set time during class (as during the work day) rather than on their own time. Furthermore, the instructor was able to provide students with feedback and answer questions in "real time," helping to alleviate some of the challenges traditionally faced in group work done outside of class time. However, the course structure still approximated some of the more difficult aspects of group work, including the challenges associated with unequal work ethics among group members.

Students reported several advantages to incorporating CL during the standard class time. One student wrote, *"Group projects can often be hard because of conflicting schedules, so having the opportunity to meet during the class time was a 'stress reliever.'"* Many students also appreciated that CL during class time allowed for peer teaching and group discussion with the immediate availability of the instructor to help resolve conflict. For example, one student wrote:

"I loved how interactive this class was and how through our peer groups we taught each other. Often times there was a debate, but that just showed us how to back up our reasoning and formulate an agreed upon answer. If in the case we couldn't [agree], [the instructor] was great about slightly pointing us in the right direction while not giving everything away."

Again, modeling the job-like setting, students also reported that the CL structure forced them to take responsibility for their own learning and that they enjoyed this new requirement. One student wrote:

"This class really challenged my study skills and time management. I had to seek out the information myself in the book, on the Internet, and in the PowerPoints rather than just passively taking notes during class. I had to take charge of my learning and discipline myself to study/take notes outside of class. This was an 'independent learning class' as opposed to just being spoon-fed material like many of my other classes."

Through promotive interaction, one of the five main constructs of CL, students teach and learn from each other to increase their group members' understanding of the course content (Johnson and Johnson, 1989). In order to promote group member learning, students must first seek to understand the material themselves. This "independent learning" that students discussed demonstrates the first steps required to engage in promotive learning. Other researchers have also found that students engaged in a variety of CL experiences report taking responsibility for their own learning, as well as the learning of their peers, indicative of promotive interaction (Kesler, 1998; Murano and Knight, 1999; Sorensen et al., 1992).

While students overwhelmingly enjoyed the unique group work experience, many did not like relying on group members to complete assignments because group members did not always complete their assigned work, negatively impacting their grades. One student wrote, *"The weakness of this class was the level of reliability present in peer groups. There were times in the semester where due dates had been established for case study submissions and learning objective assignments, and not everyone would complete their part."* This lack of responsibility resulted in poor group grades, as well as deduction in peer review points for the irresponsible group members. However, the responsible group members did not find this outcome fair.

Again modeling the job-like setting, some students experienced the negative consequences of having poor group members and were forced to decide between making up for their group member's poor performance by spending extra time on a group project to make a good grade or spending time elsewhere and accepting a poor grade. While several chose the former route, others wrote, *"Although I could have looked over their work and edited it, that would have been a lot of work for large case studies,"* and thus chose the latter option.

"Free riders," students who do not do any work or as much work as the rest of their group, are a common problem in CL. Students often worry and complain that their grade will suffer due to the lack of responsibility of other group members and that it is not fair that a "free rider" receives the same grade as the rest of the group (Leham, 2007; McKinney and Graham-Buxton, 1993). Because group success is dependent on individual members contributing ideas and information when they gather together (positive interdependence) and the most successful groups individually prepare for group work outside of their time together (Shimazoe and Aldrich 2010), some suggest implementing a "ticket in" system, wherein students must come to class with notes on the unit of study prior to initiating group work (McKinney and Graham-Buxton, 1993; Rau and Heyl, 1990), while others suggest that instructors give students a pre-test for each unit, to hold individuals accountable for their preparation (Sorensen et al., 1992).

In this case, while the instructor provided a short online lecture related to group work and provided several examples of how to successfully complete case studies as a group, in order to foster a sense of ownership in the CL experience, the instructor allowed the student groups to choose how their groups operated. As is common in CL experiences, some chose to act as a collaborative team, while others acted as individuals in a group thus missing the benefits of the CL experience (Summer and Volet, 2010). Based on student feedback, the instructor plans to provide future students with a more in-depth lesson on CL group work, as well as a group work tip sheet, giving students suggestions on how to overcome common problems encountered in groups (Lightner et al., 2007). Additionally, students will be given a short quiz at the beginning of each unit to increase the likelihood of pre-group preparation. In the future, we plan to explore how instructors can better support students' ability to handle challenging group members and difficult group circumstances in a CL environment.

Variety Desired

The large majority of students liked the CL environment and felt they gained valuable skills from the course. However, even with their enthusiasm for CL, students expressed a desire for varied learning opportunities, including teacher-led discussions, guest speakers, and service-learning activities. Students wanted to engage in large group discussions with all of their peers, providing them an opportunity to ask questions, hear varying viewpoints and clarify confusing material not addressed in the case studies. One student wrote, *"Although I enjoyed group work and learning in groups, I do not think the whole class should be centered around it. I think it would be beneficial to have at least one teacher-led, in-class lecture per unit, to allow for a better understanding of the concepts."* Additionally, a small group of students (a minor theme in the data) preferred lectures in class and assignments at home, because they felt it better suited their learning style. Others felt that the recorded lectures limited the students' interaction with the instructor and the "experience, knowledge, skills, and feedback [she could] offer."

Lessons Learned

As in any innovative course, the instructor discovered unexpected advantages to implementing CL in her classroom, as well as elements of her approach she would change the next time the course is taught. Over the next few paragraphs, the authors would like to highlight some of these lessons learned.

While the course was designed to encourage CL, some groups engaged in behaviors that were counter to the key tenants of CL. For example, some groups chose to divide up the questions and assign sections to individual group members, instead of working as a collective on each question. Additionally, assignments were designed such that if the group worked efficiently and effectively, no outside time for assignments would be required. Students were required to attend class until their assignment was submitted. However, because the instructor did not stipulate that students must attend class after their work was completed, on two occasions, a few groups chose to work on the case studies outside of class time, turn their work in early, and use the extra class time for other priorities (e.g. preparing for an exam in another class). In the future, students will be asked to attend class even after their assignment is turned in to encourage group work on learning objectives germane to the individual exams.

As stated earlier, student groups were allowed to choose their own rules for implementing CL. While the course instructor encouraged groups to watch the lectures and read the chapters before coming to class, each group was allowed to determine what course content was to be read by individual members prior to the start of each unit. This flexibility resulted in some students coming to class unprepared, causing them to scramble to familiarize themselves with the course materials during class time, when they should have been spending time on the case study. In the future, students will be required to demonstrate preparedness for class ahead of time through short quizzes at the beginning of each unit.

As presented in the introduction, CL implementation can occur on many levels, including one-time events and/or repeatedly through out the semester. Based on student feedback, future versions of this course will include one lecture or large group discussion at the end of each unit to integrate all that students have learned in that unit. This approach will increase the variety of teaching methodologies within the course to serve those with varying learning styles.

The first time this course was taught in the current format, 29 students were enrolled. The second time, the instructor increased enrollment to 49 due to student demand. While this suggests popularity of the course among students, it also demonstrates the flexibility within the course structure to accommodate a larger class size. In this case, enrollment growth is only limited by the classroom size and the number of groups with which one instructor can interact in the time constraints of a standard 75-minute block. With qualified teaching assistance, this course could easily accommodate over 100 students. Because groups consist of four students each, the number of assignments an instructor must grade in a CL environment is 25% of the non-CL format, thus easing one of the instructor burdens related to larger class size.

Limitations

Due to the qualitative nature of the data, researchers were unable to analyze data for statistical significance. To confirm the findings of this study, the research team could design and validate a quantitative instrument to measure student perceptions of a CL environment, in addition to measuring student learning outcomes through an experimental design. Furthermore, the student evaluations of the course could be biased by their feelings and attitudes toward the course instructor and thus may not reflect their perceptions of the CL environment if another instructor taught the course. Finally, the study sample is limited to one class section; however, the sample was relatively large (n=47) and representative of students typically enrolled in a life cycle nutrition course.

Summary

Through this qualitative examination, student reports revealed three dominant emergent themes related to the Cooperative Learning (CL) approach: "Real World" Preparation, Group Dynamics, and Variety Desired. Students reported that the presented course was challenging yet prepared them for future careers in which they would be required to work in groups to solve complex problems. In line with the instructor's goals, the CL environment appeared to simulate the challenges associated with group work in a professional setting while providing students feedback on their performance and opportunities to change their behavior in a group setting. While student satisfaction was high in the CL environment, they desired a variety of teaching methods in the classroom (e.g. hands-on activities, guest speakers, whole class discussion). Cooperative Learning could be used in a variety of courses to provide students structured opportunities to learn from each other and to improve their problem-solving abilities.

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Shepherding Undergraduate Students Through a Research Experience and a Professional Meeting

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Abstract

Undergraduate research consists of a student working with a faculty or staff member to develop a study plan and objectives. Polls of faculty and students report the benefits of this activity. The goal of this paper is to conduct a survey of six students at Virginia Tech who finished undergraduate research and presented their results at an annual professional meeting of agronomy, soils, and environmental sciences. The students answered a brief set of questions about their expectations before and their experiences after the trip. Even though the time input for students and faculty mentors in high, students who become involved in undergraduate research reported value in the experience. Faculty who supervise undergraduate research must be aware of the constraints and the difficulty in producing published work without much input from the students. However, the time spent in facilitating or shepherding students through the presentation of results at a professional meeting has rewards and benefits in seeing the students mature in their career choices and increase their opportunities for success as they represent the department and school after graduation. The students who attended the meeting to present their results recommend the activity to their peers and to faculty mentors.

Introduction

Undergraduate research consists of a student working with a faculty or staff member to develop a scientific objective and study plan. The Student Education Resource Center (2011) at Carlton College reported that the Council for Undergraduate Research (CUR) and the National Conferences on Undergraduate Research (NCUR) endorsed a definition of undergraduate research as the formation of a collaborative enterprise between student and faculty member that triggers a four-step learning process (that includes): 1) identification of and acquisition of a methodology, 2) setting out of a concrete investigative problem, 3) carrying out of the actual project (investigation), and 4) dispersing/sharing of a new scholar's discoveries with peers – a step traditionally missing in most undergraduate educational programs. This list of four steps in learning agrees with the report by Lopatto (2003), who compiled polls of 12 faculty engaged in the practice of undergraduate research at three colleges.

