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NACTA Journal

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

## Contents

# Use of Required Information and Communication Technology Tasks in Undergraduate Agriculture Courses

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## Abstract

Faculty members *(n = 63)* in a college of agriculture were surveyed to determine the information and communication technology (ICT) tasks they required students to complete in identified courses during the fall 2009 semester. A mean of 8.46 *(SD = 6.20)* tasks were required per course. The six tasks required in more than one-half of all courses were: receive email (80.7%), send email (73.7%), search the Internet (64.9%), send email attachments (57.9%), use Blackboard® (54.4%), and type a lab or project report (52.6%). Of 40 specific tasks, 19 were required in less than 10% of all courses. The least frequently required tasks included: program a database (0%), create an Excel® pivot table (1.8%), create a spreadsheet macro (1.8%), use file transfer software (1.8%), and create a web page (3.5%). There were significant *(P < .05)*, positive correlations between faculty members' self-perceived computer competency and the number of spreadsheet tasks required and between course level and the number of word processing, spreadsheet, computer graphics, miscellaneous, and total ICT tasks. A majority of faculty members planned to maintain their current level of required ICT use. Most undergraduate agriculture courses require a core of basic ICT tasks, but few intermediate or high-level tasks.

## Introduction

Proficiency with information and communication technology (ICT) is a requirement for success in most well-paying careers (Grant et al., 2009; Levy and Murnane, 2004; Stone and Madigan, 2007). Bresnahan et al. (2002) found that ICT has played a large and widespread role in shifting relative wages among those in the top, middle, and bottom of the U.S. income distribution since 1980, with higher pay going to those with greater ICT skill levels. Most college of agriculture graduates will need ICT skills to enter and advance in their careers (Graham, 2001).

Many in higher education believe that students enter college already proficient in ICT use (Kaminski et al., 2009). However research (Grant et al., 2009; and Kaminski et al., 2009; Leonard and Patterson, 2004; Tesch et al., 2006; and Wallace and Clariana, 2005) does not support this belief. These researchers have found that, while students perceived themselves to be ICT literate, most could not successfully complete fairly basic ICT tasks. Ratliff (2009) posited that many students have the 'wrong' type of ICT skills for academic purposes. According to Ratliff, "Students may be experts with chatting, Twittering, or social networking, but be inexperienced in attaching a document to an email or creating an essay with word processing software" (p. 1). Tesch et al. (2006) found that 10% or fewer entering business students at Xavier University could correctly use absolute cell addresses in Excel® or properly insert a clip art image into a Word® document.

Students at Northwest Missouri State University scored a mean of 53% correct on a basic competency assessment designed to allow them to test out of a required ICT literacy course (Hardy et al., 2006). Of 164 students completing the exam, only three students (1.8%) achieved a score of 80% or higher and were able to test out of the course. The researchers concluded that "a majority of the students have not mastered computer concepts, word processing skills, spreadsheet skills, presentation skills, or database skills" (p. 59). Johnson and Wardlow (2004) found that entering agriculture students at the University of Arkansas had fairly low levels of ICT knowledge and cautioned faculty not to assume that entering students possessed basic ICT skills.

The lack of ICT knowledge and skills is not limited to entering college students. Shrestha (2009) found that while graduating seniors in the College of Agriculture and Natural Resources at Michigan State University believed their academic majors had helped them develop the technical skills required in their anticipated careers, they felt their programs had not been very effective in developing their ICT skills. Kuth and Vesper (2001) studied 125,000 graduates from 205 institutions and concluded that students making larger gains in ICT skills during college scored higher on each of 27 academic and social outcome measures when controlling for socioeconomic status. Based on these results, Kuth and Vesper (2001) recommended that all entering

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students become proficient in ICT early in their college careers and that universities examine how students use computers in their courses.

The purpose of this study was to examine the ICT tasks required in undergraduate agriculture courses at a mid-South land-grant university during the fall 2009 semester. Specific objectives were to:

1. Determine the number and type of unique ICT tasks required in undergraduate agriculture courses;

2. Determine the relationship between course and instructor characteristics and the number of unique ICT tasks required in undergraduate agriculture courses; and

3. Determine instructors' plans for required student ICT use in undergraduate agriculture courses over the next two to three years.

## Methods

The population consisted of all undergraduate agriculture lecture courses *(N = 84)* taught at the [University] during the fall 2009 semester. Courses were identified using official records supplied by the dean's office. Sixty-four courses and their instructors were selected for the study using a two-step process. First, all courses taught by faculty members *(n =48)* teaching only one course in fall 2009 were selected for inclusion. Next, one course was randomly selected for each faculty member *(n = 16)* teaching two or more courses in fall 2009. Courses were selected in this manner so that the researchers could focus each respondent on one specific, identified course (rather than a generic or composite course) and still avoid asking faculty members to complete multiple surveys. Usable surveys were received from 57 faculty members for a response rate of 89%.

An emailed cover letter invited faculty to participate, identified the specific course for which responses were sought, and contained a hyperlink for accessing the survey. In order to reinforce that respondents were to base their responses on the ICT tasks required of students in the specified course, the first survey item asked respondents to list the course code and number of the course for which they were responding as identified in the email cover letter.

Data were collected using a three-part on-line survey. In Part One respondents indicated whether or not students enrolled in the selected course were required to complete each of 40 ICT tasks, grouped into seven areas, by selecting either a "Yes" or "No" response for each task. In addition to the specific tasks listed, each area of ICT use also contained an "Other (please specify):" response option. In Part Two, the respondents were asked to indicate their plans for required student ICT use in the course over the next two to three years. This section listed seven areas of computer use with the response options of "Decrease use," Maintain current use," or "Increase use." Part Three contained four items concerning the respondents' academic rank, teaching experience and appointment, and self-perceived level of ICT skills.

A panel of nine faculty members (one from each department in the college) examined the instrument and judged it to possess face and content validity. Five faculty members at two different land-grant universities completed paper versions of the instrument (at two to seven week intervals) to determine instrument stability. Part One had a test-retest agreement percentage of 95% and Part Two had a test-retest agreement percentage of 86%. The reliability of Part Three was not assessed since, according to Salant and Dillman (1994), "responses to non-sensitive demographic items are "subject to very little measurement error" (p. 87).

The survey data were analyzed using descriptive statistics (means, standard deviations, and percentages) and bivariate correlations. An alpha level of 0.05 was established a priori for all tests of statistical significance. SAS 9.2 statistical software (SAS Institute, 2008) was used for data analysis.

## Results

Responses were received from faculty teaching courses in all nine academic departments in the college. The largest percentage of courses were at the junior level (40.4%), followed by courses at the senior (31.6%), freshmen (15.8%), and sophomore (12.3%) levels. This distribution of courses closely parallels the percentage of courses offered in fall 2009: junior (35.4%), senior (31.7%), freshmen (19.5%), and sophomore (13.4%). The typical faculty respondent held the rank of professor (61.2%), had 10 or more years of university teaching experience (69.4%), held a teaching appointment of 33% or less (67.4%), and rated their own ICT skills as average when compared to other faculty (65.3%).

**Table 1. Required use of ICT Tasks in Undergraduate Agriculture Courses (n=57), by Area**

| ICT area | Mean | SD |
|---|---|---|
| Internet | 2.47 | 1.89 |
| E-mail | 2.23 | 1.27 |
| Spreadsheets | 1.42 | 2.50 |
| Word processing | 1.07 | 1.12 |
| Computer graphics | 0.53 | 0.78 |
| Miscellaneous tasks | 0.42 | 0.71 |
| Databases | 0.14 | 0.52 |

The faculty respondents reported that a mean of 8.46 ($SD$ = 6.20) different ICT tasks were required in undergraduate agriculture courses in fall 2009. The largest mean number of tasks were from the Internet ($M$ = 2.47; SD = 2.50) and email ($M$ = 2.23; $SD$ = 1.27) areas, while the fewest were from the database ($M$ = 0.14; $SD$ = 0.52) and miscellaneous tasks ($M$ = 0.42; $SD$ = 0.71) areas (Table 1).

Over 50% of courses required one or more Internet, email, and word processing tasks; less than 50% of courses required any computer graphics, spreadsheet, miscellaneous, or database tasks. The six tasks required in 50% or more of all courses were receive email (80.7%), send email (73.7%), search the Internet (64.9%), submit course assignments as attached email files (57.9%), use Blackboard® to acquire course information (54.4%), and type a lab or project report (52.6%). Of the 40 specified ICT tasks, 27 were required in less than 25% of courses, while 19 were required in less than 10% of courses. Less than 15% of courses required students to use course listserves (10.5%), threaded discussion groups (10.5%), or Internet-based communications such as Facebook©, wikis, or blogs (12.3%) to participate in course activities or discussions. The least frequently required tasks were database programming (0.0%), use of file transfer software (1.8%), use of financial management software (1.8%), creating PivotTables (1.8%), creating spreadsheet macros (1.8%), or preparing a brochure or newsletter using layout software (1.8%) (Table 2).

There was no significant ($P > 0.05$) relationship between faculty rank, years of teaching experience, or FTE teaching and the total number of required ICT tasks. There was a significant ($P < .0.05$) positive correlation ($r$ = .32) between self-perceived computer skills and the number of spreadsheet tasks required. Course level had a significant ($P < 0.05$) positive correlation with the number of word processing ($r$ = .34), spreadsheet ($r$ = .46), computer graphics ($r$ = .36), miscellaneous ($r$ = .33), and total ($r$ = .35) computer tasks required.

Faculty members were asked about their plans for required ICT use in the specified courses over the next two to three years (Table 3). (Note: respondents were not asked about their plans for miscellaneous tasks.) More than 60% of respondents planned to maintain their current level of required use in each ICT area. Fewer than 5% of faculty intended to decrease required student use of any ICT area. More than 25% of faculty intended to increase required use of computer graphics (29.2%), spreadsheets (32.6%), and the Internet (36.0%) over the next two to three years.

**Table 2. Specific ICT Tasks Required in Undergraduate Agriculture Courses *(n=57)***

| Task | Required % | Not required % |
|---|---|---|
| **Electronic mail** | **84.2** | **15.8** |
| Receive electronic mail *from* you | 80.7 | 19.3 |
| Send electronic mail *to* you | 73.7 | 26.3 |
| Submit course assignments as "attached files" | 57.9 | 42.1 |
| Participate in an e-mail course discussion group or listserve | 10.5 | 89.5 |
| Other e-mail task(s) | 0.00 | 100.0 |
| **Internet** | **79.0** | **21.0** |
| Search the Internet for information on a specific topic | 64.9 | 35.1 |
| Utilize Blackboard to acquire course information. | 54.4 | 45.6 |
| Download data to disk or hard-drive from the Internet | 40.4 | 59.6 |
| Access a *homepage* developed for your course | 31.6 | 68.4 |
| Utilize Blackboard to submit assignments. | 14.0 | 86.0 |
| Utilize Internet-based communications to contact you (for example, instant messages, Facebook, Wiki, Blog) | 12.3 | 87.7 |
| Participate in a "threaded discussion group" for your class | 10.5 | 89.5 |
| Download freeware | 8.8 | 91.2 |
| Create a web page | 3.5 | 96.5 |
| Other Internet task(s) | 7.0 | 93.0 |
| **Word processing** | **57.9** | **42.1** |
| Type a lab or project report | 52.6 | 47.4 |
| Type a formal research paper | 28.1 | 71.9 |
| Type a business letter | 8.8 | 91.2 |
| Prepare a brochure or newsletter | 3.5 | 92.5 |
| Other word processing task(s) | 14.0 | 86.0 |

**Table 2. Continued**

| | | |
|---|---|---|
| **Computer graphics** | **38.6** | **61.4** |
| Create materials using presentation graphics software | 33.3 | 66.7 |
| Make drawings using computer-assisted drafting program | 8.8 | 91.2 |
| Create visual illustrations using graphic-design programs (for example, Adobe Illustrator, Adobe Photoshop, etc.) | 8.8 | 91.2 |
| Prepare a brochure or newsletter using layout program (for example, Adobe In-Design) | 1.8 | 98.2 |
| Other computer graphics task(s) | 0.0 | 100.0 |
| **Spreadsheet** | **33.3** | **66.7** |
| Enter data into an existing spreadsheet | 29.8 | 70.2 |
| Create charts and/or graphs using a spreadsheet | 22.8 | 77.2 |
| Create a new spreadsheet | 21.0 | 79.0 |
| Write a spreadsheet formula that performs a single mathematical operation | 19.3 | 80.7 |
| Use spreadsheet functions (e.g. IF, MAX, MIN, etc.) | 17.5 | 82.5 |
| Write a single spreadsheet formula that performs a series of mathematical operations | 15.8 | 84.2 |
| Use spreadsheet database functions (e.g. sort, query) | 8.8 | 91.2 |
| Create a spreadsheet macro | 1.8 | 98.2 |
| Create PivotTables | 1.8 | 98.2 |
| Other task(s) | 3.5 | 96.5 |
| **Miscellaneous** | **33.3** | **66.7** |
| Conduct a literature search using Agricola, ERIC, FirstSearch or similar database | 28.1 | 71.9 |
| Use specialized applications | 17.5 | 82.5 |
| Write a computer program | 3.5 | 96.5 |
| Transfer files from a personal computer to a mainframe computer (or vice versa) using file transfer software (for example, Telnet or SshClient) | 1.8 | 98.2 |
| Use a financial management program such as Quicken | 1.8 | 98.2 |
| Other miscellaneous task(s) | 0.0 | 100.0 |
| **Database** | **8.8** | **91.2** |
| Enter data into an existing database | 3.5 | 96.5 |
| Create a new database | 3.5 | 96.5 |
| Sort and/or query a database | 3.5 | 96.5 |
| Create a database report | 3.5 | 96.5 |
| Do database programming | 0.0 | 100.0 |
| Other database task(s) | 0.0 | 100.0 |

## Discussion and Implications

The typical undergraduate agriculture course at this university required students to complete a mean of 8.46 ICT tasks in fall 2009, with six specific tasks being required in 50% or more of all courses. These six tasks were receive email, send email, search the Internet, submit course assignments as attached email files, use Black board® to acquire course information, and type a lab or project report. Less than one-half of courses required students to complete any tasks related to spreadsheets, computer graphics, miscellaneous use, or databases. By and large, students were not required to complete ICT tasks designed to extend class discussion and participation beyond the classroom, such as use of course listserves, discussion groups, or wikis, blogs, and Facebook©. Undergraduate agriculture courses at this mid-south land-grant university tended to require limited student ICT use with most required tasks being drawn from a narrow range of fairly low-level ICT skills.

Faculty rank, teaching experience, and FTE teaching assignment were not significantly ($P > .05$) related to the number of ICT tasks required, either overall or by ICT task area. Self-perceived ICT competency had a significant ($P < .05$) positive correlation with the number of spreadsheet tasks required. Course level had a significant ($P < .05$) positive correlation with the number of word processing, spreadsheet, computer graphics, miscellaneous, and total ICT tasks required. Thus course level, as opposed to instructor characteristics, appears to be the best predictor of required student ICT use. While required ICT tasks did tend to increase in upper-level courses, the question arises as to whether overall and specialized ICT use requirements are sufficient to prepare graduates for effective ICT use in their careers (Graham, 2001). Further research in this area is needed.

Table 3. Instructors' Plans for Required ICT Tasks over the Next Two to Three Years

| ICT area | Decrease use % | Maintain use % | Increase use % |
|---|---|---|---|
| Word processing | 0.0 | 77.6 | 22.4 |
| E-mail | 0.0 | 82.0 | 18.0 |
| Internet | 2.0 | 62.0 | 36.0 |
| Spreadsheets | 4.1 | 63.3 | 32.6 |
| Databases | 2.1 | 85.4 | 12.5 |
| Computer graphics | 0.0 | 70.8 | 29.2 |

By and large, faculty members planned to maintain their current levels of required ICT use in these courses over the next two to three years. Few faculty members planned to decrease use in any ICT area, while moderate increases were anticipated in each area. Thus, in the near term, future required student use of ICT is likely to increase at a fairly slow rate. Opportunities for faculty development should be provided in areas of ICT interest where competencies and skills are lacking in an effort to increase adoption of course-relevant ICT tasks.

Findings from this study support the need for [University] administrators and faculty to value and implement ICT skill development beyond the basics. Research indicates that students are entering college with ICT skills most suited for social networking (Ratliff, 2009). If agriculture students are to gain the level of ICT proficiency desired by graduates (Shrestha, 2009) and employers (Graham, 2001), it seems reasonable that students must first learn these skills and then be required to practice their use in appropriate courses throughout their undergraduate careers (Kuth and Vesper, 2001).

In previous years, college goals at the University of Arkansas have focused on increasing the development and use of ICT skills in the classroom. Although it is not feasible or necessary to include every outlined skill in university curriculum, it is critical for administrators and faculty to understand the educational and workplace value of ICT skills. Nationally, institutions should ensure / enact policy regarding teacher competencies in ICT. ICT skills of importance and value should be integrated into course syllabi in an effort to create successful outcomes in teaching and learning that are content specific. Additionally, information and communication technology should be selected based on learning strategies and resources needed as necessary for the course.

While all instructors should be encouraged and assisted in integrating appropriate ICT requirements into their courses, required "ICT intensive" courses should be developed at either the department or college level. Assignments in these courses should be designed to require a variety of higher-level ICT tasks appropriate for the subject matter. The details of this or similar plans should be determined by the faculty, possibly through an ad hoc committee established for this purpose or by the college curriculum committee.

Finally, given the importance of ICT to career success (Graham, 2001) and graduating seniors' perceptions concerning inadequate ICT skills (Shrestha, 2009), other agriculture colleges and departments should examine required student ICT use in their courses. Information from such studies should prove useful in designing appropriate educational experiences to prepare graduates for career entry and advancement.

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# An Ornamental Summer Program for High School Students: Issues and Perspectives[1]

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## Abstract

Potential students who would otherwise be averse to majoring in agriculture, yet who embrace the opportunities available in horticulture industries, should be recruited to this agricultural field. However, they are unaware that ornamental horticulture and related areas, including turf and landscape design, are indeed, agriculture. It is important to provide learning opportunities to increase student's awareness of agriculture so they can make unbiased decisions and enter careers in the field. Therefore, residential ornamental summer internships were conducted in 2005-2007 for select Delmarva Peninsula high school students. Thirty-five high school students from 16 high schools on the Eastern Shore, the Western Shore, and neighboring states participated in the two-week program, where they learned about landscape design, propagation, turf, floral design, horticulture therapy, tissue culture, water quality, geospatial information systems, and horticulture careers. All students reported that they gained new knowledge and interest in the above areas, and demonstrated the gain in knowledge on tests they completed. They agreed that the program increased their desire for a career in ornamental horticulture. Fifty-six percent indicated that they will consider a career in agriculture or ornamental horticulture. Students agreed that they learned much from the program, including new skills, techniques, and ideas.

## Introduction

According to ongoing reports, American youth lack agricultural knowledge and literacy while at the same time they have several misconceptions about agriculture (Fields et al., 2003; Myers et al., 2004; Overbay and Broyles, 2008). Influenced by factors such as negative perceptions, the pervasive biases of some sectors of society, career opportunities, and influential individuals, many of these students, particularly minorities, equate agriculture and horticulture with negative images of post slavery share cropping (Bradley et. al, 2000, Fields et. al., 2003, Myers, 2004, Pieter et al., 2004). According to Gilmore's (2006) citing of the study of J. A. Gonzales, 2006, 41% of high school students have a misconception or image issue with agricultural sciences, 33% lack knowledge of employment opportunities, and 22% are unaware of fields of study within Food Agriculture Natural Resources and Related Sciences. Among students the overwhelming perception is that agriculture is farming, which is viewed as boring, stressful, and hard physical labor with low pay (Holzj-Clause and Jost, 1995; Talbert et al., 1999; Overbay and Broyles, 2008). Consequently, some youth avoid studying agriculture or related disciplines when they select their college major and miss the opportunity to have a career in this field. For example, Bradley et al., (2000) reported no minority enrollment in their study of selected horticulture departments and that most of the enrolled students made the decision to major in horticulture while in high school or by the sophomore year in college. Furthermore, the report of Jones and Larke (2003) noted that many students of color did not decide to enroll in an agriculture related class or pursue an agriculture-related career until college, further evidence of the need for more agricultural awareness for K-12 youth.

Youth's aversion to agriculture and horticulture pose a challenge for the workforce since this limits the number of agriculture- prepared graduates to meet workforce needs. Indeed, the 2009 report of the Association of Public and Land Grant Universities (APLU) noted a widening gap between the number of agricultural job vacancies and the number of graduates needed to fill them. In concurrence that the lack of agriculture literacy and agricultural interest among youth must be addressed, some proponents in higher education have now issued the call to support more integration or augmentation of K-12 curriculum through different types of agricultural programs (APLU, 2009).

While there are ways such as vocational agriculture programs like 4-H and FFA, by which the agriculture curricula of K-12 students have been supplemented during the school year, other modes such as short summer programs have also caused gains in agriculture knowledge for students and increased interest in agriculture as evidenced by the work of Cotton et al., 2009, Galbraith et al., 2003, and Russell, 1993. Furthermore, researchers who studied student enrollment suggested that mentoring, teaching, and enhanced interactions with leaders in the career field could have a major impact on these students at the college level (Jones and Larke, 2003).

Experiential activities can be effective in stu-

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dents' learning, by enabling them to understand and make connections with the different disciplines. Since high school students fail to see the inherent multidisciplinary nature of agriculture as not only production and marketing, but also as the science of the disciplines, we believe that the use of learning techniques, such as field trips and hands-on laboratories, will enable them to better understand ornamental horticulture and related disciplines. Herein, ornamental horticulture is defined as the production, marketing, and scientific nature of plant and plant products for aesthetics, and recreational value. Moreover, the value of hands-on experience in supporting the experiential learning of students has been well established (Knobloch's 2003, Powell et al., 2009; Retallick and Steiner, 2009). Ornamental horticulture, along with floriculture, comprises the United States Green Industry, one of the fastest growing sectors in crop- related agriculture. This industry has an average annual growth rate of 9% (Johnson and Johnson, 1993) and represents nearly 10% of all crop agriculture. For greenhouse and nursery crops, the total wholesale receipts continue to rise and were $15.7 billion in 2004 (McCarron, 2005). A similar trend is evident on Maryland's Eastern Shore, home to the University of Maryland Eastern Shore (UMES), where this internship was conducted. Therefore the objective of this program was to provide experiential opportunities for high school students to learn about selected areas of ornamental horticulture and to determine the effects on their agricultural literacy and interest.

## Methods

### *Program Participants and Activities*

Through the team efforts of a program facilitator, faculty, and agriculture ambassadors, a two-week ornamental horticulture summer program for high school students was conducted during the summers of 2005, 2006, and 2007. Financial support was provided by a USDA teaching capacity grant. These funds supported room and board, and a $400.00 stipend for each high school intern; salaries for program coordinator, and college students who worked as dorm assistants; and other related program costs. Students were recruited from 16 high schools on the Delmarva Peninsula and neighboring states. In the 2006 group, with the exception of eight, who were also participating in an Upward Bound day program on the campus, all students lived on campus. During the spring of each of the camp years, the implementation committee developed letters, application forms, and flyers and sent them out to several high schools. The selection criteria were an essay explaining why the student was interested in the internship and what he or she would like to gain from it, two letters of recommendation from a faculty member or administrator at their school, a resume, an official transcript, and a list of their interests/hobbies. Based on the program selection criteria, a total of 35 students (Table 1) were selected and participated in the program during this period. The breakout of participants by year was 8, 18, and 9 for years 2005, 2006, and 2007, respectively. Over the two-week period, students were engaged in various activities to enlighten them about ornamental horticulture while experiencing campus life. These activities included field trips to a nursery, golf course, botanical garden; talks with/by professionals; exploration of job opportunities; discussions of careers in agriculture, horticulture, and ornamental horticulture; and hands-on laboratory activities in landscape design, plant propagation, turf, floral design, horticulture therapy, tissue culture, water quality, and geographic information systems. Based on the nature of the topic areas and the available times for some of the activities, the length and frequency of the sessions and overall student exposure to the hands-on laboratory activities for each area averaged six hours, with landscape design exposure the longest, at 13 hours. The exposure to field trips was 15 hours for each internship session and included nurseries, a flower shop, Longwood Botanical Gardens, the National Arboretum, a golf course, and a greenhouse. Most of the academic sessions were taught by UMES faculty. A commercial horticulturalist, floral designer, golf course manager, and nursery manager also taught some sessions.

**Table 1. High school Student Demographics in the Ornamental Summer Internship Combined over 2005, 2006, and 2007 (n=35)**

| Characteristic | Frequency/Value |
|---|---|
| **Gender** | |
| Male | 10 (29%) |
| Female | 25 (71%) |
| | |
| **Race** | |
| African American | 21 (60%) |
| Caucasian | 12 (34) |
| Asian | 1 (3%) |
| Hispanic | 1 (3%) |
| | |
| **Classification** | |
| Freshman | 8 (23%) |
| Sophomore | 12 (34%) |
| Junior | 11 (31.5%) |
| Senior | 4 (11.5%) |
| | |
| **Average GPA** | 3.3 |

### *Student's Agricultural Literacy and Interest*

Agricultural literacy was determined using two components: the student's actual knowledge and the student's perception of their gain in knowledge and interest in the topic areas. Each student's knowledge of the topic areas was assessed. For the 2005 and 2006

sessions, students completed short descriptions of each of the eight hands-on topic areas covered in the program. In the 2007 session, they completed a pre- and post-test of some of the hands-on subjects covered in the program and answered three open-ended questions to demonstrate their understanding of agriculture and related horticulture disciplinary areas. The pre-test was administered at the beginning of the first session of the program; the post-test was completed during the last class session of the program. The pre- and post-tests for the hands-on topics were graded as correct or incorrect. The pre- and post-test given to assess the student's thoughts of the disciplinary areas included three tasks: to describe what came to mind when they heard the term "agriculture," to describe what came to mind when they heard the term "horticulture," and to describe what came to mind when they heard the term "ornamental horticulture." These responses were categorized into two groups: those pertaining to the production of a commodity and those pertaining to the science, production, and marketing of a commodity.

Each student's perceptions were determined for each year of the program. They completed surveys on their perceived knowledge and interest about the topics covered, satisfaction with the program, suggestions for the program, and their inclinations for a career in agriculture or ornamental horticulture. Their knowledge and interest about the topics covered were assessed using a Likert scale of 1-5, where 1 = none, 2 = little, 3 = some, 4 = much, and 5 = excessive. Overall information on the program was also determined using the Likert scale of 1-5, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. This study was deemed exempt by the University of Maryland Eastern Shore Institutional Review Board.

## Data Analysis

Data were analyzed using SPSS Statistics 17.0.

## Results and Discussions

### *Program Participants and Activities*

The demographics of the high school participants included mostly females (71%) due to the limited number of male applicants (Table 1). A similar trend for a lower percentage of male participants was also reported for the summer high school program of Overbay and Broyles (2008). Our students were primarily African American (60%) and Caucasian (34%) as well as sophomores, juniors, freshman, and seniors, who had an overall GPA of 3.3. The high percentage of African Americans students attracted to this summer program is in sharp contrast to the much smaller percent enrolled nationally in agricultural degree programs, which have predominantly Caucasians. We believe this is influenced by our university's historic mission and ability to attract African American students, to its programs, which have 75% black enrollment. Each year the residential students were exposed to campus life as they experienced the ornamental program activities, which were done Monday-Friday of each week. Using laboratory exercises, field trips, presentations by guest experts, and their own presentations on their experiences at the culmination of each internship, students gained knowledge of ornamental horticulture, horticulture, agriculture, and the following eight related topics: landscape design, propagation, turf, floral design, horticulture therapy, tissue culture, water quality, and geographic information systems.