Lopatto (2003) later supplemented his faculty poll by surveying 249 undergraduate students who were working in summer research programs at Grinnell, Harvey Mudd, Hope, and Wellesley Colleges to find out what they thought were the five most important benefits of undergraduate research. The top 10 results were: 1) enhancement of professional or academic credentials, 2) clarification of a career path, 3) understanding the research process in your field, 4) learning a topic in depth, 5) developing a continuing relationship with a faculty member, 6) learning to work independently, 7) learning laboratory techniques, 8) tolerance for obstacles faced in the research process, 9) understanding how scientists think, and 10) understanding how professionals work on real problems. The benefit of presenting or publishing the results is not on the top 10 list, and we do not know if it was a choice on the list presented to the students to choose from. No mention is made about the presentation of the research results in a professional setting. However, the author concluded that even though many undergraduates practice part of the scientific method of asking and answering scientific questions, most are not familiar with or experienced enough to carry out the scientific process by themselves all the way through the final step of communicating their results. Dale et al. (2010) reported that being involved with undergraduate research helped several students

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[2]Acknowledgement: The author would like to thank Daniel Johnson, Lara Nichols, Jessica Odenheimer, Nina O'Malley, Eric Reasor, and Heather Taylor for their inputs and to the Assistant Provost and the College of Agriculture and Life Sciences Dean for Undergraduate Education for travel funding.

choose to become veterinary researchers rather than veterinarians, and Coker and Van Dyke (2005) reported that undergraduate research affected student attitudes toward pursuing a career. Woirhaye and Menkhaus (1996) reported that involving undergraduates in independent research projects can provide students valuable input in the decision of whether or not to continue their education.

Communication of results is an important part of the overall learning process of the undergraduate research experience. Stukus and Lennox (1995) earlier reported that a number of studies show an overemphasis on science content in undergraduate research and recommended (among other things) an increase in emphasis on effective communication of results. Seago (1992) recommended that students should be expected to communicate the results of their experiment in writing, orally, or both. Hammond et al. (2003) reported that close supervision and constant feedback were essential if undergraduate students were to publish research articles from their project results. Hammond et al., (2003), and Kinkel and Henke (2006), reported that additional input by the mentoring professors are required to help students report their results at meetings or publish their research results as a refereed journal articles.

Kinkel and Henke (2006) conducted a study of students involved in an undergraduate research mentoring program (URMP) initiated at Texas A&M University-Kingsville. The URMP aided students in doing wildlife science research and encouraged students to prepare a manuscript of their findings for scientific publication and present their results at professional and lay audience meetings. Among 50 students who participated in URMP, 31 research projects were completed resulting in 18 peer-reviewed, scientific publications, with 15 oral and 28 poster presentations at scientific meetings. More URMP students graduated with a B.S. degree, graduated sooner, obtained employment within the wildlife profession sooner, and had greater success obtaining wildlife related employment than students of the control group.

Undergraduate research does have some drawbacks as well as benefits for students and faculty mentors as summarized by Kinkel and Henke (2006) and Stukus and Lennox (1995). For faculty, a poll of 900 respondents concluded that undergraduate research experiences can be extremely valuable for students, but can also be very time-consuming for mentors (Coker and Davies, 2006). Ten time-saving tips were developed from the survey that may help both students and faculty mentors operate more efficiently. The process of guiding undergraduate students through the research process can be challenging and difficult to manage, but shared experiences published in a summary of pedagogical papers can be used for guidance (I'Anson and Smith, 2004).

The National Conferences on Undergraduate Research (NCUR) promotes undergraduate research across fields of study at an annual conference for students. The NCUR conference is different than meetings of academic professional organizations that focus on one or more closely related scientific disciplines. The URMP study asked participants about the benefits they received by taking the program, but did not ask students their perception of the value of the attending the meeting or of the presentation process itself (Kinkel and Henke, 2006).

The goal of this paper is to report the positive value and any negative aspects of preparing and presenting undergraduate research results at a large professional meeting. The perception comes from a group of students who related their expectations before and experiences after the meeting.

Methods

Numerous undergraduate students enroll in research studies for course credit at Virginia Tech. In the fall semester of 2010, six students who had conducted undergraduate research were invited to Long Beach, California to attend the Students of Agronomy, Soils, and Environmental Sciences (SASES) meetings then stay to attend the Tri-Societies (ASA, SSSA, and CSSA) international annual meeting. No course credit was given for attending the meeting, and attendance was not required for the credits given for doing the undergraduate research. Funds were donated to assist with travel expenses by the Assistant Provost and the college Deans for Undergraduate Education. SASES meetings began on Oct. 29 and ended Nov. 1 and included officer meetings, tours, a harbor cruise (social), student club posters, a moderated graduate school discussion, a national speech contest, a national student research symposium oral contest (two sessions), a national student quiz bowl, a leadership discussion session, a national student research symposium poster contest, and a professionalism discussion session. Four students took part in the oral presentation contest and two in the poster presentation contest. The students were asked what their expectations were for the trip (Table 1). Following the meeting, the students were asked to complete an anonymous on-line survey about their travel experiences, resume building, professional development, personal development, and job opportunities/networking (Tables 2-6) as affected

by their research and trip experience. In both polls, multiple-choice questions had five possible answers: No Value, Little Value, Cannot (or Could Not) Be Determined (equivalent to "I Do Not Know" or I Cannot Be Sure"), Moderately Valuable, and Very Valuable. One year later, the students were asked several more questions in reflection of their trip (Table 7).

Results and Discussion

The results of the student expectation poll questions are presented in Table 1. The students felt that preparing for and attending the meeting would be worth their time and effort, but they may not have been sure to what degree since only one had attended a professional meeting. At least half of the responses were in the two "more valuable" responses for each question as opposed to the "undetermined" and "less valuable" responses.

The students felt the trip would be moderately to very valuable for improving their resume, and would be very valuable for their personal and professional development. The responses were split on whether the trip would aid them with job opportunities and in network building. Even though the students were told ahead of time that they would be able to meet potential new employers and interview at the meeting, some may have felt that the distance away from their home reduced the likelihood of a job offer. The students probably did not understand what network building is and how it would benefit them, because the responses were spread across four value categories.

The results of the student experience poll questions are presented in Tables 2 through 6. There were no responses of "No Value." Overall, the students' responses were "more valuable" than "undetermined" and "less valuable." Overall, the six students who attended the professional meeting thought the experience was valuable, a response that is not surprising. These results agree with those of Kinkel and Henke (2006). The results of the meeting experience poll agree with four of the top 10 benefits reported by students in Lopatto's (2003) study. Two other benefits can be inferred to be in agreement based on private conversation with the students. However, four of the benefits were not related to questions on the poll answered by the six students in this study. The perceived value of attending and presenting increased during and soon after the meeting. The six students who communicated their research results evidently gained skills and confidence beyond what was learned in their classes, as did those who went through the URMP program (Kinkel and Henke, 2006) and those who were part of the study by Coker and Van Dyke (2005).

The students felt that the travel experience was very valuable in terms of the relationships they developed or strengthened and the absence of financial burden to attend (Table 2). Private discussions during the trip confirmed that the students saw learning value in the travel itself and that it was crucial that they received financial help in paying expenses of the trip. The students did see high value in improving relationships or building new friendships with other students from their school. The students seemed to enjoy going as a group that represented their university.

The resume building poll results show that the students placed higher value on enhancing their resume after attending, compared with their expectations before attending the meeting (Table 3). The trip and meeting provided opportunities they had not anticipated.

Professional development value perception was mixed, but positive in most cases (Table 4). Experiences were evaluated more positively than pre-meeting expectations (Table 1). Four of the students prepared seminars and practiced weekly and two worked independently preparing posters, explaining some, but not all, of the responses

Table 1. Student expectation poll for six undergraduates before attending a professional meeting. There were no responses of "No Value".

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
How valuable will the experience be for improving your resume?	1	1	2	2
How valuable will the experiences be for your professional development?	1	1	1	3
How valuable will the experiences be for your personal development?	2	1	3	
How valuable will the experiences be for providing job opportunities or professional contacts for possible future jobs?	2	1		3
How valuable will the network building be for you?	1	2	1	2

Table 2. Student travel experience poll for six undergraduates after attending a professional meeting. There were no responses of "No Value" "Little value", or "could not be determined.

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
Travel experiences				
Value of traveling to a professional meeting with a peer group of students			1	5
Importance of receiving substantial funding to offset your expenses			1	5

Table 3. Resume building poll for six undergraduates after attending a professional meeting. There were no responses of "No Value", "Little Value", or "Moderately Valuable".

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
Resume building				
Value of having a published abstract on your resume		1		5
Value of having a professional meeting presentation on your resume		1		5

Table 4. Student professional development poll for six undergraduates after attending a professional meeting. There were no responses of "No Value".

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
Professional development				
Value of learning how to make a professional meeting level of seminar compared to an undergrad level of seminar		1		5
Value of getting peer and faculty review of your seminar during development		3	2	1
Value of presenting a seminar in front of peers and judges		2	1	3
Value of getting graded by judges from other universities		3	2	1
Value of answering questions from the audience		1	2	3
Value of preparing a poster presentation		3	1	2
Value of presenting a poster to judges and audience		3	1	2
Value of attending professional meeting seminar sessions of your choice		1	2	3
Value of attending the poster sessions and talking to presenters	1	1	1	3
Value of seeing what a professional society meeting is like			2	4

where the answer regarding a seminar was "Could Not Be Determined." Highest value was placed on learning how to make a more rigorous seminar, and seeing what a professional meeting was like. Half of the six students could not determine the value of preparing or presenting a poster, and that makes sense since only three have actually presented a poster at a meeting before. More value was placed on attending seminar presentations than poster sessions. The seminar format is the way that students are used to learning in college. Poster sessions are less interesting to students and others if the authors are not present, and undergraduate students may find it uncomfortable talking to poster presenters of subjects outside their research project topics. Questions related to being evaluated or getting review from their faculty or others had the highest number of "undetermined" value responses. The response to having weekly peer feedback and tutoring as they wrote and practiced their seminar was less than expected by the author. Generally students value personal attention and extra help developing projects. It was not a question, but students discussed their gains from critiquing the seminars of the other students beforehand. Five of six students saw value in getting questions from the audience. They were able to answer the questions well and it presumably made them feel more of a subject authority. Each student was asked several standard questions by graders and ad hoc questions from the audience. Of the four seminar presenters, two finished third out of eight presenters (there were two sessions of eight presenters). Private discussion revealed that all four of the students enjoyed giving the seminars, regardless of how they were evaluated. The poster presenters did not elaborate on their experience but did state that few people other than the judges asked about their project or results. All students felt that they improved their communication skills and gained confidence concerning their research.