**Table 2. Percent of Students Knowledgeable about Selected Topics Before and After Ornamental Program**

| Topic | 2005 Post-test | 2006 Post-test | 2007 Pre-test | 2007 Post- Test |
|---|---|---|---|---|
| Landscape Design | 100 | 100 | 88.9 | 88.9 |
| Plant Propagation | 100 | 100 | 33.3 | 100 |
| Turf | 100 | 100 | 66.7 | 77.8 |
| Floral design | 100 | 100 | 77.8 | 100 |
| Hort Therapy | 100 | 100 | [z]ND | ND |
| Tissue Culture | 100 | 100 | 22.2 | 77.8 |
| Water Quality | 88 | 100 | 11.1 | 77.8 |
| GIS | 100 | ND | ND | ND |

[z] Not determined

### *Student's Agricultural Literacy and Interest*

For the 2005 and 2006 sessions, 100% of the students demonstrated literacy in the eight hands-on topics through their accurate completion of the short descriptions of two things they learned from each of the areas covered in the program (Table 2). In 2007, the pre- and posttest on these topics also showed a trend for students' increased knowledge of most of these topics after their participation in the program (Table 2). On the contrary, the limited sample of 2007 students generally did not change their immediate perceptions of the three disciplinary areas of ornamental horticulture, horticulture, and agriculture. From the time they took the pretest to the time they took the posttest, the dominant perception centered on production (data not shown). They did not include science as a part of their first thoughts on these three

**Table 3. Student Perception of their Knowledge Before and After Ornamental Program for 2005-2007**

| Topic | Before | | After | | *P*- values |
|---|---|---|---|---|---|
| | Mean | SE | Mean | SE | 0.00* |
| Landscape Design | [z] 2.03 | 0.18 | 3.73 | 0.19 | 0.00* |
| Plant Propagation | 2.15 | 0.21 | 3.50 | 0.18 | 0.00* |
| Turf | 1.62 | 0.16 | 3.62 | 0.21 | 0.00* |
| Floral design | 2.76 | 0.25 | 3.70 | 0,22 | 0.01* |
| Hort Therapy | 1.59 | 0.17 | 3.24 | 0.19 | 0.00* |
| Tissue Culture | 1.77 | 0.24 | 3.12 | 0.27 | 0.00* |
| Water Quality | 2.10 | 0.22 | 3.35 | 0.19 | 0.00* |
| GIS | 1.25 | 0.16 | 2.63 | 0.33 | 0.00* |
| Ornamental horticulture career | [y]ND | ND | 3.1 | 0.20 | |
| Horticulture career | ND | ND | 2.8 | 0.23 | |

[z] Scale of 1=none,2=little,3=some,4=much and 5=excessive
* $p<0.05$
[y]Not determined

**Table 4. Student Perception of their Interest before and after Ornamental Program for 2005-2007**

| Topic | Before | | After | | *p*- values |
|---|---|---|---|---|---|
| | Mean | SE | Mean | SE | |
| Landscape Design | [z] 2.53 | 0.24 | 3.50 | 0.22 | 0.00* |
| Plant Propagation | 2.62 | 0.23 | 2.91 | 0.23 | 0.37 |
| Turf | 1.88 | 0.21 | 2.94 | 0.23 | 0.00* |
| Floral design | 3.21 | 0.27 | 3.47 | 0.24 | 0.48 |
| Hort Therapy | 2.18 | 0.24 | 3.18 | 0.24 | 0.00* |
| Tissue Culture | 1.82 | 0.31 | 2.82 | 0.35 | 0.04* |
| Water Quality | 2.26 | 0.24 | 2.71 | 0.24 | 0.20 |
| GIS | 1.75 | 0.41 | 2.38 | 0.46 | 0.33 |
| Ornamental horticulture career | [y]ND | ND | 3.24 | 0.24 | |
| Horticulture career | ND | ND | 3.33 | 0.26 | |

[z] Scale of 1=none,2=little,3=some,4=much and 5=excessive
* $p<0.05$
[y]Not determined

**Table 5. Students' Combined 2005-2007 Response to Career Questions**

| Questions | Yes (%) | No (%) |
|---|---|---|
| Will you use the skills and knowledge obtained from this program in the future? | 97 | 3 |
| Will you consider majoring in Agriculture when you attend college? | 56 | 41 |
| Will you consider a career in Ornamental Horticulture? | 56 | 41 |

areas. This finding is similar to that of Overbay and Broyles (2008), who noted that many students in their summer program still defined agriculture as farming after they had completed a summer experience in agriculture. Our results indicate that high school students may need to be exposed to longer periods of education on these topics in order to readily connect their thoughts with the science of these career areas.

Students' perceptions of their knowledge showed a trend, in that they believed they had gained knowledge from the hands-on topic areas over the course of the internship (Table 3). They felt that they had little to no knowledge of the hands-on topics before the internship and increased to having some knowledge after completing the program. Their perceptions of this knowledge gain tended to agree with their actual assessments based on the open-ended questions on the eight topics at the end of the 2005 and 2006 sessions and from the pre- and posttest questions for 2007 (Table 2). Similar to their perception of gain in knowledge, students indicated on the surveys that they had gained an interest in the topic areas (Table 4). In general, their interest level rose from little to some. With respect to their perceptions on ornamental horticulture and horticulture careers, they indicated that they had some knowledge of and interest in the careers at the end of the program. Follow-up questions for the combined three years revealed that most (97%) thought they will use the skills and knowledge from the pro-

gram, and 56% would consider majoring in agriculture or ornamental horticulture (Table 5).

Based on a list of 16 statements related to the program, students agreed overall that the program was positive and that they learned much (Table 6). Learning new skills and exposure to new concepts and ideas were among the highest rated areas, rating 4.6 out of 5. While they found the program activities (4.4) and field trips (4.3) helpful in understanding the topics, they were neutral (3.1) in their response on whether the internship experience was challenging. Because the internship experience included the academic activities as well as other aspects of campus life, we believe this may have negatively impacted this factor based on their comments, such as dislike for walking too much on campus and dissatisfaction with the variety of campus foods.

When asked whether the internship length, length of each class session, or the number of field trips were insufficient, sufficient, or excessive, at least 80% felt that two weeks was adequate for the length of internship and five was adequate for the number of field trips. However, 26% felt that the length of each individual class session was excessive, an observation noted in the feedback pertaining to what they disliked.

Students have offered a variety of comments and suggestions about the program over the last three years. Some of the common ones are as follows. In response to what they liked most about the program, they noted learning new things, the lab projects, and field trips, with Longwood Gardens a favorite trip site. One student commented, "I got to learn new things that never really crossed my mind." Their dislikes were walking too much on campus, a lack of variety in campus foods, and long class periods. When asked what topics they would have liked to learn more about, surprisingly, they noted all the topics covered in the internship. Yet, they complained that the duration of the class periods were too long. This suggests that shortening each class session and increasing the frequency of each class may be more effective for learning in future activities. Although students were accepted to this program because of their stated interests in ornamental horticulture, it is interesting that one of their additional comments suggested broadening the learning experience by including more areas of horticulture or agriculture.

Overall, students learned about new areas in ornamental horticulture during the two-week internship period and highlighted the field trips and lab projects as their favorites. Most thought that the length of the internship was adequate, and some preferred shorter individual class sessions. This will be one item for consideration for future K-12 student activities.

Graduates from the three years of summer programs, provided a low response rate (20%) to a follow up survey mailed to them in summer 2007, following the end of the last program. All respondents were enrolled in a college program with 8.6% studying agriculture and the others studying engineering, business, pre-nursing or criminal justice. They stated that they would recommend or had recommended the program to other students because of the experience and knowledge they had gained. It was our

**Table 6. Student's Overall Rating of the Program Activities (2005-2007)**

| Student perception | 2005 [z]Mean | 2005 SD | 2006 Mean | 2006 SD | 2007 Mean | 2007 SD |
|---|---|---|---|---|---|---|
| My overall experience was positive | 4.75 | 0.46 | 4.18 | 0.73 | 4.33 | 0.50 |
| My internship experience was challenging | 3.38 | 0.51 | 3.11 | 0.99 | 2.89 | 1.36 |
| I learnt new skills and techniques | 5.00 | 0.00 | 4.35 | 0.61 | 4.56 | 0.53 |
| I was exposed to new ideas and concepts | 5.00 | 0.00 | 4.41 | 0.51 | 4.44 | 0.73 |
| The labs and studios were conducive to my learning | 4.25 | 0.71 | 4.18 | 0.64 | 4.44 | 0.73 |
| The instructors were knowledgeable | 4.88 | 0.35 | 3.83 | 1.07 | 4.56 | 0.53 |
| The instructors presented their information clearly | 4.00 | 0.53 | 4.18 | 0.64 | 4.33 | 0.87 |
| The education materials helped me learn | 4.63 | 0.74 | 4.35 | 0.70 | 4.44 | 0.53 |
| I felt comfortable around the instructors | 4.75 | 0.46 | 4.18 | 0.95 | 4.67 | 0.71 |
| I felt at ease participating in discussions | 4.63 | 0.52 | 3.82 | 1.07 | 4.56 | 0.73 |
| The projects were interesting | 4.38 | 0.52 | 3.88 | 0.78 | 4.11 | 0.78 |
| The projects helped me understand the topics | 4.38 | 0.52 | 4.35 | 0.49 | 4.44 | 0.73 |
| The field trips helped me understand the topics | 4.63 | 0.52 | 4.06 | 0.83 | 4.44 | 0.53 |
| I learnt much from the program | 4.88 | 0.99 | 4.35 | 0.61 | 4.33 | 0.71 |
| This experience increased my desire for a career in ornamental horticulture | 3.88 | 0.71 | 3.41 | 1.06 | 3.44 | 1.13 |
| I will recommend this program to other students | 4.75 | 0.77 | 3.94 | 0.75 | 4.44 | 0.73 |
| n | 8 | | 18 | | 9 | |

Rating scale where 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

observation that this program had become popular, not only because of our advertising, but also due to the interns' dissemination of information to other students in their schools. We continued to receive inquiries about the next year's programs after the last internship. Regrettably, the grant funds had been exhausted as the grant expired; and we did not have resources to continue the program.

## Summary

The findings from these three summer internships show that high school students learned new information and developed new ideas and skills in ornamental horticulture. This finding was in agreement with their belief that they had increased their knowledge and interest in this area. While the total number of students impacted by this program over the three years was low (35), the trend in their increased knowledge indicates that short term summer programs can have a positive effect on increasing student literacy in ornamental horticulture and related sciences. Although students perceived that they had some knowledge of ornamental horticulture and horticulture after completing the internship, they may need to be exposed to additional agricultural learning opportunities as many still fail to first connect the science with agriculture, horticulture, and ornamental horticulture when they think about these career fields.

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# Adding Value to AAAE Professional Conferences for Agricultural Education Graduate Students

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## Abstract

Graduate students are a critical component to the agricultural education profession and it is necessary to ensure that conferences provide valuable professional development to its future leaders. The purpose of this descriptive research was to assess Agricultural Education graduate students' perceptions of and to determine the factors influencing attendance at American Association for Agricultural Education conferences. Sixty-six graduate students responded to a national online survey in the fall of 2009 for a 55% response rate. Results of this study indicated networking and employment opportunities were the most important reasons why graduate students attend professional conferences. The majority of graduate students attending conferences were PhD/EdD students pursuing higher education faculty positions. Research paper sessions and professional development workshops were the two highest rated conference activities, while the graduate student meetings and special interest group were ranked the lowest. Qualitative comments indicated the need for additional networking opportunities and more structured needs-based graduate student meetings. These findings offer useful information for AAAE faculty coordinators to plan valuable graduate sessions, programs, and activities at future conferences.

## Introduction

Within the American Association for Agricultural Education (AAAE), members value the importance of professional development, as evidenced by annual conferences within the three regions of the organization, as well as the national conference. A cursory review of conference agendas and conference business meeting minutes revealed that an overwhelming majority of AAAE members attended at least one of the AAAE-sponsored conferences for each of the past several years. Such anecdotal evidence was indicative of the value AAAE members placed on professional development and research-sharing opportunities provided through the various conferences of the organization.

Interestingly, a review of the research paper proceedings and poster presentations for the north-central, southern and western regions as well as the national research conference proceedings revealed numerous authors/presenters were not faculty members, but graduate students. Few would question the value of involving graduate students in these research and innovative-idea sharing opportunities. However, there was a question as to the professional development value of regional and national AAAE conferences, beyond the research and poster sessions, for the graduate students.

VanSandt and Anderson (1992) noted professional conferences provided both personal and professional growth opportunities. "Through meeting new people, you create opportunities for your own growth and build a network of resource people and a support system" (2). Aitkin et al. (2004) listed benefits of professional organization conferences, including sense of identity, recruitment, personal and career development, networking, formal and informal information exchange, and research, teaching and practice connections.

The meeting participation model (Lee and Back, 2008) provided a framework for this study. The model hinges on the concept that association members make meeting participation decisions consciously, therefore "their plan to attend the meeting can be affected or altered through changes in attitude and perceived social norms that contribute to the formation of meeting participation intention" (p. 308). This model is based on and influenced by the Theory of Reasoned Action and the Theory of Planned Behavior. The meeting participation model included five constructs: attitude, subjective norm, perceived behavioral control, destination image, and past experience. Attitude refers to an individual's beliefs about a destination; subjective norm and perceived behavioral control refer to an individual's intention to perform a behavior; destination image refers to the attributes of a destination; and past experience refers to past-meeting participation and its effect on future response. These constructs are considered to be input factors that affect an individual's preference, destination image, and motive to travel. Lee and Back (2008) recommended utilizing strategies to encourage first-time members' attendance as well as to focus on the benefits the sponsoring organizations or individuals receive through allowing meeting attendance. Knight (2002) noted the importance of formal and informal student interactions at conferences, whereby students have the opportunity to share together and

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discuss with one another what they have gleaned from conference sessions. Additionally, Knight noted the students had opportunities to meet future professional colleagues. Apul and Tufenkji (2007) reported graduate students desired access to regional and national conferences for similar reasons to Aitkin et al. (2004): networking, real-world experience, targeted membership, and organizational service. Further, conferences were listed as one of the key reasons graduate students would join a professional organization. Perhaps most interesting was the Apul and Tufenkji finding that graduate students perceived networking as not only interacting professionally with professionals and faculty members, but also connecting with other students.

The American Society of Horticultural Sciences (ASHS) provided a workshop for graduate and undergraduate students attending the 2008 ASHS professional conference. The pre-conference workshop, facilitated by an ASHS member, targeted undergraduate and graduate students with information about the various components of the conference so the students could "gain the most from their conference experience" (ASHS, 2008, p. 1054). An additional student-oriented workshop during the annual ASHS conference sponsored by the ASHS Collegiate Activities Committee was entitled *Student Career Forum: Options, Q & A, …*, with the objective "to expose students to some of the career options in horticulture and provide a forum for students to ask questions and get answers from a panel of professionals in horticulture" (p. 1061).

Barrick et al. (2006) discovered faculty and graduate student agreement on the importance of faculty members providing opportunities for graduate students to attend professional meetings. However, the data revealed graduate students perceived the faculty members should be more proactive in providing those professional development opportunities. Additionally, Barrick et al. reported graduate students believed their ideas were not treated with due respect by faculty mentors and that graduate students preferred to receive more assistance in preparing publications.

Other researchers acknowledged the importance of helping graduate students develop research skills (House and Sterns, 2003; Shelton et al., 2006). Likewise, the importance of preparing graduate students outside classroom settings was noted by McKenna et al. (1993) and Skelly et al. (2002). However, the focus was primarily on field and laboratory operations rather than professional development and peer contact. Mentoring was noted as essential in the faculty member-graduate student relationship (Dodson et al., 2006; Kilmer et al., 1997; Shelton et al., 2006); however this was not included in professional conferences as part of the mentorship process. Based on the involvement of master's and doctoral level graduate students in regional and national Agricultural Education professional conferences, the importance of such involvement for the professional and career development of the students was accepted. However, there was little evidence regarding the best practices for accomplishing that professional development and career mentoring.

## Purpose and Objectives

The purpose of this research was to assess agricultural education graduate students' perceptions and to determine the factors influencing attendance at the American Association for Agricultural Education (AAAE) regional and national conferences. This purpose was accomplished through the following specific objectives:

1. Determine selected demographic characteristics of graduate students who attended the AAAE regional and national conferences in 2008-2009;
2. Determine the graduate student attendees perceptions of professional development activities at AAAE regional and national conferences in 2008-2009;
3. Determine graduate students attendance patterns at AAAE regional and national conferences in 2008-2009
4. Determine participants' perceptions of graduate student meetings at AAAE regional and national conferences in 2008-2009.

## Methods

The population for this study was graduate students who attended a regional and/or national agricultural education affiliated professional conference in 2008-2009. A census of 127 participants was obtained from the official list of attendees provided by each regional conference chair and the national chair. Due to inaccurate and incomplete lists, the final sample consisted of 120 graduate students. The instrument was researcher-developed based upon needs and curiosities of agricultural education faculty and graduate students at Montana State University. The instrument was designed on SurveyMonkey™ with specific focus on how to add value to professional conference participation for graduate students. Questions were derived from literature on conference participation and student professional development (American Society for Horticultural Science, 2008; Skelly et al., 2002; VanZandt and Andersen, 1992). Survey questions were created to determine attendance patterns at AAAE conferences, opinions on the conference sessions and activities, factors that added or decreased value to conference experiences, and gain insight into professional development opportunities. The survey was assessed for validity by a panel of university faculty. Ten agricultural education graduate students who have previously attended a national AAAE conference participated in a pilot test to assess reliability. A Cronbach's alpha was also

calculated on the instrument and revealed a reliability coefficient of 0.81. Following the validity and reliability assessments, several questions were restructured.

### Data Collection

The Montana State University Institutional Review Board approved the study protocol and all participants provided voluntary consent online prior to completing the survey and participating in the study. This study was deemed exempt by Montana State University IRB. The survey was disseminated using the web-based host SurveyMonkey™ and consisted of 25 questions divided into four sections. Section one centered on participants' graduate program background and sought to determine their participation levels in professional conferences. Sections two and three included specific questions about participation in a 2008-2009 AAAE Regional Conference and/or the 2009 AAAE National Conference. These two sections assessed respondents' perceptions of the value of conference sessions and activities. The last section focused on participants' insight into ideas for future conferences. Researchers utilized a modified version of Dillman's (2000) tailored design method. An introductory email was sent via SurveyMonkey™ to 120 graduate students who met the criteria of having attended a regional and/or national AAAE conference in 2008-2009. This correspondence informed potential participants they had been selected for the study and included background information about the study, the informed consent form, and a web link to the survey. Participants gave voluntary consent by clicking on the link to complete the survey. One university blocked emails from SurveyMonkey™, therefore a copy of the email was sent through a personal email and responses were combined in the results section. The survey remained active for 30 days and non-responders/late responders were sent two reminder emails two weeks apart. Because the response rate was less than 80%, researchers chose to contact 5 to 10% of the sample to gather data to address the non-response as recommended by Tuckman (1999). A random sample of 10 non-respondents was contacted via personal email to answer critical questions on the survey. After comparing answers, no differences were found between respondents and non-respondents in a way relevant to the study.

### Data Analysis

Data were analyzed using SPSS 18.0 software package, Microsoft Excel, and SurveyMonkey™. The data collection period was from September 22, 2009, to October 22, 2009. Responses were filtered through SurveyMonkey™ to only include current graduate students during the 2008-2009 school year and fully completed surveys. After eliminating duplicates and partial responses, the survey yielded a 55.0% (N=66) response rate. SurveyMonkey™ allowed the researchers to report descriptive statistics by providing charts and graphs based on each question. For further analysis, data were downloaded into Microsoft Excel and SPSS to calculate means, standard deviations, and reliability coefficients.

## Results

**Objective 1:** *Determine selected demographic characteristics of graduate students who attended the AAAE regional and national conferences in 2008-2009.*

Based on registration lists obtained from regional and national conference coordinators, 120 graduate students comprised the study sample. All respondents were enrolled as graduate students during a semester or quarter of the 2008-2009 school year. Twenty-eight percent of the respondents (n=19) were Master's students; 63.6% (n=42) were PhD/EdD students; and 7.6% (n=5) were in combined Master's and Doctorate programs.

The suggested length of participants' graduate programs was reported as 1-2 years by 27.3% of respondents (n=18); 2-3 years by 25.8% (n=17); 3-4 years by 40.9% (n=27); 4-5 years by 4.5% (n=3); and more than 5 years by 1.5% (n=1). When asked about the number of semesters completed in graduate school, 18.2% (n=12) completed 1-2 semesters; 40.9% (n=27) completed 3-4 semesters; 15.1% (n=10) completed 5-6 semesters; 9.1% (n=6) completed more than 6 semesters; and 16.7% (n=11) had completed all degree requirements. Participants were asked to identify their career goals and research topic areas. The career goals reported were as follows: 19.7% (n=13) were pursuing extension, 16.7% (n=11) were pursuing high school teacher or administrator; 16.7% (n=11) were pursuing industry positions; 12.1% (n=8) were pursuing non-profit work; 15.2% (n=10) were pursuing government; 15.2% (n=10) were pursuing PhD/EdD programs; 72.7% (n=48) were pursuing higher education faculty; and 15.2% (n=10)

**Table 1. Graduate Student Research Topic Areas According to National Research Priority Agenda (N=66)**

| Topic | *f* | % |
|---|---|---|
| Agricultural Education in University and Postsecondary Settings | 16 | 24.2 |
| Agricultural Education in Schools | 13 | 19.7 |
| Agricultural Communications | 12 | 18.2 |
| Agricultural Education in Dom. & Int. Settings: Extension and Outreach | 10 | 15.2 |
| Agricultural Leadership | 9 | 13.6 |
| Other | 4 | 6.1 |
| Undecided | 2 | 3.0 |

were pursuing international development. Respondents were asked to categorize their research topic into one of the National Research Priority Areas (Table 1).

**Objective 2:** *Determine the graduate student attendees' perceptions of professional development activities at AAAE regional and national conferences in 2008-2009.*

Participants were asked to rate the usefulness of regional conference activities to professional development using a 5-point Likert-type scale (Table 2). Means and standard deviations were calculated. Only 51 respondents answered this question because 15 had not attended a regional conference. If respondents did not attend the conference activity or if the activity was not offered, they were not included in the final calculations.

Participants were asked to rate the usefulness of national conference activities to professional development using a 5-point Likert-type scale (Table 3). Means and standard deviations were calculated. Only 35 respondents answered this question because 31 had not attended the national conference. If participants did not attend the conference activity, they were not included in the final calculations.

**Objective 3:** *Determine graduate students' attendance patterns at AAAE regional and national conferences in 2008-2009.*

Of the 66 total respondents, 34 (54%) were affiliated with the Southern Region, 18 (28.6%) were affiliated with the North Central Region, and 11 (17.5%) were affiliated with the Western Region. Forty-three respondents (65.1%) reported having attended one or two AAAE conferences, while 33 respondents (39.3%) had attended 3-5+ conferences. When asked about attendance at all professional conferences (AAAE and others), 22 respondents (34.9%) had attended more than five, 31 respondents (49.1%) had attended two to four, and 10 respondents (15.8%) had attended either one or five. In a check-all-that-apply format, participants were asked the types of all professional conferences attended (Table 4). Fifty-one (81.0%) of the respondents attended a Regional AAAE conference in 2008-2009. In a "mark-all-that-apply" format, participants marked the reasons for attending the regional conference (Table 5).

Attendance for professional conferences was supported by a combination of the following funds listed in descending order: department (82.4%), personal (58.8%), grants (15.7%), university (11.8%), college (9.8%), and other (9.8%).

**Table 2. Usefulness of Regional Conference Activities to Graduate Student Professional Development (N=51)**

| Activity: Likert Scale | 1 | | 2 | | 3 | | 4 | | 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | *f* | % | *f* | % | *f* | % | Mean | SD |
| Research Paper Sessions | 0 | 0 | 1 | 2.0 | 10 | 19.6 | 20 | 39.2 | 19 | 37.4 | 4.14 | 0.81 |
| Prof. Dev. Workshops | 0 | 0 | 4 | 7.8 | 7 | 13.7 | 11 | 21.6 | 9 | 21.6 | 3.81 | 1.01 |
| Arranged Social Events | 1 | 2.0 | 4 | 7.8 | 11 | 21.6 | 20 | 39.2 | 10 | 19.6 | 3.80 | 0.89 |
| Arranged Local Tours | 1 | 2.0 | 2 | 3.9 | 6 | 11.8 | 16 | 31.4 | 7 | 13.7 | 3.80 | 0.97 |
| Professional Seminars | 0 | 0 | 4 | 7.8 | 10 | 19.6 | 13 | 25.5 | 9 | 17.6 | 3.75 | 0.97 |
| Poster Session | 0 | 0 | 4 | 7.8 | 17 | 33.3 | 23 | 45.1 | 3 | 5.9 | 3.53 | 0.75 |
| General Session | 0 | 0 | 6 | 11.8 | 17 | 33.3 | 16 | 31.4 | 7 | 13.7 | 3.47 | 0.97 |
| Graduate Student Meeting | 0 | 0 | 10 | 19.6 | 4 | 7.8 | 12 | 23.5 | 6 | 11.8 | 3.44 | 1.13 |
| Business Meeting | 3 | 5.9 | 5 | 9.8 | 19 | 37.3 | 11 | 21.6 | 2 | 3.9 | 3.10 | 0.96 |

*Note*. On a 5-point Likert-type scale, 1=Not useful, 2=Somewhat useful, 3=Useful, 4=Very Useful, 5=Extremely Useful

**Table 3. Usefulness of National Conference Activities to Graduate Student Professional Development (N=35)**

| Conference Activity | 1 | | 2 | | 3 | | 4 | | 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | *f* | % | *f* | % | *f* | % | Mean | SD |
| Research Paper Sessions | 0 | 0 | 1 | 2.9 | 2 | 5.7 | 13 | 37.1 | 18 | 51.4 | 4.41 | 0.74 |
| Prof. Dev. Workshops | 0 | 0 | 0 | 0 | 6 | 17.1 | 8 | 22.9 | 17 | 48.6 | 4.35 | 0.80 |
| Alumni Events | 1 | 2.9 | 1 | 2.9 | 3 | 8.6 | 11 | 31.4 | 10 | 28.6 | 4.08 | 1.02 |
| Professional Seminars | 0 | 0 | 2 | 5.7 | 4 | 11.4 | 11 | 31.4 | 6 | 17.1 | 3.91 | 0.90 |
| Arranged Social Events | 0 | 0 | 2 | 5.7 | 5 | 14.3 | 19 | 54.3 | 5 | 14.3 | 3.87 | 0.76 |
| Committee/SIG/Bus. Mtg | 0 | 0 | 1 | 2.9 | 9 | 25.7 | 13 | 37.1 | 7 | 20.0 | 3.87 | 0.82 |
| Poster Session | 0 | 0 | 3 | 8.6 | 5 | 14.3 | 22 | 62.9 | 3 | 8.6 | 3.76 | 0.75 |
| Opening Session | 0 | 0 | 5 | 14.3 | 8 | 22.9 | 9 | 25.7 | 9 | 25.7 | 3.71 | 1.07 |
| Graduate Student Meeting | 1 | 2.9 | 5 | 14.3 | 10 | 28.6 | 5 | 14.3 | 2 | 5.7 | 3.09 | 0.97 |

*Note*. On a 5-point Likert-type scale, 1=Not useful, 2=Somewhat useful, 3=Useful, 4=Very Useful, 5=Extremely Useful

**Objective 4:** *Determine participants' perceptions of graduate student meetings at AAAE regional and national conferences in 2008-2009.*

Twenty-nine respondents (56.9%) indicated their regional conference had a specific time for a graduate student meeting, and 70.6% of these (n=24) attended this meeting. When asked to categorize the meeting, 23 respondents (85.2%) described it as a meet and greet/social; 11 respondents (40.7%) had guest speakers at the meeting; four respondents (14.8%) described it as professional development; three respondents (11.1%) described it as other; and one respondent (3.7%) described it as service learning.

Thirty-five (55.6%) respondents attended the National AAAE conference in 2008-2009 while 28 did

**Table 4. Professional Conferences Attended by Graduate Students (N=66)**

| Conference | *f* | % |
|---|---|---|
| American Association of Agricultural Education (AAAE) | 62 | 98.4 |
| Other* | 24 | 38.1 |
| North American College and Teachers of Agriculture (NACTA) | 19 | 30.2 |
| Association for Career and Technical Education (ACTE) | 11 | 17.5 |
| Association for International Agricultural and Extension Education (AIAEE) | 8 | 12.7 |
| Association for Communication Excellence (ACE) | 8 | 12.7 |
| Agricultural Communicators of Tomorrow (ACT) | 7 | 11.1 |
| Association of Leadership Educators (ALE) | 6 | 9.5 |

*Other included State AgEd Conferences, NAAE, SAAS, NAE4-HA, ASABE, NIFS, ATE, MANRRS, AMS, Outreach Scholarship Conference

**Table 5. Graduate Students' Reasons for Attendance at Regional Conferences (N=51)**

| Categories | *f* | % |
|---|---|---|
| Professional Networking | 37 | 72.5 |
| To learn about research | 27 | 52.9 |
| To present a poster | 27 | 52.9 |
| To present a paper | 25 | 49.0 |
| Non-professional reasons* | 14 | 27.5 |
| Other | 3 | 5.9 |
| Class requirement | 1 | 2.0 |

*Non-professional reasons included to visit friends, see a new town, location, etc…

not. Of these 35 participants, 21 (60.0%) attended the graduate student meeting. In a forced choice question format, participants ranked the importance of graduate student meeting activities on a 6-point Likert-type scale (Table 6).