Personal development value perception was mixed (Table 5), although experiences were evaluated more positively than pre-meeting expectations (Table 1). The responses concerning the writing and leadership workshops were mostly "undetermined" and "moderately valuable", but still seen as more valuable than not. However, there was great value placed in attending the graduate school preparation workshop, and the experience helped several students decide that they wanted to attend graduate school. Two of the six students decided to apply for graduate school after attending the meeting. Dale et al. (2010) reported similar results. Woirhaye and Menkhaus (1996) and Coker and Van Dyke (2005) reported increased interest in attending graduate school by undergraduate researchers. Two students received multiple graduate school offers after returning and applying formally to the schools of their choice, but chose to attend their undergraduate school instead. It was not clear if they received offers from the schools they interviewed with at the meeting. Four of the six students who attended have now either entered or applied for graduate school and one is working as an intern for a private

Table 5. Student personal development poll for six undergraduates after attending a professional meeting. There were no responses of "No Value" or "Little Value".

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
Personal development				
Value of attending the graduate school preparation workshop		1		5
Value of attending the writing workshop		2	3	1
Value of attending the leadership workshop		2	3	1
Value of attending the plenary (featured) speaker's presentation			3	3
Value of learning about your future professional possibilities			2	4

Table 6. Student job opportunities/networking poll for six undergraduates after attending a professional meeting. There were no responses of "No Value" or "Little Value".

Questions	Little Value	Cannot Be Determined	Moderately Valuable	Very Valuable
Job opportunities/networking				
Value of meeting students from peer universities		1	3	2
Value of attending social activities with students from other universities		1	2	3
Value of interviewing for graduate school in person at the meeting		1	2	3
Value of viewing commercial and organization exhibits and talking to exhibitors		1	3	2
Value of meeting professionals from other schools/companies/agencies/areas of country			2	4
Value of meeting professors from other schools			2	4
Value of meeting recent Virginia Tech graduates		2	2	2

consultant. The meeting helped one student decide what her career interests were among several related disciplines, revealed by personal communication with the author. All students enjoyed the plenary session and the talk by the speaker concerning environmental change caused by humans. There was much private discussion about the subject, and most were excited that the speaker reinforced what they were learning in the classes. The students saw personal value in learning about their future possibilities. Taking part in the undergraduate research and presenting at the meeting probably brings multiple positive benefits. For example, a common response of URMP students was that they believed they were better prepared for employment, better organized as a student, and better understood the applicability of their schoolwork to jobs in their field (Kinkel and Henke, 2006).

Job opportunities and networking value perception was positively valued, with just a few "undetermined" responses (Table 6). Experiences were evaluated much more positively than pre-meeting expectations (Table 1). Attending the meeting must have answered some of the uncertainty. The students saw value in finding out about professional opportunities through networking at the meetings and attending exhibits, where they could talk to exhibitors about their companies and products. The exhibits were not just commercial companies but other professional associations and federal agencies. Students valued meeting students, professors, professionals, alumni from Virginia Tech, and employees from other universities. The students undoubtedly "compared" their schools, curriculum, and overall satisfaction with other students, and met and explained their career plan with the others. Several students were not certain how much value there was in meeting alumni because few were in a position to offer jobs or graduate school admission, but most did see some value. The graduate school interview was positively valued but not as much as expected, because several times the students could not find a representative at the school when they went for their interviews. Several students collected business cards. There is no anecdotal evidence that the majority of the six students developed a continuing relationship with a faculty member that directed their research, although most highly recommend the experience to other students and to faculty.

One year after the meeting and presentations, a positive/negative poll was conducted to see if the student perceptions had changed (Table 7). Five of the six students answered the poll. The number and percentage of responders who agreed with the question are indicated. The remainder felt the opposite or did not answer. The values perceived by the students just after the meeting held steady after one year. The responses followed the trends from the experience poll, with a few modifications. The students did not feel that they made new business/academic or professional contacts at the meeting. The students did make contacts at the meeting and were introduced to a number of people. Informal discussion on the trip home included a list of people they had interviewed with and talked to about jobs. However, the students must not have had success with any of the opportunities discussed or had any significant follow-up contact with people they met outside of their peer group. The students who

Table 7. Post-meeting experience poll answered by up to five of the six undergraduates one year after attending a professional meeting.

Question	No. of "yes" answers and total responses
I feel that what I gained by going on the trip was worth the extra financial cost	4/4 (100%)
I feel that presenting at a professional meeting was a better learning experience than doing a departmental seminar	4/4 (100%)
I gained a better idea of what I wanted to do with my future	3/4 (75%)
I did not really make any new contacts	3/4 (75%)
I did not learn much more about what my career choices might be	3/4 (75%)
I did not learn about new job opportunities	2/3 (67%)
I benefitted by doing my research project	4/4 (100%)
I benefitted more by presenting the results at a professional meeting than I think I would have otherwise	2/3 (67%)
I learned from the student activities and training sessions	4/4 (100%)
The meeting inspired me in my professional goals	3/4 (75%)
I was more inspired to apply to graduate school after the meeting	2/3 (67%)
I would recommend that other undergrads try to do research and present it	5/5 (100%)
I would recommend that professors mentor undergraduate students in research projects	4/4 (100%)
The entire experience was well worth my time	4/4 (100%)
I would recommend that professors who mentor undergraduate students in research projects accompany them to a professional meeting	4/4 (100%)
I gained a new appreciation for the positive roles that professors can play in mentoring their students	3/4 (75%)

responded that they did not really learn much more about their career choices meant that they had not learned of new opportunities they were not already aware of. In other words, they already knew that their choices would be to go to graduate school, work for a private consultant, or work for an agency. The question was poorly worded, but was meant to ask if attending the meeting had allowed them to find a new school, company, or agency to consider applying to. However, the students also said that they did not learn about new job opportunities at the meeting. This could be because of limited jobs in general or because the students were not looking for a job but graduate school instead. The students may also have limited their job search to their local area, on the opposite side of the United States from the meeting. Students may not benefit much from building a network of contacts at a single professional meeting. However, they should gain from repeated attendance if that is possible. One year later, the lack of making new contacts that directly altered their futures was noted by the students. Even though the students who attended the meeting were made aware of multiple career options, most had already narrowed their choices to graduate school or working in an area local to their family.

Summary

Undergraduates are required to take courses that teach them scientific writing, some assist with research as part of their employment, and some observe case studies in classes that review scientific studies. Therefore, many undergraduates with aspirations of attending graduate school engage in an internship, work in a lab or in the field assisting graduate students, or enroll in undergraduate research projects. The value of doing the research can go beyond learning about the studied subject and learning the skills used in the research project.

We surveyed six students who presented their undergraduate research results at a professional meeting both before and after the meeting. Dissemination of their research results to peers and professionals was perceived to be a positive and valuable experience by the students and a benefit to building their resume for graduate school application. Travel to the meeting, meeting peers and professors from other schools, attending seminars, interviewing for graduate school, and learning more about their professional society was a benefit. Even though the time input for students and faculty mentors in high, and the time length of involvement for undergraduate students may be limited to one semester, there was value reported by the students who become involved in and reported their undergraduate research. The departments and programs must also have perceived some benefit or they would not sponsor such activities. Faculty who supervise undergraduate research must be aware of the constraints and the difficulty in producing published work if they do not receive much input from the students. It will require additional input by the mentoring professors to assist the students in this study to publish their research results as a refereed journal articles. However, the time spent in facilitating or shepherding students through the presentation of results at a professional meeting has some professional rewards and personal benefits as the students mature in their career choices and increase their opportunities for success after graduation. The students saw overall value in conducting and disseminating their research, despite the drawbacks, the time and funds spent. They saw value in attending professional meetings to

present their results and they recommend the experience to their peers.

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Effects of a Summer Teacher Tour Program on Agriculture and Science Teachers' Knowledge of Applying Science, Technology and Math in Research and Industry

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Abstract

In order to make teachers more aware of the demands of the economy, industry, and research, two groups of agriculture and science teachers were taken on tours of research and industry facilities across the state of Georgia. During each of the four-day tours, teachers were transported across the state by bus and visited The University of Georgia, Georgia Technical Institute, six Centers of Innovation, and a cross section of the industries that the universities and Centers of Innovation serve. The objectives of this project were to engage high school teachers of science and agriculture in a program that would (a) increase science content knowledge, (b) develop teachers' comfort levels with inquiry based teaching strategies, (c) expose them to new teaching technologies, and (d) influence them to share ideas with fellow teachers. When comparing retrospective means with post-experience means, on a 5-point Likert scale, teachers reported close to a three point change in their knowledge level of how the Georgia Centers of Innovation fit into the overall economic growth plan for the state of Georgia. Additionally, responses to open-ended questions indicated that teachers found the tour extremely beneficial and believed that it would help them in utilizing inquiry based instruction to teach science content knowledge in their classrooms.

Introduction

Students in the United States of America are falling behind their international counterparts in the two academic areas most commonly linked to country success, math and science. Governmental initiatives, such as No Child Left Behind, are intended to provide the impetus for schools to improve their students' academic performances by federally mandating assessment and accountability standards (U.S. Department of Education, 2004). Private initiatives, such as the American Association for the Advancement of Science's Project 2061, have also been developed to improve student performance in mathematics, science, and technology by improving curriculum, instruction, and assessment (American Association for the Advancement of Science, 2007). Even the corporate sector is getting involved in the effort to improve the academic performance of youth. In 2004, Bayer was a sponsor of the U.S. Summit on Science and continues to promote improved scientific literacy at the elementary education level through its Making Science Make Sense initiative (Allan, 2004). While these efforts have certainly helped to increase awareness of the need for greater math and science literacy, there is still a demand for additional, practical solutions that teachers can implement in their own classrooms. Simply mandating higher academic standards is not enough. Attainable tools and solutions must be provided in order to meet those standards.

According to the Third International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Educational Achievement in 1995, American eighth

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grade students ranked 28th in the world in math proficiency and 17th in science proficiency (U.S. Department of Education, 1999). More recently, U.S. students (15 years of age) performed below average in both math and science when compared to students of the same age in other industrialized countries (Lemke et al., 2004). Even within the United States, many students are failing to achieve proficiency levels. Seventy percent of eighth grade students in the U.S. were not proficient in math (Perie et al., 2005). The results are similarly grim in science, where only 29% of eighth grade students were at or above the proficient level (Planty et al., 2007)

Research shows student achievement is linked to teacher content knowledge (Hill et al., 2005). Students perform better when teachers have a strong background in the subject matter being taught. Miller and Gliem (1996) discovered that preservice agriculture teachers were not capable of applying basic mathematics skills to agriculture related problems. This finding is a harsh realization as the movement continues toward agriculture classes counting for graduation credit in science and math (Dormody, 1993). With that in mind, the researchers sought to engage teachers with industry that relies heavily on the application of scientific and mathematical principles. If teacher knowledge increases, there is greater potential for students to have increased knowledge and interest in science and math related careers. To facilitate this increased content knowledge, Thompson (1998) recommended in-service professional development opportunities emphasizing real life science applications, especially physical science. The findings of Warnick et al. (2004) suggest that collaborative in-service workshops be developed that bring science and agriculture teachers together to improve content integration and hone technical skills while working in collaborative teams.