When asked how graduate student meetings should be structured at future conferences, participants ranked the following choices in descending order: 59% (n=36) desired a meet and greet at the beginning of the conference; 58.3% (n=35) desired various sessions throughout the conference; 56.7% (n=34) desired a graduate session during a business meeting; and 55.2% (n=32) desired all graduate students to sit together during a meal. Additionally, 69.8% of the respondents (n=44) also indicated they would like to have one to two graduate student activities during a professional conference.

In a short answer format, participants were asked how graduate student meetings could be improved at professional conferences (Table 7). Comments from 26 respondents were summarized into three themes: (a) Adding more structure and content to graduate student meetings by having a formal agenda, leadership, planned program activities, and useful information to take home; (b) Focus the meeting on needs-based topics to improve professional development, research, and teaching skills in order to better prepare students for future careers; and, (c) Provide additional formal and informal networking opportunities for graduate students to interact with each other and faculty members.

## Discussion

Professional networking was considered the most important reason graduate students attend professional conferences confirming the research of VanSandt and Anderson (1992). Graduate students placed repeated emphasis on this factor throughout the survey. Although students can participate in scheduled conference activities, it is also important that they have time to visit informally with faculty during the conference. Faculty should acknowledge the significance placed on developing personal and professional relationships and strive to frequently interact with graduate students in different ways. This interaction can be done formally in conference sessions, meetings, workshops, and panel discussions, as well as informally at social activities, tours, and session breaks. These opportunities allow for information exchange and assist in building relationships that can benefit both faculty and students in the future. Conference coordinators should consider including these types of events in the schedule in order to provide both formal and informal networking opportunities.

Beyond networking, other closely ranked reasons to attend conferences were to learn about research and present a paper or poster. These findings reinforce the value of graduate student involvement at the conference beyond attendance. These unique opportunities help to build confidence, improve research skills, create a sense of identity, establish professional connections, and enhance the overall graduate program experience (Aitkin et al., 2004).

The majority (63.6%) of graduate students attending conferences was PhD/EdD students, and when asked about career goals, 72.7% indicated that they were pursuing higher education faculty positions. With this high number of doctoral students pursuing professional positions, it is critical that conference coordinators allow time for graduate students to visit with faculty about career opportunities; this time also offers an excellent opportunity for faculty recruitment (Aitkin et al., 2004). Additionally, the inclusion of a career workshop, similar to the 2008 American Society of Horticultural Sciences conference that exposes students to professional options and allows them to ask faculty questions could be a valuable experience.

All participants rated the same top two conference activities as being very to extremely useful for professional development. The highest rated activities were research paper sessions and professional development workshops. Therefore, graduate students should continue to be encouraged by advisors to submit and present papers at conferences in order to gain experience and establish their professional identity. Professional development workshops should also incorporate topics valuable to both faculty and graduate students and possibly be

**Table 6. Importance of Graduate StudentMeeting Activities at National AAAE Conference (N=35)**

| Conference Activity | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | *f* | % | *f* | % | *f* | % | *f* | % | Mean | SD |
| Networking | 3 | 5.7 | 4 | 7.5 | 4 | 7.5 | 11 | 20.8 | 16 | 30.2 | 15 | 28.3 | 4.47 | 1.46 |
| Employment Opp. | 8 | 14.3 | 5 | 8.9 | 6 | 10.7 | 9 | 16.1 | 14 | 25.0 | 14 | 25.0 | 4.04 | 1.75 |
| Research Assistance | 3 | 5.9 | 7 | 13.7 | 16 | 31.4 | 9 | 17.6 | 7 | 13.7 | 9 | 17.6 | 3.73 | 1.48 |
| Prof. Skill Development | 3 | 5.4 | 12 | 21.4 | 11 | 19.6 | 15 | 26.8 | 8 | 14.3 | 7 | 12.5 | 3.61 | 1.44 |
| Educational Seminars | 4 | 7.5 | 16 | 30.2 | 12 | 22.6 | 6 | 11.3 | 10 | 18.9 | 5 | 9.4 | 3.32 | 1.50 |
| Graduate Student Special Interest Grp. | 29 | 46.8 | 8 | 12.9 | 6 | 9.7 | 7 | 11.3 | 7 | 11.3 | 5 | 8.1 | 2.52 | 1.76 |

*Note*. On a 6-point Likert-type scale, 1=Not important, 2=Somewhat important, 3=Important, 4=Moderately Important, 5=Very Important, 6=Extremely Important

**Table 7. Participants' Ideas for Improving Graduate Student Meetings at Conferences (N=26)**

| Themes |
|---|
| *More structure and content* |
| "Have more than one graduate student meeting" |
| "Better promotion and organization of graduate student meetings prior to conference |
| "Have presentations, handouts and take home materials that may help grad students when they go back home" |
| "Have a designated student leader to serve as a point person for students" |
| "Provide more structured events, meetings, and activities led by faculty member or experienced graduate student" |
| "Make them more than a meet and greet. Add some substance to the program and make it meaningful to be there" |
| "Have a formal agenda for graduate student meetings. A well-thought out program would allow students to receive proper benefit after leveraging time to attend" |
| *Needs-based meeting topics* |
| "Survey the graduate students to determine interests" |
| "Create a meaningful program" |
| "Have a specific professional development session for graduate students" |
| "Keep sessions for graduate students with an objective to improve their professional skills and research skills for the future when they will work as faculty or educators" |
| "Provide incentives with unique opportunities for attendance and be creative with rewards" |
| "Sending out questionnaires like this one to see what are the needs of graduate students" |
| "Give graduate students something useful to walk away with. Something unique that they can't get at their home campus" |
| *Provide additional networking opportunities* |
| "Create a more accepting atmosphere of graduate students that encourages interaction" |
| "Have more organized social activities" |
| "Allow more time for graduate student interaction. The current meetings are rushed and there is little time to converse" |
| "I would also like to see activities that allow graduate students and professionals to meet and greet/network; I would also like to see more focus on pairing students with professionals in a mentoring relationship for added assistance" |
| "Schedule small get-together activities. The "parking lot" conversations have been most beneficial" |
| "Make the meetings more informal" |
| "Encourage all regions to include graduate student meetings as a time to network and socialize" |

divided into two separate sessions. It might be useful for faculty to submit separate professional development workshop proposals so that the sessions can meet the specific needs of each audience. The lowest rated activity at regional conferences was the business meeting and was ranked by more than half of the respondents as the desired time to offer a graduate session. These results indicate this could be an appropriate time to offer a professional development session specifically for graduate students.

At the national conference, the graduate student meeting was the lowest ranked activity, while 59.7% of respondents also rated the graduate student special interest group as least important. This data indicates the need to re-examine the quality and focus of these graduate student events. If conference coordinators are to provide valuable career and professional development for graduate students, then faculty must reconsider the needs of graduate students at professional conferences and structure activities to better educate its future leaders. Further research on the professional and career development needs of graduate students can assist in providing a direction for coordinators as they plan regional and national conference agendas.

Comments indicated the need for more structured and topic-based graduate student meetings. The development of a student leadership team that provides direction to the overall graduate program could be used to plan meeting content, events, and networking opportunities each year. The idea of creating a newsletter might also be an additional opportunity for students to contribute to the organization and collaborate with faculty. This graduate leadership structure has been successful in other organizations, such as the Association of International Agricultural and Extension Education, and should be considered for AAAE members as well. More than 50% of the respondents stated that they would like to have a meet and greet, multiple sessions, a graduate session during a business meeting, and a meal when all graduate students sit together. Coordinators should include these kinds of events in the schedule to maximize the value of the conference for graduate students. A separate evaluation for graduate student attendees should be conducted at the end of conferences to evaluate the success and value of these activities.

The results of this graduate student study corroborated the meeting participation model (Lee and Back, 2008), most especially the constructs of attitude, perceived behavioral control, and destination image. These constructs should be taken into

consideration during promotion of the conference. Conference organizers should emphasize the personal and professional benefits of the location, entertainment, networking opportunities, conference content, guest speakers, and various activities to highlight the destination image. Highlighting previous participants' conference experiences, possibly through videos, evaluations, quotations, or pictures, could also influence attitudes and motive to attend. Hosts should also provide an overview of conference outcomes and evaluations, as well as a detailed agenda of future expectations, to help produce positive behavioral beliefs in participants.

Networking and employment opportunities were ranked as the most important activities at the national conference; therefore additional focus should be placed on how to improve these targeted areas. As mentioned, formal and informal opportunities to network and socialize should be incorporated into the agenda. The establishment of structured graduate student meetings as well as informal social events can assist in providing the time for this desired interaction. The creation of a faculty- student or student-student mentoring program might also encourage relationship building important for future employment. Mentoring programs can provide an essential link to prepare graduate students for the agricultural education profession and its future leadership. All conferences offer a unique outlet for interactions between faculty and graduate students and should continually be reassessed to determine how to improve the experience for attendees. As Apul and Tufenkji (2007) reported, graduate students attend conferences to network and gain real-world experiences; therefore, it is the responsibility of the organizational members to create these valuable opportunities for participants.

## Summary

Results of this study indicated networking and employment opportunities were the most important reasons why graduate students attend professional conferences. The majority of graduate students attending AAAE conferences were PhD/EdD students pursuing higher education faculty positions. Research paper sessions and professional development workshops were the two highest rated conference activities, while the graduate student meetings and special interest group were ranked the lowest. Qualitative comments indicated the need for additional networking opportunities and more structured needs-based graduate student meetings. These findings offer useful information for faculty coordinators in all disciplines to plan valuable graduate sessions, programs, and activities at future conferences.

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# Post-Secondary Agricultural Teaching Faculty Need for a Methodologies Resource Sharing Web Site

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## Abstract

The objective of this study was to determine the need for a centralized teaching resource that fosters faculty interactions and resource sharing among agricultural faculty. As part of a NACTA-funded project, 808 professors and administrators representing land-grant, public, and private universities as well as state and junior colleges with active standing in NACTA were administered a post-secondary agricultural instructors resource assessment instrument. The majority of participants (74%) worked at a land-grant institution and had at least a half-time teaching appointment (61.5%). Findings indicated participants seek information on classroom management (72%) and teaching methods (81.6%) from colleagues at their university, while they seek information on educational resources such as videos and graphics (76.3%), and slides and/or lectures (57.9%) from the Internet. The majority of participants indicated that convenience and trust in the source were important factors in choosing sources of information regarding classroom management, teaching methods, learning styles, and educational resources. Almost half (46%) sought educational videos or graphics most often. About 40% indicated their teaching resource needs were being met; yet, a majority of participants (72.7%) are interested in a teaching resource website containing resources from agricultural faculty across the U.S.

## Introduction

Most faculty face an ongoing challenge of multiple competing demands of teaching, research, and outreach (Jepson et al., 2005). In the 18th and 19th centuries, the most prized role of faculty was teaching, but since then there has been a shift toward a research-based focus despite student perceptions that teaching is the most important job of a faculty member (Kelsey et al., 2002; Wiedmer, 1994). Today, faculty must make difficult choices between professional priorities and institutional missions, which require faculty to devote time and resources toward teaching instruction (Boyer, 1990).

It is challenging and time-consuming to learn and try new instructional methods and to keep track of an exponentially increasing number of available options that may potentially enhance teaching and learning (Jepson et al., 2005). College of Agriculture faculty have adopted Internet technology to help with the information retrieval (Dahlgran, 2003); however, Lieberman and Pointer-Mace (2010) reported educators have yet to capture the potential of the Internet and multimedia tools for professional learning. Molnar and Fields (2004) reported the full potential of this technology is centered on the sharing of instructional materials as well as the availability of online source materials (e.g., images, presentations, and diagrams) to supplement lecture materials. Currently, not all teaching resources are readily available as Molnar and Fields (2004) explained some universities and faculty have moved to protect access to course material by limiting access to course websites, while others take a community of scholarship approach and make their course materials freely available over the Internet. Additionally, instructors can find the Internet to be daunting and burdensome, and thus face dilemmas about how to stay current within their discipline, subject matter, and new teaching styles (Molnar and Fields, 2004).

To address the shortcomings of currently available resources, most institutions of higher education have instructional technology resource centers and organize faculty workshops, which allows faculty to share pedagogical and technical aspects of teaching with colleagues within and outside of their own fields (Jepson et al., 2005). Such practices encourage faculty to learn from one another and to adopt interactive modes of instruction, and promote greater intellectual community and vitality among faculty (Austin and Baldwin, 1991). Other opportunities for faculty development include participation in organizations such as the North American Colleges and Teachers of Agriculture (NACTA) organization, which provides a public forum for exhibiting teaching and learning scholarship (Rudd, 2005). Little is known, however, if faculty actively seek teaching resources and which resources they commonly seek.

The objective of this study was to determine the need for a centralized teaching resource that fosters faculty interactions and resource sharing among agricultural faculty. Specific research questions were developed to determine: 1) If NACTA members seek information on selected teaching resources from

[1]Assistant Professor

selected sources; and 2) Where NACTA members seek information on selected resources.

## Methods

A web-based survey instrument was created using surveymonkey.com by the researchers in order to meet the specific needs of this study. A panel of experts reviewed the instrument for face and content validity. Panelists were selected based on their expertise in agricultural education, agricultural bench sciences (i.e. plant and soil sciences, animal science, etc.) and their participation in the North American Colleges and Teachers of Agriculture (NACTA) organization. The panel provided helpful suggestions that were made to improve the instrument's usability and functionality. In addition, a university institutional review board (IRB) approved the instrument and supporting materials.