This research examines the effects of taking agriculture and science teachers on a one week tour of current applications of science, math, and technology in industry and research across the state of Georgia. More specifically, this article describes teachers' self-perceptions of their knowledge and experience as related to science, technology, and mathematics in industry and research, after completing a summer tour.

Theoretical and Conceptual Framework

A constructivist framework was used to develop this study. In its most simple form, constructivism asserts that people build their own beliefs, knowledge, and understanding based on the experiences they have had in past and present contexts (Doolittle and Camp, 1999). In the classroom, constructivism is evidenced by a greater dedication to the process of facilitating the formation of knowledge, rather than simply relaying factual information to the learners (Confrey, 1990). A constructivist classroom is characterized by student-teacher dialogue, open-ended questions, and hands-on experiences (Powell, 1995). These techniques allow students to assemble knowledge gradually, at a comfortable pace for each individual.

Constructivism is particularly appropriate in more complex subjects. Science and math education can be improved by incorporating a constructivist approach into the classroom (Gil-Perez et al., 2002; Spinner and Fraser, 2005). O'Sullivan et al. (2000) reported eighth grade science students who were taught by teachers with a science degree averaged higher test scores than students of teachers without science degrees. There exists a need to supplement the experience (or lack of) of science teachers in order to best develop scientific literacy in youth.

Materials and Methods

The objectives of the summer teacher tour program were to:

1. Increase Science Content Knowledge - Increase the technological and scientific literacy of the group by exposing them to research on college campuses. Teachers may not have a deep understanding of what they are shown, but they will appreciate the ever-changing landscape of research and how research begins adding to their scientific and technological literacy. Ideal professional development leads to teachers who, in partnership with outside resources, provide productive learning environments for students. Teachers who experience research first-hand not only better understand the scientific content and processes but also develop a renewed interest in and commitment to their field (Loucks-Horsley et al., 1998).

2. Develop Inquiry Based Teaching Strategies - Make teachers aware of the science, mathematics, and technological skills students need for high impact 21st century jobs. Jobs of the 21st century will go to students who are innovative and have strong knowledge foundations in science, technology, and mathematics. Teacher exposure to the opportunities available and the skills needed to be successful will empower them to not only educate youth on the importance of science and math skills, but to educate youth using strategies that require practicing such skills. By introducing teachers to the research process, they can then utilize that process in their classrooms by using inquiry learning.

3. Expose Teachers to New Teaching Technologies - Expose teachers to critical workforce needs. Most teachers do not realize that the U.S. is facing a critical shortage of students trained and interested in pursuing STEM (science, technology, engineering, and mathematics) degrees. Through interactions with industry leaders, teachers learn about current and future job demands as well as the technology proficiencies that the future workforce will need. They also gain insight into new technologies and resources available for their classrooms.

4. Share Ideas with Fellow Teachers - Share ideas among teachers and build relationships for ongoing partnerships between K-12 and post-secondary institutions. The sharing of materials, course offerings, and assessment requirements by teachers who are from the same school, department, or grade is a key component of successful professional development activities (Garet et al., 2001). Incorporating shared readings and discussion fosters cooperation among teachers and highlights potential future partnerships.

This is a descriptive study designed to measure change in individuals' awareness due to participation in the Teacher Quality Education Program's Centers of Innovation Tour. The tour was a four-day event held in the summer; twenty teachers participated in the event each year which involved tours of university laboratory facilities at three different college campuses, the Georgia Centers of Innovation, and various business and industries related to the work being conducted at the universities and businesses. The tour stops included: Agriculture Innovation Center (AIC), Aerospace Center of Innovation, Life Sciences Innovation Center (LSIC), Center for Applied Genetics Technology, Manufacturing Excellence Innovation Center (MEIC), and the Enterprise Innovation Institute (Price, 2007).

Population

Participation in the program was open to agriculture and science educators in the state of Georgia. Space was limited to the first twenty participants to register. A census of participants was conducted at the last session of the tours in both 2007 and 2008.

Instrumentation

A researcher-developed questionnaire with a retrospective post-test format was used. The questionnaire consisted of ten awareness statements. Participants were asked to select their level of awareness of a topic before the tour and after the tour, using a five point Likert scale where 1 = very low; 5 = very high (Table 3). Four Likert-type questions were included to assess the likelihood that teachers would use the information in their classrooms, how beneficial the reading materials were, and the overall benefit of the tour (Table 2). In addition to the standard evaluation required by the Teacher Quality Higher Education Program Grants, a retrospective posttest was conducted using a five point scale (1 = none; 5 = complete) in order to measure changes in participant knowledge level with regards to 13 key indicators (Table 1). The instruments were delivered to participants at the end of the tour and all instruments were completed and collected for a true census of participants.

Results and Discussion

Mean changes were measured for 13 key indicators of teacher learning (Table 1). Participants reported the least amount of change (mean = 1.8) in "knowledge of the role high school education plays in Georgia's Key Industries." Teachers perceived they already possessed a moderate level of knowledge prior to the tour regarding the role that high school education plays in Georgia's Key Industries. This moderate level of knowledge prior to the tour limited the amount of possible improvement that was available for the participants. The teachers had a relatively low increase in knowledge because they already had a moderate understanding of the role high school education plays in Georgia's Key Industries.

The greatest change (M = 2.9) in knowledge level for the teachers was related to their knowledge of how the Georgia Centers of Innovation fit into the overall economic growth plan for the state of Georgia. The specific reason for this level of change in knowledge

Table 1. Participant's Change in Knowledge Level from Pre Test to Post Test

Question	Change
1. Knowledge of activities taking place at the Agriculture Innovation Center.	2.6
2. Knowledge of activities taking place at the Aerospace Innovation Center.	2.4
3. Knowledge of activities taking place at the Center for Applied Genetic Technologies.	2.5
4. Knowledge of activities taking place at the Life Sciences Innovation Center.	2.8
5. Knowledge of activities taking place at the Manufacturing Excellence Innovation Center.	2.8
6. Knowledge of activities taking place at the Enterprise Innovation Institute.	2.7
7. Knowledge of the role high school education plays Georgia's Key Industries.	1.8
8. Knowledge of the 21st century career opportunities for Georgians.	1.9
9. Knowledge of the role science education plays Georgia's Key Industries.	1.8
10. Knowledge of how to utilize Georgia Centers of Innovation in your classroom activities.	2.8
11. Knowledge of how Center of Innovation activities can be aligned with GPS's.	2.5
12. Knowledge of how the Georgia Centers of Innovation fit into the overall economic growth plan of the state of Georgia	2.9
13. Knowledge of the role that globalization plays in influencing Georgia economic development.	1.9
Total Average Change	2.4

Note. Pre-and Post-test Scale: 1 = Very Low; 2 = Low 3 = Moderate; 4 = High; and 5 = Very High.

was not investigated by the researchers, but is believed to be due to the relatively recent creation of the Centers of Innovation only four years prior to the first tour.

Table 2. Participants' Perceptions of Information, Materials, and the Overall Benefit of the Tour

Question	M
1. 14. What is the likelihood that you will use information gained on this tour in your classroom?	4.7
15. How beneficial were the reading materials The World is Flat?	3.9
16. How beneficial were the reading materials Tough Choices or Tough Times?	4.2
17. How would you rate the overall benefit of this tour?	4.9

Note. Scale: 1 = Very Poor; 2 = Poor; 3 = Moderate; 4 = Good; and 5 = Excellent.

The mean response of all participants with regards to their perceptions of information, materials, and the overall benefit of the tour was measured on a five point scale (Table 2). Teachers indicated there was an excellent likelihood they would use information gained on this tour in their classrooms. To encourage the use of tour information in the participants' classrooms, time was provided for lesson plan development, sharing best practices, and developing partnerships with the universities, Centers of Innovation, and industries.

Table 3. Change in Participants Knowledge and Comfort Levels

Tour Target Objectives	Pretest Mean	Posttest Mean	Change	Percent Change
Science Content Knowledge	3. 6	4.3	0.8	20%
Knowledge of Inquiry Based Teaching Strategies	3.6	4.6	1.0	25%
Knowledge New Teaching Technologies	3.3	4.1	0.8	20%
Comfort Level with Sharing Ideas With Fellow Teachers	4.3	4.7	0.4	10%

Note. Scale: 1 = Very Low; 2 = Low 3 = Moderate; 4 = High; and 5 = Very High.

In addition to the tours and lesson planning, participants engaged in discussion of assigned readings. When asked about the level of benefit from these readings, teachers responded positively. Teachers responded with means of 3.9 and 4.2 (Likert Scale 1-5) respectively to the two reading assignments that accompanied the tour; "The World is Flat" by Thomas L. Friedman (2006) and "Tough Choices or Tough Times" by the National Center on Education and the Economy (2006). Anecdotal data indicated teachers believed the books were interesting but there was not enough time on the tour to adequately read the assigned chapters each night. The pace of the tour and the late evenings left teachers exhausted in the evenings and just under half were able to read the assigned chapters for the next day. Even so, participants rated the overall benefit of the tour as excellent (M = 4.9).

As for the four main objectives of this tour, teachers experienced a 20% increase in their science content knowledge; a 25% increase in their ability to develop inquiry based teaching strategies; a 20% increase in exposure to new teaching technologies; and a 10% increase in willingness to share ideas with fellow teachers, when pre and post-test means were compared (Table 3). The overall level of change for all objectives was 2.4. This change in learning on all four objectives suggest that these subjects responded well to the constructivist classroom and responded well to student-teacher dialogue, open-ended questions, and hands-on experiences thus offering support for Powell, 1995; Gil-Perez et al., 2002; and Spinner and Fraser, 2005.

Summary

This tour can be a point of beginning for The University of Georgia and Georgia Tech to solidify some of their K-12 outreach efforts. K-12 teachers are a viable conduit for reaching pre-collegiate students and we are counting on their ideas for future efforts. These tours were successful in raising teacher awareness and increasing the teachers' ability to make meaningful connections between what is being taught in high school classrooms and what is happening across the state in industry. Marc Tucker, president of the New Commission on Skills of the American Workforce, said, "There is growing mismatch between the demands of the economy and what our schools are supplying" (Herszenhorn, 2006 p. B5). These tours and others like it help to correct that mismatch by increasing teacher content knowledge and with using inquiry learning and new technologies in their classrooms.