The instrument consisted of multiple choice and fill-in-the blank responses related to systems teaching and learning resource use and needs of post-secondary agricultural faculty as well as demographic information. No scaled items were used in the instrument. Demographic information included questions related to faculty such as years of experience, course load, and gender, as well as questions related to their institutions such as instructional environment and type of institution (i.e. land-grant, private, junior college). The instrument measured usefulness and use of common pedagogical resources. Pedagogical resources selected for analysis were: classroom management techniques, methods related to teaching, learning styles, and educational resources such as videos/graphics and PowerPoint slides and/or lectures. Educational resources were divided into "support" materials and "lecture" materials. Videos and/or graphics were defined as "support" materials and PowerPoint presentations and/or lectures were defined as "lecture" materials. Unless a question specified, participants were able to check all responses that were relevant to their use or needs.

The instrument was administered to post-secondary agricultural faculty who are members of NACTA. With permission from the organization, email addresses from the membership were used to distribute an online survey instrument to NACTA members. Through member records, 815 email addresses were used to distribute the survey instrument. According to the June 2009 Annual report (NACTA, 2009), NACTA has about 900 members. Seven email addresses were unusable, thus the usable sample size was n=808.

Collection procedures followed standard email survey protocol (Schaefer and Dillman, 1998). Two email contacts were made during the collection time. The first contact was an introductory email informing the subject of the study and confidentially of the responses. In addition, a personalized link to the instrument was included as well as a link to "opt out" of the study. The first email was sent December 27, 2009. Another email was sent on January 11, 2010, to subjects who had not responded or had not opted out of the study. Electronic collection ended January 25, 2010. To increase response rate, a student assistant was employed to call non-participants. Phone interviews were administered for approximately four weeks before data collection procedures ceased. Overall, 304 NACTA members participated in the study for a response rate of 37.6%. There were no significant differences in early and late responses (Lindner and Wingenbach, 2002).

Frequencies were computed using SPSS 16 for Windows. Instrument reliability was analyzed by visually checking for skewness. Based on visual analysis, the data set contained no outliers and all cases were included. Missing data was removed from analysis, thus frequencies and percentages were calculated based on responses only.

## Results and Discussion

The majority of participants (74%) indicated they work for a land-grant university. Almost 90% of participants work for a publicly-funded university whereas 4.3% work at a private university. Only seven participants indicated they worked at a junior college. It is not surprising that this number was small, as only approximately 4% of the NACTA membership comes from two-year institutions. (M. Parker, personal communication, August 17, 2010). Teaching appointment percentages were relatively distributed. The most frequently reported professional title was Professor (30.9%), suggesting there are a relatively large number of NACTA members who are tenured or promoted during their careers as educators. The second most frequently reported professional title was Assistant Professor (26%), indicating there are many members who would likely benefit from the expertise of more experienced members.

Most participants (84.3%) had teaching experience before starting their current position. As part of a national study conducted on faculty in Colleges of Agriculture, Simerly (1989) found that three-fourths of the faculty surveyed had teaching experience as graduate students. However, outside of graduate teaching assistantships, most faculty have had little or no practical experience in developing and delivering instruction (Davis and Beyrouty, 1995; Adams, 2002; Austin, 2002; Pals, 1988; and Wardlow and Johnson, 1999). While previous experience has the potential to provide excellent teaching experience, the experience obtained is quite variable from one assistantship to the next.

About 20% of participants teach on a 0 to 25% teaching appointment and about one-third indicated they teach on a 75 to 100% teaching appointment. One hundred seventy-eight participants indicated they hold at least a 50% teaching appointment at their institutions. The majority of participants

(70.6%) indicated their instructional contact with students is face to face or a combination of face to face and distance contact (28.7%). About three-fourths (77%) teach advanced undergraduate courses and about half (50.3%) teach at least one graduate course. Most participants indicated they teach classes with enrollments between 0 and 25 students (63.2%) or 26 to 50 students (46.1%) with the instructional environment of their classes to be mostly lecture (55.6%), laboratory (26.7%), or a combination of lecture and lab (58.2%).

Instructors often use videos or graphics to add interest to their classroom activities, regardless of the instructional environment. This is supported by data presented in Table 1. Videos and graphics were sought by more participants than any other type of pedagogical information. Only two other types of information were reported as most sought by more than 5% of participants, teaching methods and slides or lectures. Rocca (2010) found that faculty had the lowest perceived level of instructional skills in alternative teaching methods, and learning about alternative teaching methods was ranked as the highest professional development priority areas for faculty at the College of Agricultural Sciences and Technology at California State University. Additionally, Pals (1988) reported that faculty most frequently cited variety in classroom teaching methods as their greatest instructional need.

A majority of participants indicated they seek information about classroom management and teaching methods from colleagues at their institutions (Table 2). In addition, over half seek information on teaching methods from colleagues from other institutions and printed scholarly publications. More participants seek educational resources such as videos and graphics and PowerPoint slides or lectures from the Internet than any other source. However, about half also seek these educational resources from colleagues at their universities.

Participants indicated they seek information about pedagogical resources from colleagues at their institution because of convenience and trust (Table 3). About half of the participants sought information on teaching resources from colleagues from their institution because of the similarities in curriculum. Over half of the participants sought information from colleagues at different institutions because of similarities in curriculum. Most participants sought pedagogical resource information from the Internet because of its convenience. However, few participants indicated they sought information from the Internet because of trust in the source. Even though many of the participants in the present study indicated that they seek certain information from colleagues at their own institution, it is not uncommon for colleagues to be unaware of the novel pedagogical practices being used at their own institutions (Dardig 1997; Rups, 1999). However, there may be a preference for acquiring teaching advice from known colleagues, as Whaley and Wickler (1992) reported that 91% of faculty at their institution seek advice from fellow faculty members, while only 66% chose to read about effective teaching.

**Table 1. Information Most Sought by Post-Secondary Agricultural Faculty from any Source (N=302)**

| Topic | n | % |
|---|---|---|
| Classroom Management | 10 | 3.3 |
| Teaching Methods | 82 | 27.2 |
| Learning Styles | 4 | 1.3 |
| Educational Resources - Videos or graphics | 139 | 46 |
| Educational Resources - PowerPoint slides or lectures | 67 | 22.2 |

**Table 2. Information Sources Sought by Post-Secondary Agricultural Faculty on Selected Pedagogical Topics (N=304)***

| | Colleagues - same institution | Colleagues - different institution | Journals or scholarly publications - printed | Journals or scholarly publications - on-line | The Internet | Does not seek information |
|---|---|---|---|---|---|---|
| Topics | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Classroom Management | 219 (72.0) | 108 (35.5) | 90 (29.6) | 84 (27.6) | 69 (22.7) | 58 (19.1) |
| Teaching Methods | 248 (81.6) | 173 (56.9) | 182 (59.9) | 150 (49.3) | 110 (36.2) | 6 (2.0) |
| Learning Styles | 153 (50.2) | 92 (30.4) | 161 (53.0) | 138 (45.4) | 86 (28.3) | 29 (9.5) |
| Educational Resources - Videos or graphics | 149 (49.0) | 120 (39.5) | 82 (27.0) | 102 (33.6) | 232 (76.3) | 23 (7.6) |
| Educational Resources - PowerPoint slides or lectures | 165 (54.4) | 129 (42.4) | 53 (17.4) | 70 (23.0) | 176 (57.9) | 51 (16.8) |

*Participants were asked to check all that apply.

**Table 3. Why Post-Secondary Agricultural Faculty Seek Pedagogical Information from Sources (N=304)***

| Source | Reason(s) for seeking information from sources | | | | |
|---|---|---|---|---|---|
| | Convenience n (%) | Trust in the source n (%) | Completeness of information n (%) | Similar Curricula n (%) | Does not seek information n (%) |
| Colleagues - same institution | 240 (78.9) | 239 (78.6) | 73 (24.0) | 127 (41.8) | 11 (3.6) |
| Colleagues - different institution | 65 (21.4) | 222 (73.0) | 72 (23.7) | 175 (57.6) | 28 (9.2) |
| Journals or scholarly publications - printed | 60 (19.7) | 206 (67.8) | 145 (47.7) | 29 (9.5) | 33 (10.9) |
| Journals or scholarly publications - on-line | 204 (67.1) | 108 (35.5) | 89 (29.3) | 40 (13.2) | 33 (10.9) |
| The Internet | 265 (87.2) | 17 (3.6) | 34 (11.2) | 33 (10.9) | 17 (3.6) |

*Participants were asked to check all that apply.

As Table 4 indicates, participants sought information on selected pedagogical topics with varied frequency. About one-quarter sought support-type educational materials (videos and/or graphics) weekly. In addition, about half sought information on learning styles about once a year. Participants indicated educational resources such as graphics or lecture slides were sought most. A little over one-quarter of participants sought information on teaching resources most, whereas very few participants sought information on classroom management most. The easiest information for participants to obtain was videos and/or graphics with 145 participants selecting this type of educational resources. PowerPoint slides and/or lectures were the next easiest to obtain with 69 selecting this response. Information on learning styles and classroom management were the hardest information for participants to obtain.

These results, when considered together with information about what information is most frequently sought, suggest that information about teaching methods would be a key component of a teaching resources web site. Videos and graphics would also be an important component of the side, as this would provide a convenient and trustworthy source of learning objects frequently sought by agricultural faculty. Additionally, a community of practice section, similar to the networks currently being implemented through extension could be included to provide a forum for solving problems and sharing ideas in near real-time (Sobrero and Craycraft, 2008).

Over half of the participants indicated that their pedagogical resource needs are not being met or they are unsure if they are being met (Table 5). However, 42.2% did indicate they are meeting their current resource needs. In addition, participants were interested in a website that housed pedagogical resources for agricultural teaching faculty. Almost three-fourths of participants were interested in a website of pedagogical resources, whereas only 13 were not (Table 6). This interest in an opportunity to share resources and experiences with colleagues was also reported by Jepson et al., (2005) who found that the most beneficial component of a 14-institution animal science consortium was the exposure to current practices of other professionals. The high interest in the proposed website may also be related to the relatively large proportion of Assistant Professors in the organization. Rocca (2010) reported that most new faculty have a strong need for professional development opportunities by which their teaching effectiveness can be improved.

**Table 4. How Often Post-Secondary Agricultural Faculty Seek Information from any Source on Selected Topics (N=304)**

| Topics | Daily n (%) | Weekly n (%) | Monthly n (%) | Yearly n (%) | Rarely n (%) | Not at all n (%) |
|---|---|---|---|---|---|---|
| Classroom Management | 1 (0.3) | 12 (3.9) | 68 (22.4) | 90 (29.6) | 94 (30.9) | 39 (12.8) |
| Teaching Methods | 1 (0.3) | 27 (8.9) | 107 (35.2) | 126 (41.4) | 38 (12.5) | 5 (1.6) |
| Learning Styles | 0 (0.0) | 5 (1.7) | 57 (18.8) | 147 (48.5) | 81 (26.7) | 13 (4.3) |
| Educational Resources - Videos or graphics | 13 (4.3) | 80 (26.4) | 96 (31.7) | 66 (21.8) | 33 (10.9) | 15 (5.0) |
| Educational Resources - PowerPoint slides or lectures | 12 (3.9) | 54 (17.8) | 94 (30.9) | 63 (20.7) | 41 (13.5) | 40 (13.2) |

In conclusion, the results of the present study indicate that a website devoted to sharing pedagogical strategies and resources is needed. Most participants regularly seek information about teaching resources, but fewer than half of the

**Table 5. Post-Secondary Agricultural Faculty Current Pedagogical Resource Needs (N=282)**

| Are pedagogical resource(s) needs being met? | *n* | % |
|---|---|---|
| Yes | 119 | 42.2 |
| No | 64 | 22.7 |
| Not sure | 99 | 35.1 |

**Table 6. Post-Secondary Agricultural Faculty Interest in a Systems Teaching and Learning Resources Website (N=286)**

| Interested in a teaching resources website? | *n* | % |
|---|---|---|
| Yes | 221 | 72.7 |
| No | 13 | 4.3 |
| Not sure | 51 | 16.8 |

participants said their teaching information needs are being met. This site would likely be used by NACTA members, as 73% indicated interest in a resource-sharing website. This site would represent a source that is both reliable and convenient, which are two characteristics that most participants said are important when selecting pedagogical resources. In addition, the Internet was cited as the most convenient but least trusted source. Perhaps an Internet resource that compiled information from trusted sources would be both beneficial and utilized by NACTA members.

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# Factors Associated with Student Success in an Introductory Plant Science Course

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## Abstract

It is important to understand those factors that determine whether a student will excel or struggle in their university studies. A study was conducted to determine the characteristics that influence students' course performance and how student study habits change during the semester in order to facilitate better course performance in a plant science course at [State] University. The descriptive-correlational study was based on data collected from students enrolled in a plant science course at the beginning and end of the semester as part of a larger study. A total of 107 students participated in the study. Most students were freshmen animal science majors enrolled in the course as part of their degree requirements. Student study and exam preparation time increased over the course of a semester, while course attendance decreased. Student characteristics associated with a high grade in the course were: ACT score, semester GPA, sex, class attendance, and age. Recommendations for future students based on these observations include attending class regularly and studying course content at least three hours each week.

## Introduction

For many institutions, high standards on college entry examinations ensure, to a degree, that only the best and brightest students are accepted. As such, it is important to determine why some students thrive and succeed in college and others struggle and eventually drop out of college altogether (Zusho et al., 2003). One reason may be that, in general, "Many students seem to be poor judges of their likely performance on pending examinations" (Stinson and Zhao, 2008, p. 33). Another reason students fall short of their potential intellectually is because of a lack of self-discipline (Duckworth and Seligman, 2005). Students must have initiative and persistence regarding their coursework in order to succeed academically. Past studies have shown that self-discipline is a major factor related to academic performance. Specifically, Wolfe and Johnson (1995) noted that self-discipline was a strong predictor of students' grade point average (GPA). Tangney et al. (2004) found that a strong relationship existed between college students' self-discipline and their final grades in the course.

Further, McKenzie and Schweitzer (2001) found that students' prior academic performance, level of self-efficacy, and employment status were predictive of grades attained at the university. Pantages and Creedon (1975) supported the notion that past academic performance (i.e., high school GPA; high school rank) is the best predictor of future success. Additionally, the authors noted that students' study habits, or lack thereof, can be predictive of academic success or failure in college. Further, Remer (1993) concluded that large, required courses likely have higher rates of absenteeism than smaller, upper-level courses.