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(Presented at 8th Annual Meeting)
Published May 1962

AGRICULTURE IN THE WORLD MARKET . . .

By Dr. George Mehren, Director

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Mr. Chairman, and Gentlemen: Early in August of 1945 a long and vicious war was terminated with the dropping of an instrument known vulgarly as a "whammy." It introduced the nuclear age, and perhaps that was the most important thing that has happened in this twentieth century. A few years ago a satellite went up and the space age opened. That may have been the most important thing that has happened in this twentieth century. And yet in 1952, obscurely, without much publicity or propaganda, another development occurred that may very well be vastly more important than the "whammy" that brought nuclear power to us, or the "sputnik" that opened space to us. In 1962 a Coal and Steel Community was developed in western Europe. It had some difficulties at the start. Two years later efforts were made in western Europe to open up a Defense Community, and a Political Community. Both of them failed. Yet, in 1958, the common market, the European Economic Community and the European Atomic Community were developed. They have been vital, they have prospered, and the economic community especially is going ahead at a rate that may well make it true that **this** is the important development of this century in which we live.

The communities came mainly out of efforts for rehabilitation and defense. Some of the people in western Europe knew clearly that they couldn't indefinitely depend on things like ECA and charity from the United States; they couldn't depend indefinitely and continuously on defense instruments like NATO; and so they wanted to develop their own institution. I think there were three major motives: one of them was to solace, if possible, the ancient enmity of the French and the Germans and not merely to solace the ancient enmity out of which millions of people had died, but to find affirmative participation by these two peoples who had hated each other for so many years in their rebuilding process. And the second thing they wanted to do was to integrate the entire area of western Europe into one economic entity, competitive in nature, protected internally, and to try to get the same industrial efficiency through the same basic methods that the United States had used in this country. And, thirdly, they wanted a third-power force.

They knew, as we know, that we have lived not just for fifteen years but for thirty years in a two-force world where the forces are hostile, where war has been on the edge of a razor, and in that context it was not mere economcis, not mere business, but the development of a power intermediate between the Americans and the Russians through which there might be some possibility of survival to the nations of western Europe. They understand clearly, and we should understand clearly, that this is not simply an economic machine. This is—ultimately—the development of a supranational power with its own institutions and its own sovereignty. The six nations now in it are sovereign entities; the community itself is a sovereign state; we cannot dictate to it; we have to live with it; it is there. From our viewpoint, overall, it is a good thing it is there. Yet, again, it is a national power and its ultimate objective, and not so ultimate either, is the development of a United States of Europe in all respects: military, political, foreign relationship, and business. There is already actual power now in the common market. There is some political power, some political sovereignty, and the capacity to enforce its own decisions. The British did not originally participate for good and compelling reasons, but now the British probably will participate. And when the British participate, this may mean over the long-run the death of the commonwealth, the death of the sterling block commerically, and the emergence of a power whose rate of growth has been faster than our own, and the strength of which is now clearly defined. That power will be intermediate between us and the Soviet.

They have recognized, and they have stated when all of the early work that was done in developing this community, that they want an organization which will protect them against changes that have occurred and changes only shortly ahead of us, technically, in terms of capacity to produce; in terms of military strategy and military capacity; and in terms of the raw, naked power that has governed the relationship of most of the earth for most of three decades. They know, as you know, that the relative power of the Communists has increased. They know that there is a capacity now given to man to destroy the earth. This is not exaggeration; this is not hyperbole; this is the cold and difficult fact with which those people of that community and ourselves, and everybody else, must live. They know that they must have defense and they must have power, but they also know they need growth; they need substantial equalization of an ancient social system, more feudal than modern; they know that most of their basic institutions must change drastically; and, especially, they know that to survive there must be European unity. So, ultimately, and again not so ultimately either, within twelve years at the most—and if the same rate of performance goes on in the second and

third stages as has occurred in the first, within eight years—there will be a fully integrated western Europe' fully integrated economically and, to a very large measure, fully integrated politically and in every other way. Their performance in the first four years has been almost fantastically successful.

In all respects they have been ahead of schedule on everything they have tried to do, bar one, and that is to develop a common internal agricultural policy. It may surprise Americans who live in an agricultural economy which is relatively free of government intervention—except for the 14-¾ billions dollars that may be used for price supports and except for the associated production controls and the marketing quotas and the export dumping and the tariff prohibition—to understand that the poor, simple, peasant farmers of western Europe are potent politically. In England, the division of the vote usually is less than six per cent and the organized farmer constitutes something more than six per cent of the electorate. In Italy, almost fifty per cent of the people work on farms and many of them work on farms that are as ancient, as feudal, as much afflicted with the ills of a peasant society today as they were a thousand years ago. The distribution system, the marketing and processing systems, are as much afflicted with the evils of guild control as they were a thousand years ago. Yet, these people vote. Their problem is not an acceleration of technical efficiency which spews out agricultural goods and "shuffs" off agricultural labor faster than other markets and other industries can absorb them. Their problem is small scale, strip, separated, peasant production: primitive, inefficient, and poverty stricken. And so, out of this economic integration comes a frankly protectionist internal agricultural policy for western Europe.

That which is most discussed in the performance of this community is the development of a common external tariff. Parts of that were done on March 7 when the GATT agreements between the United States and the common market were published. The cries of anguish which rose from some parts of California agriculture could be heard from Karachi, to Rhodesia, to Brussels where the document was signed, and to Washington where it was released. Internally, their objective with respect to the agricultural industries is frankly, to protect it, to insulate it, and to use essentially the same devices we have used. But, basically the community involves a far broader set of objectives. They want, first, to eliminate all internal barriers. The six nations, the original corps, have committed themselves through binding treaty to that end. They want uniform external barriers and they have almost gotten them. In four years they will have them completely against the rest of the world. First, then, no barriers to any type of movement within the nations now participant in the community or those which will come in later. Second, common barriers, equal, in all of the countries against the rest of the world, and third, a single negotiating agency, and that already has been achieved.

This country will never again negotiate separately with France, Italy, Germany, Luxembourg, Belgium, or the Netherlands. This country will negotiate henceforth on all matters of trade with the common community which has some of the national sovereignty once formally vested in each of those states. They want and to some measure they already have eliminated all barriers on the movement of labor within the community; all barriers in the movement of capital within the community; all barriers against the movement of services and business enterprises. They seek to coordinate their entire monetary and fiscal system, and this alone means national sovereignty if tax powers, budget powers, monetary powers are in one common agency and not in six or seven others. They want and to a surprisingly successful measure they have succeeded in getting a common agricultural policy. In all respects, again, the performance has exceeded anything ever anticipated or found in any set of nations anywhere.

In the four years in which the first stage of the comunity was finished, the average increase in real income in the community was some forty-five per cent. The volume of trade has gone up sharply, the competitive position of the common market is vastly improved over what it was four years ago, and they are one year early on schedule. They have cut their internal duties by thirty per cent. They have cut them on agriculture by twenty to twenty-five per cent. The common market is not anything to talk about in the future; the common market is here. It is strong. Its total dimensions now set off against our own are in some ways almost as big as us. In many ways, they are already a substantially more powerful economic unit than the Soviet block. It is here, it is a fact, and from our viewpoint it is a good fact, I think. They have developed executive agencies to exercise the supernatural power of the community. They have developed commissions for each one of the areas in which the nations have yielded up part of their individual sovereignties. They have developed a parliamentary system which within four years is to be elected by the individual voters of the nations now in the community and those who are waiting in line to come in later.

Their major prcblem, again, has been agriculture. But, what they are intending to do in agriculture is not difficult really to see. Our people dislike them for it. Our people have already realized on the official level that which all of us will have to realize on the personal level: that this community which is to expand very sharply very soon is now here, a fact, a powerful fact, and an agency with which we will negotiate and not one to which we can dictate. They have decided in agriculture to do this simple thing. There is to be a price support

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Agriculture . . .

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system. The price support system will be somewhere between that in France, which is the low one, and that in West Germany, which is the high one. Gradually all agricultural products will move at prices determined by their government and supported by the communities financially just as we support that with which the farmers of this country have been blessed for thirty years. Secondly, they are going to put out, as they already have put out, common external tariffs against agricultural products. But, they are going to do two other things. They have agreed, and stand ready by July 1 of this year, to use variable duties. In short, wherever any European products of agricultural origin are produced by present or future members of the community and can not be sold at artificially high price supports within that community, then there will be variable duties. This is a euphemism for saying that if imports come in at a time when they have surpluses, large or small, they will raise those duties on a short-term basis high enough to keep the foreign competition out. If that doesn't work, any one of the nations can lower or embargo any imports of agricultural products from anywhere else so long as it is necessary to protect the price support program of the common market nations, subject to review by community agencies.

Our agricultural people are not pleased with that arrangement, but briefly, this is one part of what the commun.ity is. The community intends to compete on exports of non-agricultural goods. It intends, as it has already done rather sharply, to lower its non-agricultural duties and perhaps even to remove the quotas, the quality controls, the packing standards, the exchange limitations which have been far more restrictive of trade. Yet, again, on the whole with the present performance and status of this community, it is to our national advantage. It is difficult for a man who ships raisins to see Greece be given associate membership in the community because Greece, then, will have almost, but not quite, the completely free entry into the western market that the full members get. It is not pleasing to some of our people, and particularly the California people, to see the almost inevitable participation by the United Kingdom in an internally duty-free community where full preference will be given to Italy which is the Mediterranean state of the community, as we are the Mediterranean state of this nation. However, again these are the facts with which our people have to live.

The raisin shipper is an American. As an American he can not really take exception to specific activities that are not designed merely to fatten the real income of our own people. For better or for worse, we are the United States and we are the major power of the world. As a major power of the world we have obligations against a hostile system quite clearly dedicated to our own death. We can't, therefore, cut loose Japan and we can't therefore cut loose the Indians, whose behavior sometimes may be a little bit disturbing, because we can't permit the complete overrunning of Asia by the Communists. We can't even do that in Latin America because if we do this country becomes a fortress, and fortress life is much more costly than our present kind of life and vastly less pleasing as a way to live. So the overriding objectives of the American government are not simply trade and not simply the business or economic welfare of our individuals. The overriding objectives is the necessity that impinges on our people to protect ourselves in a world at war. Then, there are our own foreign policy operations which are required to meet those objectives. Finally, there is the general welfare.