At [State] University, PLNT 1213 is a course offered to students as part of the core curriculum of the college and therefore is a required or controlled-elective course for students in many majors. However, not all students within the College are expected to take PLNT 1213. In some majors, this course is listed as an elective. Wachtel (1988) noted that the "electivity" of a course can influence students' perceptions regarding the utility of the course. In fact, Wachtel hypothesized that students have a lower inherent interest in "required" courses and therefore rate the course and instructor more poorly than "elective" courses.

Conceptually, this study was framed on the self-determination theory of motivation (Ryan and Deci, 2000). Self-determination is based upon an individual's motivation, personality, and level of self-regulation (Ryan and Deci, 2000). People who are internally motivated have higher levels of self-efficacy and are more interested, passionate, and resilient about achieving a particular task, which leads to better persistence and performance overall (Deci and Ryan, 1991). In contrast, people who are extrinsically motivated are urged by fear and the thought of being exposed if they do not perform up to standard (Ryan and Deci, 2000). Therefore, self-determination (i.e., study habits and attendance) may contribute to students' performance and end-of-semester grades.

The purpose of this study was to determine the characteristics that influence students' course performance and how study habits of students change during the semester in order to facilitate better course performance by students in a plant science course at [State] University. The following objectives guided the study.

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1. Describe the personal characteristics of students enrolled in PLNT 1213.

2. Describe the academic characteristics of students enrolled in PLNT 1213.

3. Describe participants' final grades and semester GPAs based upon taking PLNT 1213.

4. Describe class attendance and study habits of students enrolled in PLNT 1213.

5. Describe changes on time students spent studying throughout the semester in PLNT 1213.

6. Describe the relationship between reported participant characteristics and final grades in PLNT 1213.

## Methods

This descriptive-correlational study relied on data collected from students enrolled in a plant science course (PLNT 1213) in the College of Agricultural Sciences and Natural Resources (CASNR) at [State] University in spring 2010. Data presented in this manuscript were collected at the beginning and end of the semester as part of a larger study to assess students' academic characteristics, motivation related to the course, and involvement (Institutional Review Board project AG-10-7). The instrument used for the study was adopted from the Expectancy-Value measurement originally developed by Wigfield and Eccles (2000) and later adapted by Eklöf (2006). Because this research is part of a larger study, only portions of the Expectancy-Value measurement were used. The questions presented in this manuscript included questions with open-ended responses (e.g., "How many hours do you study each week?") and categorical responses (e.g., "Have you taken this course previously?"). Prior to its administration, the instrument was evaluated by a panel of teaching faculty to ensure face and content validity. The questionnaire was administered twice during the spring 2010 semester – once by an undergraduate assistant at the beginning of a lecture period in February and later by a departmental staff member in April. Only those students who remained enrolled throughout the semester were considered for the study. In all, 107 students participated in the study with 56 students responding during both evaluations.

Data were analyzed using Statistical Analysis Software v 9.2 using the CORR and FREQ procedures (SAS, 2008). Descriptive statistics and correlations were used by the researchers to describe and explain the population of the study more fully (Davis, 1971; Miller, 1994).

## Results and Discussion

Objective one sought to describe the personal characteristics of students enrolled in the study. Because PLNT 1213 is an introductory-level course required for many students in CASNR, the student population of this course is more diverse than in other courses in the college. Almost three-fourths of these students were born between 1989-1991, indicating that they were between 19 and 21 years of age (Table 1). Of these students, a majority (92%) identified themselves as white, with the remaining 8% selecting American Indian/Alaska Native or Hispanic as their ethnicity. The 92% of white students who participated in the study were in excess of the 82% of students campus-wide ([State] Institutional Research and Information Management). Further, two-thirds (66%) of the students were female, in comparison with 50.4% in CASNR and 48.5% within [State] University ([State] Intuitional Research and Information Management).

**Table 1. Personal Characteristics of Students (N=107) Participating in the Study**

| Characteristic | Frequency | Percent |
|---|---|---|
| Age (year of birth) | | |
| 1991 | 26 | 24.30 |
| 1990 | 30 | 28.04 |
| 1989 | 23 | 21.50 |
| 1988 | 18 | 16.82 |
| <1988 | 10 | 9.35 |
| Race | | |
| white | 98 | 91.59 |
| American Indian | 7 | 6.54 |
| Hispanic | 2 | 1.87 |
| Sex | | |
| male | 36 | 33.64 |
| female | 71 | 66.36 |
| Marital status | | |
| single | 106 | 99.07 |
| married | 1 | 0.93 |

Objective two was to describe the academic characteristics of students participating in the study. Most of the participants (67%) were classified as either freshmen or sophomores (Table 2). The majority of participants were animal science majors (60%), many of whom also indicated they were in the pre-veterinary option (data not shown). Participants majoring in degree programs associated with the agricultural education, communications, and leadership department and the agricultural economics department each accounted for more than 10% of the respondents. Fewer than 5% of the participants were majoring in any other degree program, including plant and soil sciences. Greater than 95% of the respondents reported taking the course as a degree requirement for their academic major. Self-reported ACT scores ranged from 16 to 34. Seventy-seven

**Table 2. Academic Characteristics of Students (N=107) Participating in the Study**

| Characteristic | Frequency | Percent |
|---|---|---|
| Classification | | |
| freshman | 42 | 40.00 |
| sophomore | 28 | 26.67 |
| junior | 26 | 24.76 |
| senior | 9 | 8.57 |
| Major | | |
| agribusiness | 7 | 6.60 |
| agricultural communications | 12 | 11.32 |
| agricultural education | 7 | 6.6 |
| agricultural leadership | 3 | 2.83 |
| agricultural economics | 5 | 4.72 |
| animal science | 64 | 60.38 |
| plant and soil sciences | 3 | 2.83 |
| animal sci. double major | 3 | 2.83 |
| other | 2 | 1.89 |
| Reason for taking the course | | |
| required | 101 | 95.28 |
| controlled elective | 3 | 2.83 |
| free elective | 2 | 1.89 |
| Previous enrollment | | |
| yes | 5 | 4.67 |
| no | 102 | 95.33 |
| ACT score | | |
| >29 | 5 | 5.21 |
| 25-29 | 32 | 33.33 |
| 20-24 | 42 | 43.78 |
| <20 | 17 | 17.17 |

percent self-reported scoring between a 20-29 on the ACT, while five reported scoring above a 29 (Table 2). The mean ACT score reported by participants in the study was 23.7. This score is more than one point less than the average ACT score (24.8) for all freshmen entering [State Institution] between 2006 and 2009 ([State] IRIM).

Objective three sought to describe participants' final grades in the course and semester GPAs (taken from student records; "A" = 4.0) based upon taking PLNT 1213. Actual final grades for students participating in the study ranged from "A" to "F", with only 9% of participants earning a "D" or "F" (Table 3). Nonetheless, the most frequently earned grade was an "A" for students participating in the study (43%). Seventy-five percent of the participants in this study earned a grade of "B" or better. This finding is in excess of the average GPA per semester, where only 60% of the students earned a 3.00 ("B") or higher during the spring 2010 semester. The mean final GPA of participants participating in the study was 2.96 (data not shown).

Objective four sought to describe class attendance and study habits of students enrolled in PLNT 1213. Most students (98%) who participated in the study indicated they attended class all three days each week (Table 4). However, fewer participants (87%) indicated that their friends attended class all three days each week. Class attendance is not required; however it is rewarded with opportunities to earn points on in-class activities and assignments.

Over half (51%) of the respondents reported spending between one and 2.9 hours studying each

**Table 3. Participants' (N=107) Final Course Grades and Semester Grade Point Averages**

| Characteristic | Frequency | Percent |
|---|---|---|
| Grade Earned in course[z] | | |
| A | 46 | 43.40 |
| B | 33 | 31.13 |
| C | 18 | 16.98 |
| D | 7 | 6.60 |
| F | 2 | 1.89 |
| Grade point average in semester | | |
| 3.60-4.0 | 24 | 22.64 |
| 3.0-3.59 | 40 | 37.74 |
| 2.60-2.99 | 16 | 15.09 |
| 2.0-2.59 | 14 | 13.32 |
| <2.0 | 12 | 11.32 |

[z]Two participants withdrew from the course before the end of the semester

**Table 4. Class Attendance and Study Habits Reported by Students (N = 107) Participating in the Study**

| Characteristic | Frequency | Percent | Mean | Standard Deviation |
|---|---|---|---|---|
| Weekly class attendance | | | 2.98 | 0.14 |
| 1 day | 0 | | | |
| 2 days | 2 | 1.87 | | |
| 3 days | 105 | 98.13 | | |
| Friends' weekly class attendance | | | 2.85 | 0.41 |
| 1 day | 2 | 1.92 | | |
| 2 days | 12 | 11.54 | | |
| 3 days | 90 | 86.54 | | |
| Weekly study time | | | 2.45 | 1.65 |
| <1 hour | 11 | 10.38 | | |
| 1 – 2.9 hours | 54 | 50.94 | | |
| 3 – 6 hours | 40 | 37.74 | | |
| > 6 hours | 1 | 0.94 | | |
| Friends' weekly study time | | | 2.27 | 1.72 |
| <1 hour | 16 | 16.16 | | |
| 1 – 2.9 hours | 48 | 48.48 | | |
| 3 – 6 hours | 35 | 35.35 | | |
| > 6 hours | 0 | 0 | | |
| Time preparing for exams | | | 3.90 | 2.68 |
| <1 hour | 3 | 2.80 | | |
| 1 – 2.9 hours | 35 | 32.71 | | |
| 3 – 6 hours | 55 | 51.40 | | |
| > 6 hours | 14 | 13.08 | | |
| Friends' time preparing for exams | | | 3.44 | 2.14 |
| <1 hour | 5 | 5.38 | | |
| 1 – 2.9 hours | 33 | 35.48 | | |
| 3 – 6 hours | 47 | 50.54 | | |
| > 6 hours | | 8.60 | | |
| Read syllabus | | | - | - |
| yes | 93 | 87.74 | | |
| no | 13 | 12.26 | | |

week. Thirty-eight percent of the participants reported that they spent between three to six hours studying each week. Similar to the responses for attendance, participants reported that they generally spent slightly more time studying each week and preparing for examinations than their friends. When considering the duration of the semester, we found that students increased their study and examination preparation time; yet, their course attendance decreased.

Objective five sought to describe changes in time students spent studying throughout the semester. When comparing responses of the same participants early (February) and late (April) in the semester, participants' mean self-reported attendance was similar in April and February, although the number of participants who said they attend class all three days decreased from 100% to 97% (Table 5). Perceived attendance of friends showed a similar pattern, with the number of participants who said their friends attended class all three days decreasing from February to April. Even though attendance dropped, most participants still reported that they and their friends attended class all three days each week. Data revealed a slight decline in student attendance from February to April. Similarly, the data revealed a larger decline in students' perceptions regarding their friends' attendance throughout the semester.

Mean time spent studying by participants and their friends was unchanged from February to April (Table 5). However, the distribution of student responses varied. Both the number of participants who spent less than three hours studying at the beginning of the semester decreased, while the number of participants studying three to six hours increased. When asked about their friends' weekly study time, more participants reported that their friends studied three or more hours in April than in February. The number of participants spending in excess of six hours preparing for exams also increased from February to April. The responses for friends' examination preparation time were similar to responses for friends' weekly study time. More students believed their friends spent three or more hours preparing for examinations in April than in February.

Objective six sought to describe the relationship between reported participant characteristics and their final grades in the course. The characteristic most highly associated with final grade in PLNT 1213 was semester GPA (Table 6). Specifically, according to Davis (1971), semester GPA had a very high and positive (.81) relationship to students' final grade. Also, ACT score was found to have a moderate and positive correlation with students' final grade. Other characteristics correlated with final grade were sex, attendance, and age.

**Table 5. Changes in Reported Attendance and Study Habits Reported byStudents (N = 59) Early (February) and Late (April) in the Semester**

| Characteristic | Frequency | | Percent | | Mean | | Standard Deviation | |
|---|---|---|---|---|---|---|---|---|
| | February | April | February | April | February | April | February | April |
| Weekly class attendance | | | | | 3.0 | 2.97 | 0 | 0.18 |
| 1 day | 0 | 0 | 0 | 0 | | | | |
| 2 days | 0 | 2 | 0 | 3.39 | | | | |
| 3 days | 59 | 57 | 100 | 96.61 | | | | |
| Friends' weekly class attendance | | | | | 2.93 | 2.74 | 0.26 | 0.55 |
| 1 day | 0 | 3 | 0 | 5.17 | | | | |
| 2 days | 4 | 9 | 7.14 | 15.52 | | | | |
| 3 days | 52 | 46 | 92.86 | 79.31 | | | | |
| Weekly study time | | | | | 2.41 | 2.52 | 1.66 | 1.69 |
| <1 hour | 5 | 6 | 8.62 | 10.17 | | | | |
| 1 – 2.9 hours | 34 | 27 | 58.62 | 45.76 | | | | |
| 3 – 6 hours | 18 | 25 | 31.03 | 42.24 | | | | |
| > 6 hours | 1 | 1 | 1 | 1.69 | | | | |
| Friends' weekly study time | | | | | 2.07 | 2.45 | 1.64 | 1.93 |
| <1 hour | 10 | 8 | 18.52 | 14.55 | | | | |
| 1 – 2.9 hours | 30 | 26 | 55.56 | 47.27 | | | | |
| 3 – 6 hours | 14 | 18 | 25.93 | 32.73 | | | | |
| > 6 hours | 0 | 3 | 0 | 5.46 | | | | |
| Time preparing for exams | | | | | 3.81 | 4.60 | 2.00 | 2.73 |
| <1 hour | 2 | 1 | 3.39 | 1.72 | | | | |
| 1 – 2.9 hours | 17 | 14 | 28.81 | 24.14 | | | | |
| 3 – 6 hours | 33 | 33 | 55.93 | 56.90 | | | | |
| > 6 hours | 7 | 10 | 11.86 | 17.24 | | | | |
| Friends' time preparing for exams | | | | | 3.49 | 4.14 | 1.93 | 2.44 |
| <1 hour | 2 | 1 | 3.92 | 1.82 | | | | |
| 1 – 2.9 hours | 25 | 14 | 49.02 | 25.46 | | | | |
| 3 – 6 hours | 19 | 32 | 37.25 | 58.18 | | | | |
| > 6 hours | 5 | 8 | 9.62 | 14.55 | | | | |

**Table 6. Correlation of Student Characteristics with Final Grade**

| Characteristic | Spearman's Correlation Coefficient (ρ) | Probability > ρ (p) |
|---|---|---|
| ACT score | 0.407 | <0.0001 |
| Semester GPA | 0.811 | <0.0001 |
| Sex | 0.222 | 0.022 |
| Weekly attendance | 0.199 | 0.041 |
| Age | 0.169 | 0.08 |
| Previous enrollment in course | 0.132 | 0.176 |
| Time spent preparing for exams | 0.109 | 0.266 |
| Marital status | 0.102 | 0.299 |
| Race | -0.010 | 0.309 |
| Major | 0.092 | 0.354 |
| Friends' weekly attendance | 0.089 | 0.373 |
| Classification | -0.085 | 0.389 |
| Friends' time spent preparing for exams | 0.086 | 0.414 |
| Weekly study time | -0.029 | 0.468 |
| Read syllabus | -0.053 | 0.590 |
| Friends' weekly study time | -0.041 | 0.687 |
| Reason for enrolling | -0.012 | 0.903 |

In terms of sex, female participants were more likely to earn a higher grade than male students. This finding contradicts a study by Wilson (2002) who found that, gender was not associated with course performance in a computer science course. Weekly attendance and age were both positively correlated with students' final grade. Low course attendance has been associated with low course grades in previous research (Romer, 1993). The current findings for student age are also supported by previous research (Tucker, 2009) who suggested that age may be a determining factor of student success in introductory courses with older students earning higher grades.