Two things seem superficially to be quite separate matters. The European economic community overall is consistent with that which we need. But, we also have another system about which quite a few of our people are unaware that doesn't have too much immediate sex appeal and not too much apparent relevance to the daily work and the daily thought or speech of our people as individuals. This is reciprocity. The reciprocal trade system of this nation is also a fact. It has been a fact for twenty-eight years. The round of negotiations with thirty-two other nations that was announced a week ago is the fifth such round. The act dies on June 30, 1962. That act was a system whereby we and thirty-nine other nations negotiated together, usually for as much as eighteen months at each individual sitting, to come up with concessions on our part for entry into our market, which we traded off for concessions that they gave us. We have also lived for those twenty-eight years under a system of most-favored-nation treatment such that if we give any concession to any GATT member—and now to any common market member—that concession is automatically and fully available to every other nation of the world with the exception of the Communist bloc.

A week ago, before the House and Ways Committee an instrument designed by its perpetrator, if you are a Republican and by its distinguished and scholarly author if you are a Democrat, the President of the United States, was described as an instrument that was bold and new—and in some sense it is bold and some sense it is new. This is really what it does: it would give the President the power to cut our duties against the rest of the world, and we are a very low tariff nation, up to fifty per cent over the five-year period ending on June 30th of 1967. It also gives specific powers to the President beyond that major provision in dealing with the present and the future common market. the present market has six nations. Before long it will have England almost surely, Norway, perhaps Sweden, and perhaps Switzerland. It will have to rule on present or future applications of Israel, Spain and the applications of Portugal and others

as full or associate members. Here, the President asks for power to eliminate tariffs completely if they and us together do eighty per cent of the trade in any category or any article; to wipe out any agricultural duty that is now five per cent or less, and in short, to operate on a bloc basis, category by category, broadly, instead of the item by item system we now use. A set of administrative procedures, a set of escape clause provisions, a set of peril point provisions, a set of powers to eliminate imports if the national security be threatened by them is also written in. The second part, the part that may be bold and new, provides for adjustment. Here, the government of the United States would commit itself to provide training, to provide capital, to provide low cost credit, to provide new facilities, plants, equipment for workers as individuals, for workers as groups, for enterprises as individuals and for industries as groups if a flood of imports were seriously to affect them. This goal is as pious and as desirable and as far beyond argument as the institutions of motherhood and justice and beauty and truth. Operationally, to the agriculture of California they may be almost totally irrelevant. It is very difficult to readjust a citrus orchard which may take seven years of gestation before yields come. It is difficult to readjust an olive orchard which may have a life of fifty or seventy-five years. It is obvious that the adjustment provisions were made without real reference to the operating facts of agriculture and specifically to the operating facts of agriculture like our in California.

Our stake in the common market and the reciprocal trade system, taking American agriculture as a whole, is clear beyond peradventure of doubt. Those people in Europe about whom prune and citrus growers in California are making rather unpleasant statements, because they got their duties bumped up last week, buy about ten times as much agricultural commodities from us as we sell to them. Yet, there is fear, suspicion, and mistrust among the agricultural people of the nation and especially among the agricultural people of this State with respect both to the common market and with respect to the present and future administration of our own reciprocal trade program. However, more broadly, we turn out about twenty billion dollars of exports a year and agricultural commodities run about twenty-five per cent of them. The State of California is not the heaviest export state of the fifty that comprise this Union, but in industrial commodities we are the third highest state. Our people export a total of 1.3 billion dollars. In agricultural commodities the State of California is the number one exporter with almost 500 million dollars, followed at the usual respectful distance by the sovereign republic of north, south, east, and west Texas, but at quite some distance behind us. Here are the difficulties really: in California we sell 200 commercial commodities. We are not a wheat state. We are not a barley state. We are not a soybeam state. We are not a livestock state. We are not a corn state. We are a state with more than 200 quite different sets of commodities in it. Our biggest commodity is cotton, and it is also our biggest export commodity, but cotton is only eleven per cent of our income.

Among the more than fifty groups with whom we in the University have talked in the last two years—not once has any California agricultural person said "I oppose what we have done to engender the common market." Not once has any Californian been stupid enough or vicious enough to say that "my personal interests shall override the development of a political and military power in Europe which will be on our side and not on the Russian side." Not once has any Californian objected to reciprocity, to the giving on our side in order to get from them. But, our people have taken two major exceptions, and these are proper, just, respectable, and consistent with the overriding needs of this nation. Our people want to know the standards in terms of which specific actions are taken. To our people, this is what really seems to happen: some unidentified person deeply buried in the black vastness of the State Department suddenly presents a thick book with thousands of items on which we state we are willing to barter in a poker game for decreases in duties up to specified limiting magnitudes. There is a second book, almost as thick, in which they say it is our intention to play poker to try to get specified concessions from the other side. Nobody really knows who puts the commodities on that list, or why. Nobody knows why sherry wine should be on it, and port and muscatel and angelica should not be on it. Nobody knows why dessert wines are on it and table wines or raisins or table grapes are not on it. Nobody knows why they pick a 25 cent decrease and not a 15 cent or 30 cent cut. There are no clearly defined standards. More important, there are no appraisals of the effect of the proposed limits. Last week two federal officials asked "why should we be able to say in advance what the effects of this is going to be on you or the benefit that they may get on the European side." It was asked "why doesn't the University's Giannini Foundation do this?" The answer is that the University's Giannini Foundation does not generate the decreases in duties. The Giannini Foundation doesn't pick the products which are to be considered for concessions on the other side. It is more properly the obligation of the State Department to know something about the impact before they give a set of proposed negotiations to an industry which then must buck its way through a complicated and difficult process of a hearing. These, again, are facts, and they are the facts to which our people take exception: that the proposed concessions are generated in secrecy; and that to find means of adequate hearing is not simple and is often far beyond the capacity of small industries.

There are two agricultural industries in California about which no great worry need be had. Cotton is a politically sensitive item because it is big, and because the cotton industry, putting it bluntly, can put itself together about twenty-two senators. The industry may associate itself with

other large industries in the feed-grain states or elsewhere and it can make itself heard, and so can rice. Raisins are a big item here in the San Joaquin Valley. Coldly and brutally, raisins and most of the other specialty crops are not sensitive crops because the most you can put together in the raisin industry is a few congressman out of 435. There is no hostility in the State Department or else where to agriculture. Yet, inevitably, there is ignorance of specialty crops. There is danger—not to the big national commodities that are understood and represented—but rather there is danger from inadvertence or ignorance to those which are big in a state like this and little elsewhere. There is one problem. Another problem is standards: what for example are the criteria in terms of which the wine industry shall be subjected to further foreign competition; how much benefit must be gotten on that side against how much burden on this side in order to justify a specific decision; how do small industries get a hearing; how do small industries protect themselves in a difficult and political administrative contest against adjustments that are not needed in the national interest?

In summary then, the community is a third force. It is in a sense a new nation. It is a new nation which, with those who are preparing to join it, may some day be as big and as strong as we are. From the viewpoint of trade and our survival it is a good thing. Reciprocity, of one sort or another, is with us and we shall have to live with it. We should live with it, because overall it is the only instrument we can use to help assure survival in an age when survival is continuously in doubt. Our people, Nonetheless, ask and they should have the right to know the standards that govern these actions; the right of access, the right of appeal; and an avenue to protect themselves in a system that is beneficial taking all, but which inadvertently and perhaps uselessly damage respectable and honest people in the agriculture of this state.

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Expectations and Realities of My First Undergraduate Research Experience

Undergraduate research experiences (URE) were traditionally considered an opportunity reserved for students voicing their interest in pursuing subsequent graduate degrees (Dodson et al., 1997; Seymour et al., 2003). Today, URE are common among universities and are valuable to the overall development of undergraduate students-whether interested in advanced degrees or not (Dodson et al., 1997; Seymour et al., 2003, Wimbush and Amstutz, 2011). Prior to participating in undergraduate research, I held several misled opinions toward researchers and Animal Science as a discipline. Subsequently, my opinions changed completely, causing me to feel a bit judgmental and wonder why I had not gotten involved sooner. The goal of telling my story is to help nudge other undergraduates with similar reservations towards participating in a research effort. Although presented with challenges, the time I spent in the laboratory was beneficial in establishing a sense of belonging while at Washington State University (WSU), utilizing the scientific method, and for clarifying an exciting area of physiological research.

Initial Expectations

After a two year integrated ecological agriculture curriculum and attaining a bachelor's degree from a liberal arts university, I entered my second undergraduate degree program in biology at WSU. My goal was to complete prerequisites for physician's assistant school, and previous interests in both medical and veterinary sciences caused me to cross department lines. I enrolled in my first Animal Science course because I thought the class would be interesting; however I did not consider it appealing as a career. I also recall wondering if I would have to modify my wardrobe to include Carhartt's and rubber boots to gain acceptance amongst the "Aggie" students I had seen around campus.

Three times a week I crossed campus into a different "city," and as expected, I felt out of place. My first week was sprinkled with various uncomfortable encounters and students showing me an outsider's welcome. But as time progressed, my rank was promoted from "that stranger" to "he's ok, I have a class with him," I began to feel at ease in my new environment. I discovered that the students were in fact quite pleasant and would often work together in the study lounge to ensure that those having difficulty became successful. I was surprised to see that even at a large university, there was a strong sense of community among students and faculty in the department, and I felt fortunate to become a part of it.

One month after the class began, the professor observed my growing interest in molecular biology. He offered me the opportunity to "hang around" his laboratory and shadow a Ph.D. student working with primary adipocyte culture. The informal invitation left me feeling a bit apprehensive as I had attended general chemistry and biology laboratories but had never been exposed to a professional research environment. I had seen the Ph.D. student in lectures; but had never spoken with him personally, and was intimidated of being evaluated by someone with much more experienced than me. I assumed that he would be arrogant and treat me as an inconvenience which kept me from participating initially. Believing that this experience was important to my future, I overcame my fears of being embarrassed or judged and decided to participate in hopes of taking my education to its next level. When I approached the graduate student, I was surprised to hear that he was excited about the prospect of my involvement in the laboratory. At minimum, I was a new face that presented an outlet for discussion topics other than fat cell metabolism; at most, I could be a prospective predecessor when he returned to his home country of Brazil. My maturity compared to most undergraduates, and non-traditional background facilitated our initial connection and improved my outlook going into the experience.

My First Day

Upon entering the lab, my initial reaction was one of cautious optimism. I was relieved to see familiar equipment around the room, but uneasy in knowing many objects were still foreign and that I was expected to apply classroom knowledge to actual scientific experiments. Following an introduction to the various features of the laboratory and having

had my formal safety lecture, my first tasks included preparing buffers, counting cells and changing media in culture flasks. I was so concerned with making mistakes that I weighed reagents multiple times and asked for approval on every measurement, which took considerable time. Luckily, my inexperience and apprehensions were familiar to my supervising graduate student. He responded by offering tips on working efficiently in the laboratory and stressed the importance of keeping meticulous notes. As the day progressed, I regained my composure and was later praised for my ability to take direction and learn quickly. I remember the excitement of using my laboratory skills acquired earlier in my education for actual scientific research. It felt rather rewarding and increased my desire to return the next day.

As the weeks passed, my fears of contaminating the laboratory or damaging technical (and expensive) equipment dissipated. I also began to gain competency in communicating scientifically by becoming frequently engaged in laboratory activities. As this was a voluntary opportunity, it was up to me to show initiative. I spent many free hours before and after class asking questions in the laboratory, meeting other members of the department and gaining credibility as a member of the research team by being present day to day. Towards the end of my research experience, I was invited to the meat processing facility on campus to assist in acquiring tissue samples from cattle. Actively participating in collecting the samples felt like an affirmation of initiation/nod of approval from my mentor for my commitment and efforts in the lab, and it has left a lasting impression to this day. In addition, my first hand encounters with animals and industry workers disproved negative misconceptions I had previously held about meat production and improved my interest in Animal Science as a career.

Hurdles

Regardless of my studious efforts, I recall routinely leaving the laboratory with more questions than answers. When my supervisor could not provide the answer, I turned to my faculty mentor for insight. Unexpectedly, I was not provided answers outright, rather I was directed to specific journal articles and encouraged to decipher the answers on my own. This was a new technique to me and required expansion beyond my familiar resources. I was startled to learn that there were not definitions in book chapters on the material I was expected to be familiar with, but also excited to be involved with such a fresh area of research. Initially, the literature was overwhelming. Meticulous details and unfamiliar language frequently left me feeling confused and frustrated. Through perseverance, repeated exposure to the literature, and additional clarification from my mentor, I did eventually become comfortable with the dynamic language of muscle biology and lipid metabolism. I must say there is no easy way to become familiar with a large body of information other than to dive in. While in my first weeks, I regularly found myself following literature sources backward to find additional information needed to communicate effectively with the group. However, the research experience facilitated my ability to navigate scientific literature which is a skill I am grateful to have attained. Therefore, I feel it is of great benefit to become accustomed to the literature review process before graduate school, and UREs present that opportunity.

Expectations and Realities

Some students may be under the impression, as I, that working in a laboratory setting is for those who prefer to work independently and avoid social interaction. My experience did not involve any solitary confinement at a fume hood. Instead, it required working collaboratively in a group and utilizing member's diverse backgrounds and skill sets to contribute to the current body of knowledge regarding lipid metabolism. It was a positive environment that was energizing to be around. By participating in undergraduate research, I gained exposure to a professional environment/network, made a few friends, and developed core skills required of all successful scientists.

My mentor and supervising graduate student also provided me with an opportunity for participation in the publication process. As undergraduates are low ranking members of the research team, opportunities for publication are quite rare. However, it is an attainable achievement as undergraduates here in the Animal Sciences department at WSU have made significant contributions to scientific literature. For example, from 1993 – 1997, at least twenty undergraduate students participated in research projects in the muscle biology laboratory, resulting in five scientific publications (Dodson et al., 1997). The ability to be published in one's field of study as an undergraduate is unique, and provides a significant advantage when applying for graduate schools or industry positions. In addition, becoming familiar with the process of revision was worth all the extra hours I spent reading journals and loitering outside of offices waiting to ask questions of my supervisors. I gained access to advantaged information and I am grateful to have been given insight to the challenges graduate students commonly encounter in their first years of research.

Current Perspectives

Undergraduate research experiences allow enthusiastic students access to knowledge and resources customarily reserved for established members of academia. To be successful in research, a student must be self-motivated, willing to become thoroughly familiar with scientific literature and communicate effectively with others in a concise, meaningful way. Therefore, faculty mentors often handpick URE students observed to be capable and enthusiastic because they must donate time outside of class and demonstrate patience by allowing for mistakes and learning to take place (Dodson, 1997; Seymour et al., 2003). Through my research experience, I encountered many challenges but ultimately improved my skills in reading comprehension, communicating scientifically and thinking critically. In addition, I gained a sense of confidence in my abilities as a member of a research team and found a place to belong amongst thousands at a major university. In my opinion, it would greatly benefit anyone with the opportunity to participate in an URE to do so. In addition to the positive results I have experienced, completion of URE has also been reported to result in many tangible benefits such as higher starting salaries (Coco, 2000; Gault et al., 2008), higher job satisfaction (Devine et al., 2007; Gault et al., 2008) and increased job opportunities after graduation (Coco, 2000; Devine et al., 2007). Looking back, I realize that many of my initial expectations about participating in a scientific research setting were unfounded and the reality of being a researcher was more exciting and rewarding than I anticipated.

Conclusion

Through my time spent in the laboratory, I gained competence in basic cell culture techniques and became a contributing member of a research team. In addition, I expanded my opportunities by taking chances and testing my personal boundaries. This required a thick skin, persistence and the ability to be flexible and grow as an individual. Interestingly, I was told these were all qualities of a good researcher on my first day in the laboratory. I developed lasting relationships with faculty members whom I may later call upon for letters of recommendation and whom will forever be an inspiration to me in my future endeavors. I plan to take knowledge and skills from my research experience and apply them to the pursuit of a professional career in health sciences, working to treat disorders such as cancer, metabolic syndrome and obesity. For better or worse, my mentor and supervisor gave me an accurate portrayal of life as a researcher and changed my perspectives about careers in laboratory research settings in a positive way. Although my abilities to think critically, work effectively in a group, and manage time, were tested to their limits, overall my undergraduate research experience was an enjoyable and rewarding journey with benefits that will last a life time.

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Interviews with Farming and Food Systems Experts

To gather additional resource information and broaden the scope of discussion in agroecology and other courses, we have implemented an exercise using interviews with experts outside the classroom. These activities introduce students first hand to farmers, consultants, input suppliers, and others directly involved in the production process, as well as with processors, distributors, marketers and nutritionists in the food system. Each student reports back providing an expanded picture of the farming and food system with perspectives and dimensions that enrich the topics presented and discussed during the lecture sessions. Through the questions posed to people interviewed, students move the content of the course and extend the discussion to a broader audience. The idea of "interview as outreach" is an innovative way to generate discourse in the community about issues related to the future of farming and food systems.

Objectives of the interviews in the community and reports back to class are to 1) expand the breadth of information resources and opinions about current and future food and farming systems, 2) explore new perspectives on content of agroecology or other courses through interactions with people in the community and 3) challenge key people in the farming and food system to think about issues central to future sustainability of the system and the long-term consequences of current practices and systems design.

Methods include: 1) an orientation about the interview process, 2) goals and conduct of interviews, 3) how to take notes or record results, 4) the format and value of a written report of the activity and 4) how this may be reported back to maximize the benefit of the interview for our class learning community. For the farming systems interview, students are urged to explore different opinions about the success of current systems and their limitations, and to ask about how their subjects view potential changes in the future of farming practices and design of systems. Most frequent interviewees include farmers, crop consultants, seed, fertilizer and chemical pesticide sales people, coop elevator managers, organic certifiers, and government officials involved in agriculture, including regulation and support programs. For the food systems interview, we again explore the successes and challenges in current systems, related issues such as nutrition, diet-related illness, and comparative advantages and disadvantages of local and global food systems. Those often chosen for interviews include food processors, wholesale and retail marketers, nutritionists, people involved in institutional food programs, health specialists, and others active in the food system. Students choose 1)who they will interview, 2) set up appointments, 3) conduct the interviews and 4) submit a maximum two-page report on the results. We then spend at least one class period summarizing the interviews and discussing the results. Substantial literature is available on the process of designing, conducting, and summarizing interviews; for example, Kvale and Brinkman (2009).

Outcomes include improved student understanding on practical applications of theory and information discussed in class, an appreciation of the range of opinions of people in farming and in the community about current and future systems. Classroom discussions often transcend those in the syllabus. Additionally, we speculate that an increase in community awareness and discourse about present and future food systems occurs as a result of the interviews.

Presentations in class have resulted in a rich array of facts about current systems, ideas about how they function as well as some of the shortcomings, and perspectives about the future. In farming systems reports, there is generally a satisfaction with current systems, a lack of concern about future resource scarcity, a concern about prices for commodities and the inputs needed to produce them, and a projection of future systems that closely resemble our current practices, rotations, and commodities. The results change to a broader concern about higher level issues and about the sustainability of future systems only if there is an interview with someone outside the mainstream, such as an organic or biodynamic farmer, a diversified crop/livestock farmer, or a vegetable producer who does direct marketing. One exception is a concern about farmer age, and who will inherit the land and farm in the future and topics that come from interviews with both conventional and alternative interviewees.

In food systems interviews, there is a wider range of opinions about current food and systems, the availability and cost of quality food, current diets and related health issues, and potential long-term alternatives. Although there are limited people with innovative opinions about how future food systems will differ from those today, there is a general appreciation that current foods and diets are detrimental to health. Although some favor regulation and government intervention in the marketing of fast food and other prepared foods, there is a general agreement that consumers must make their own decisions from the options available. There is little support for taxation of harmful foods, incentives for a more healthy diet, or

regulation of any kind, although many of the reports include statements on the importance of nutritional education and future informed decisions by consumers. There is a concern about childhood diets, and the current epidemic of obesity and how this can be solved through education and better meals in schools. Budget concerns often come up in discussions about changes in school, hospital, and institutional building cafeterias and food systems. At times, there is discussion of how the university dormitories and cafeterias could provide a healthy model for future consumers.

In summary, the interviews provide an opportunity for students to interact with farming and food specialists outside the classroom, and to bring in ideas to enrich the discussion. Apparently, most of those interviewed support the status quo, although some do question current practices and systems, and provide some alternatives for the future. We speculate that even the process of asking questions about the future will cause some thought and discussion about present systems, and the long-term result will be a broader impact of class topics than is possible with only our internal discussions.

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Submitted by:
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Empowering Volunteers to Find Viable Solutions to Problems

Educators understand the value and importance of mobilizing volunteers to achieve goals beyond what one can do themselves. With proper leadership, an effective volunteer base is a valuable resource for classrooms, clubs, school committees and special interest groups. Keeping volunteers aligned with organizational expectations, philosophies and goals can be a challenge especially when conflict complicates this relationship. Among the challenges of working with volunteers, are solving interpersonal problems and conflict. How do educators empower volunteers to find viable solutions to problems while maintaining the philosophies of their groups?

The ability to solve problems efficiently and effectively is extremely valuable. Positive management of problem situations can retain quality volunteers and increase volunteer ownership of their efforts. Many techniques can be used to manage conflict, but one in particular can be empowering to volunteers, adaptable and easily implemented by educators.

History and Basic Principles of the Solution Focused Therapy

Solution Focused Therapy (SFT) has its roots in clinical social work and was developed by Steve de Shazer (1940-2005), and Insoo Kim Berg (1934-2007) in the 1980's (De Shazer et al., 1986). The approach is goal-driven and focuses on strengths (what is good that is happening) rather than on weaknesses, such as problems (Wallerstedt and Higgins, 2000). While it is primarily utilized by therapists as a tool to guide clients, its foundations can also be easily adapted for use in other disciplines. The process empowers people to take ownership of a situation and outline their own steps in solving the conflict.

The Miracle Question: Probably the most well-known and popular intervention within the solution-focused approach is the miracle question (de Shazer, 1988). The miracle question is a method of framing questions to help a person presenting the problem to envision how the future will be different when the conflict/problem is no longer present. During this process of questions, goals can often be identified. Careful consideration to how the question is framed will help people move away from what the problem is and focus on how to begin solving the issue. For example:

"If you woke up tomorrow, and a miracle happened so that you no longer felt your club officers do not follow through with their responsibilities, what would you see differently? What would the first signs be that a change has occurred within the club? What would members be doing differently in the club?" "What would you be doing differently?"

The use of this question reframes the problem into positive discussion. Beyond that, the educator has engaged the member to identify, on their own, what changes need to occur to begin to move the club into effectiveness.

Scaling Questions: Scaling questions can be used to identify useful differences for volunteers and may help to establish goals as well. Scaling questions also can help people incrementally set their own goals. When these questions are framed by educators, they enable people to focus on steps that can eventually lead to larger, overall change. Typically, a range from "the worst the problem has ever been" (zero or one) to "the best things could ever possibly be" (ten) is used. The person presenting the problem is asked to rate their current position on the scale, and questions are

then used to help the person identify resources. For example: *"What's stopping our club meetings from slipping one point lower down the scale?"*

Scaling questions that seek exceptions to the problem may be framed like this:

"On a day when our club meeting is one point higher on the scale, what would tell you that it was a 'one point higher' meeting?"

Scaling questions that describe a preferred future may be framed like this:

"Where on the scale would be good enough? What would a club meeting at that point on the scale look like?"

Exception Seeking Questions The objective of this strategy is to refocus the person to search for times when the problem is less severe or absent. Exception seeking questions help people self-identify what has worked in the past and can be used to encourage clientele to repeat such behaviors. Simply asking the person to outline a time when the problem did not exist and then encourage them to describe what different circumstances existed in that case can expose significant behavioral changes that can be tried to resolve the issue.

For example: *"I understand you and Mary are having challenges working together on our committee. You and Mary have been serving for many years together. Can you think of times when you worked well together? Describe how that worked for you? When the problem did not exist, what were you doing then?"*

Discussion

At some point or another, the business of working with people will lend itself to mediating difficult interpersonal situations. Finding the right tools to solve these problems is of critical importance to a volunteer group's overall positive presence in communities. Generally, people have preconceived ideas of how things should work and when they do not take place in such a way, a problem occurs. Many of us have the propensity to focus on the problem and highlight what went wrong. One of the biggest hurdles initially in solving problems is repositioning focus from reliving the issue to thinking about steps that can be taken to solve the problem. By utilizing these solution focused techniques outlined above, educators can transition difficult problems into solutions efficiently.

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Engaging the Online Learner: Activities and Resources for Creative Instruction, Updated Edition

By R. Conrad and J.A. Donaldson. 2011. San Francisco, CA: Jossey-Bass. 160 pages, $29.00, ISBN: 978-1-1180-1819-4

The new edition begins with a chapter explaining engaged learning and providing an explanation of the four phases that move students from the role of "Newcomer" through "Cooperator" and "Collaborator" to "Initiator/Partner." Likewise, instructors move from "Social Negotiator" through "Structural Engineer" and "Facilitator" to "Community Member/Challenger." Essentially, you "teach" students how to be engaged learners and to gradually build community and take more responsibility for their own and their peers' learning environment This framework is prescriptive enough that the authors recommend at least one activity for each phase regardless of how well students are already oriented toward the course, learning online, or each other.

In Part One: Constructing Activities to Engage Online Learners, Chapter 2 talks about designing online environments and Chapter 3 offers a brief explanation of what to consider in assessing engaged learning and then some examples of team assessments, self-assessments, and discussion rubrics that, unfortunately, contain few new ideas. Chapter 4 offers activities to help students learn to use online tools, i.e., a skills survey, a scavenger hunt, and a syllabus quiz; all useful ideas for teaching students new to the online learning environment

The rest of the book is Part Two: Activities to Engage Online Learners and each chapter provides a page or two of introduction to a type of activity and then a group of example activities ranging from icebreakers to learner-led activities. As might be expected, some of the activities are widely usable while others are more discipline-specific and might be difficult to transfer to other content areas.

Chapter 5 offers some good ideas for effective icebreakers such as "lineup," where students score themselves on five statements about hobbies (reading, sports etc.) and the content of the course and then look for someone with the score that most closely matches their own (I'm assuming on all five statements rather than each statement or a total although that is not clear from the directions). This seems a unique way to help students make connections.

Chapter 6 offers an overly simplistic view of dyad and team possibilities. There are really no truly collaborative activities, i.e., tasks where students must reach agreement on a single answer or plan except the "Medieval Shield" and it is still a compilation of images. More activities that require interaction, critical analysis, and/or reaching consensus would be more engaging than the critique or respond to each others' work type of activities provided. The new edition does contain useful information on factors to consider in assigning groups.

Chapters 7 and 8 have some interesting and creative reflective and "authentic" activities. For instance, creating a bumper sticker to sum up your learning in a class could be fun. Likewise, interviewing a professional about his/her job, responsibilities, and transition from the beginning of his/her career to this position should be helpful for students. I particularly like the "Social Responsibility" group activity to create potential solutions for an actual community problem.

Chapter 9 does a good job of defining games as includes tasks that provide an element of engagement, decision making and knowledge acquisition from a new perspective" and simulations that "explore and replicate real-life situations" (Chapter 9, paragraph. 2). However, there are only three simulations offered and two are discipline-specific but offer templates that could be adapted to other content areas.

Finally, Chapter 10: Learner led Activities does a good job of listing the steps for creating and implementing learner led activities and provides some good examples of activities that students have created. It might have been more useful to have the assignment directions that the examples came from rather than the work the students created.

All in all, the book provides very brief information about each type of activity. If you are looking for in-depth guidelines about creating simulations or games or using dyads and groups in the online environment, look elsewhere. If you are looking for some simple examples, this is a solid resource. Some of the examples are fairly common but others are creative and could certainly provide a foundation for some interesting assignments.

The primary difference between the 2004 and the 2011 editions is, disappointingly, a few updated references, a few paragraphs nodding toward new technologies (i.e., Skype) and blended courses, and some added Author's Notes about the activities which offer alternative ways to use them. There is no substantial difference in content, no new types of activities or chapters, and only one new activity, a survey about readiness for learning online. If you are using many of the activities from the 2004 edition and want to consider alternatives, the Author's Notes could be useful. Otherwise, the 2004 edition is roughly equivalent to the 2011 edition unless you want to read it on your iPad - only the 2011 edition is available as an eBook

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Teaching Naked: How Moving Technology Out of Your College Classroom Will Improve Student Learning

By Jose Antonio Bowen. 2012. San Francisco, CA: Jossey-Bass. 352 pages, $36.00, ISBN: 978-1-1181-1035-5

Introducing a new way to think about higher education, learning, and technology that prioritizes the benefits of the human dimension. José Bowen recognizes that technology is profoundly changing education and that if students are going to continue to pay enormous sums for campus classes, colleges will need to provide more than what can be found online and maximize "naked" face-to-face contact with faculty. Here, he illustrates how technology is most powerfully used outside the classroom, and, when used effectively, how it can ensure that students arrive to class more prepared for meaningful interaction with faculty. Bowen offers practical advice for faculty and administrators on how to engage students with new technology while restructuring classes into more active learning environments.

Reviews:

"This is an important book. Everyone who is concerned about the future of higher education should read it. In a highly readable and lively style, Bowen makes the most intelligent argument I've encountered about how we should think about teaching and learning and emerging technologies. It is also a powerful guide to more effective teaching and deeper learning."

—Ken Bain, provost and vice president for Academic Affairs and professor of history and urban education, University of the District of Columbia.

"Teaching Naked is a persuasive proposal for using technology outside the classroom to free up time inside the classroom for more meaningful student-faculty interaction. Insightful and provocative, it is filled with practical advice for teachers, administrators, and institutions on how to navigate the revolutionary present in order to remain relevant for the future."

—Elizabeth Barkley, professor of music, Foothill College

"This is one of the most exciting books I have read in a long time. I could not stop sharing quotes from it with my wife, also an educator, while reading it. It provides incredible insight and foresight in a fresh and bold analysis of what we could be doing and should be doing with technology in higher education."

—L. Dee Fink, author

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The Innovative University: Changing the DNA of Higher Education from the Inside Out

By Clayton M. Christensen and Henry J. Eyring. 2011. San Francisco, CA: Jossey-Bass. 512 pages, $33.00, ISBN: 978-1-1180-6348-4

The *Innovative University* illustrates how higher education can respond to the forces of disruptive innovation , and offers a nuanced and hopeful analysis of where the traditional university and its traditions have come from and how it needs to change for the future. Through an examination of Harvard and BYU-Idaho as well as other stories of innovation in higher education the authors decipher how universities can find innovative, less costly ways of performing their uniquely valuable functions.

The book offers new ways forward to deal with curriculum, faculty issues, enrollment, retention, graduation rates, campus facility usage, and a host of other urgent issues in higher education

It discusses a strategic model to ensure economic vitality at the traditional university, and contains novel insights into the kind of change that is necessary to move institutions of higher education forward in innovative ways

This book uncovers how the traditional university survives by breaking with tradition, but thrives by building on what it's done best.

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