## Conclusions

The data suggest that most of the factors associated with student achievement are factors the student cannot control, i.e., past performance on college entrance examinations, sex, and age. However, these data also suggest that students who attend class regularly are more likely to succeed than those students who do not. Additionally, the students who earned high grades in this course were also more likely to excel in their other courses. This finding could be a testament to these students' having higher expectations and values related to their education than those students who perform consistently worse in their coursework. Further, this conclusion is consistent with the findings of Pantages and Creedon (1975) who found that past academic performance (i.e., high school GPA; high school rank) is the best predictor of future success. This finding also resonates with previous research by Wolfe and Johnson (1995) who found that self-discipline was a strong predictor of students' grade point average and Tangney et al. (2004) who found that a strong relationship existed between college students' self-discipline and their final grades in the course.

Specifically, overall semester GPA was the characteristic that had the highest relationship with final grades. In fact, it had a "very high" association to final grades. This finding closely aligns with previous research by Park and Kerr (1990) who found that students' performance on college entrance examinations and performance in other courses are the key determinants in predicting a student's course grade.

Tangney et al. (2004) found that a strong relationship existed between college students' self-discipline and their final grades in the course. However, when accounting for self-discipline (i.e., time spent studying for exams) on students' final grade in PLNT 1213, it was noted that a low, positive relationship existed. This may be because students are poor at describing their efforts accurately (Stinson and Zhao, 2008). Or, it may be that they are not being taught good study habits prior to enrolling in college. Further research is needed to answer this question.

This study further revealed that students invested more time studying course materials but less time actually attending class as the semester progressed. Perhaps this was because students were motivated externally rather than intrinsically (Ryan and Deci, 2000) and therefore did not have a deep affinity for the course. Or, perhaps students failed to recognize the meaning and relevance of the course to their future careers. Future research should investigate this phenomenon.

Wachtel (1988) found that the type of course can have an influence on students' perceptions of how useful the course is to them. Specifically, Wachtel hypothesized that students are less interested in "required" courses and more interested in "elective" courses. However, this study found no support for that claim. In fact, "reason for enrolling" in the course was negligible regarding its association with final grade in the course. Therefore, this study should be replicated in other course settings and in other states to determine if study habits, examination preparation time, and performance vary between "required" and "elective" courses.

Finally, these results provide the course instructor with practical information that may help future students excel in the course. Although generalizing the results beyond the scope of this study is cautioned, data now exists that can inform future PLNT 1213 students that if they desire a high grade in the course, they need to attend class regularly and study course content at least three hours each week.

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# Communicating Strategically with Generation Me: Aligning Students' Career Needs With Communication about Academic Programs and Available Careers[1]

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## Abstract

Many academic programs in agriculture struggle with recruiting qualified students. Why are students choosing to enter other fields of study instead of agriculture? The purpose of this study was to determine students' perceptions and awareness about academic agricultural programs. A set of three focus groups were conducted, which consisted of 1) students inside a specific academic program, 2) students outside of the program but within the college of agriculture, and 3) students outside of the college of agriculture but enrolled in an introductory agriculture class for non-majors. Questions were asked regarding students' career and major choices, and perceptions about a specific program of study. The results showed that students were initially unaware of careers available in this area and had a negative impression of careers in the agricultural field. However, after hearing about available careers, their perceptions were positive, and they expressed the need for more marketing and branding of the industry so that students would be aware of careers available in this field. A major implication of this study is the need to address students' lack of awareness with respect to the diverse range of careers and employer organizations within agriculture. Future research is recommended to determine how to develop effective strategic communication plans for academic programs in agriculture.

Keywords: student recruitment, college of agriculture, career choices, college students

## Introduction

Colleges and universities can no longer rely on simply knowing how to communicate. It is essential that institutions also know how to communicate effectively. To thrive in today's marketplace, an institution must communicate strategically with its publics, including but not limited to donors, students, alumni, prospective students, and parents (Smith, 2002). While improving communication at all levels are important when working to build a strong reputation (Fill, 2002), for recruitment programs to entice the highest caliber of students, it is imperative to assess the current state of their communication from a student's perspective as to what is effective and meaningful.

The triad mission of the land grant institution and the value of an agriculturally related education have historically been supported by stakeholder groups without much attention to public relations or marketing (Kelsey and Mariger, 2003). The land grant institution offers a unique experience and is often the only place where a student can obtain a degree with an agricultural focus; however, there is an increased need for developing a diverse population of students and support within these institutions (Kellogg Commission, 2001). As times change and the population of the United States is further removed from production agriculture, these institutions have a greater need for a strategic approach to communication in order to recruit the next generation of leaders. Today, in addition to agriculture, a land grant education may include a myriad of areas of interest ranging from communication to science, technology, and pre-professional options like medicine (University of Florida, 2008).

While all colleges and universities are concerned with the recruitment of students in quantity and quality (Montmarquette et al., 2002), agricultural programs of study struggled with a significant decline in enrollment in the 1980s and 1990s (Donnermeyer and Kreps, 1994). Numerous studies were conducted to determine the exact cause of this decline, primarily by researching students' choice (DesJardins and

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Hendel, 1999; Chapman, 1981). However, no one cause was established. In more recent years, enrollments in colleges of agriculture have actually increased, but the increase has been in the areas of business, social sciences, and pre-professional track programs, while other program areas have seen a decline in enrollment (personal communication, E. Turner, 2009).

Over the last decade, the competition to get admitted to a college or university has increased astronomically, as a direct result of more students wanting to pursue a college education. In 1990, 55% of high school sophomores said they intended to graduate from a four-year college, compared to 80% in 2002 (Twenge, 2006). Demands for perfect grades and above average SAT/ACT scores are a minimum requirement to get in to many top colleges and universities. Harvard notoriously rejects 50% of applicants with perfect SAT scores, Ivy League schools only accept an average of 10% of applicants, and these high standards are trickling down to land grant institutions and state schools. For example, the majority of the University of Wisconsin's 2004 freshmen were in the top 10% of their class (Twenge, 2006).

The number of students entering pre-professional track programs as freshmen is growing, but only a small number of these students will eventually be accepted to professional programs like medical, law, or veterinary schools. National acceptance rates into these programs range from 4-10% (Twenge, 2006). There is certainly an opportunity for academic programs that have declining enrollment to recruit students internally who have decided that the pre-professional track will not work for them or that this decision has been made for them because they do not meet the extreme standards for acceptance (personal communication, E. Turner, 2009).

Students facing growing competitive entrance standards and increased pressure to, at a minimum, acquire a bachelor's degree, are a part of a new generation that has never known a time without the Internet nor a world where duty was more important than self (Twenge, 2006). This generation has many names: millennials, igeneration, generation Y, or generation ME (Twenge, 2006). Typically, this generation starts with those born after 1992 (Provitera-McGlynn, 2005) though some suggest it starts as early as those born after 1982 (Twenge, 2006). Marketing studies have found that the generation a person was born in is more likely to influence decision making than income, sex, or education (Twenge, 2006), thus it is imperative that researchers determine how this generation communicates and interacts (Provitera-McGlynn, 2005) in order to effectively recruit students.

## Literature Review

### *Marketing in Higher Education*

Marketing and public relations on college campuses have progressed considerably since a study in 1966 reported that the most important function of the college informational program was press relations (Steinberg, 1966). Today, the central purpose of marketing and public relations activities in general are broader in their definition. These activities now include mitigating damages, responding to the needs of key stakeholders, responding to organizational crises, and restoring and maintaining favorable reputation (Seeger et al., 2001). Additionally, it is important to build relationships with stakeholders (Fill, 2002), including prospective students, in the place where they are the most comfortable interacting (Provitera-McGlynn, 2005).

Studies have determined that prospective students have a desire to find out if a program is a good match for their interests before they make a decision on a college or a major (DesJardins and Hendel, 1999). Thus, an academic program should communicate its strengths accurately in order to engage the correct type of student for their goals (Stewart, 1991). In order to communicate these strengths, a program must know where it fits within industry requirements for graduates. The understanding of a program's position within the market should be the first step in any recruitment planning process (Hossler, 1999).

### *Academic Programs in Agriculture*

The scope of academic programs in agriculture at land grant institutions continues to evolve. However, at the core of the wide span of programs are a myriad of plant and animal related majors (National Science Foundation, 2009). National employment opportunities for U.S. college graduates with expertise in food, agricultural, and natural resources remain high, with an estimated 52,000 annual job openings for new graduates during 2005-2010. Yet, there are not enough qualified college graduates in these areas, with only an estimated 32,300 food, agricultural, and natural resources college graduates expected annually during this same time frame (USDA CSREES, 2005-2010). While many agricultural program areas without pre-professional track options are suffering from a decline in enrollment (personal communication, E. Turner, 2009).

One specific academic program area that is struggling with enrollment nationally is that of ornamental horticulture (FAEIS Reports, 2008). In this study, ornamental horticulture has been defined as a discipline of horticulture concerned with growing and using flowering and ornamental plants for gardens, landscapes, and floral display. Horticultural science nationally has dropped in enrollment from 3,484 in 2003 to 2,559 in 2007 and specifically ornamental horticulture dropped from 495 in 2003 to 301 in 2007 (FAEIS Reports, 2008). In the past, a

plethora of students from traditional agricultural backgrounds with an interest in all facets of the industry from production and managerial positions to sales and marketing were attracted to a major in ornamental horticulture (Fretz, 1991). However, with the shift from production agriculture that has been seen across the U.S., this major has likewise been affected and has seen a decline in enrollment (Rom, 2004). During this period of national decline, some ornamental horticulture programs have seen a slight increase in enrollment. From fall of 2002 to the fall of 2008, the University of Florida had an increase in students from 56 to 80 (UF College of Agriculture, 2008). However, this increase in a few programs has not been able to stop the trickle-down effect to employment in the industry. The ornamental horticulture industry is struggling to find and retain qualified students to fill positions in the field (Rom, 2004). This is a $20.1billion industry in the United States (U.S. Bureau of Economic Analysis, 2008) and is of major importance to the state of Florida's economy with total sales of nursery, landscape service firms, and horticulture retailers totaling $15.2 billion in 2005 (Florida Gardening, 2009). The ornamental horticulture industry has more than 500 positions available nationally each year and as little as 400 students graduating in this area annually, some of whom go into other industries (National Center for Educational Statistics, 2007).

## Purpose and Objectives

In order to determine the position of academic programs of agriculture in the market place, as suggested by Hossler (1999), it is important to explore the perceptions and level of awareness of current and potential students. An assessment of where students stand in terms of attitudes and awareness will be valuable in improving recruitment communication and guidelines (Wildman and Torres, 2001). Thus, the purpose of this study was to determine students' perceptions and awareness about academic agricultural programs. For the purpose of this study, one academic program, ornamental horticulture, was chosen as an example of an agriculture program area that is struggling to find enough qualified students. Though the ornamental horticulture industry struggles with issues specific to their industry, they are not unlike other academic agricultural programs in their decline of student enrollment (Wildman and Torres, 2001) and communication challenges (Kelsey and Mariger, 2003). In this study, ornamental horticulture has been defined as a discipline of horticulture concerned with growing and using flowering and ornamental plants for gardens, landscapes, and floral display. The following research objectives were developed to guide this study:

- Objective 1: Determine students' key influences when choosing a major or career;
- Objective 2: Investigate students' awareness and perceptions of a career in agriculture;
- Objective 3: Identify students' barriers and constraints in choosing a specific academic program of agriculture as a career.

## Methodology

This study used a set of three focus groups comprised of representative members of the target audience of current college students. A market research firm was hired and used Computer Assisted Telephone Interviewing (CATI) telephone random digit dialing (RDD) sampling to qualify potential participants. Probability samples were generated using a predetermined sampling frame based on demographic variables for groups one and two. The third group was a purposive sample recruited by researchers through the University of Florida's Environmental Horticulture Student Organization. The first two focus groups were conducted on November 17, 2008, and the last focus group was conducted on November 18, 2008. Focus group research has long been prominent in marketing studies in part because market researchers seek to tap emotional and unconscious motivations not amenable to the structured questions of conventional survey research (Morgan, 1998). A protocol was developed to guide all three focus groups using the procedures set forth in Krueger's (1998) book, *Developing Questions for Focus Groups*. The protocol was used to guide the discussion and to keep the focus groups consistent between groups. The protocol was reviewed by a panel of experts for face and content validity. Additionally, the protocol was sent to the Institutional Review Board and received approval that participants rights were not violated in this study. Moreover, a written informed consent was signed by each participant prior to the start of each focus group session. All focus groups were video and audio recorded for transcription. Transcripts from the focus groups were imported into Weft QDA software to be analyzed in accordance with Glaser's (1965) constant comparative method. Researchers worked to remain unbiased throughout the process, which was aided by the fact that none of the researchers had direct affiliations or ties to the industry of interest. While this research was funded by the American Floral Endowment, no one from their organization was involved during the research process and all information was analyzed without their involvement.

## Demographics

The total number of participants in all three focus groups was 28; a breakdown of the demographics of all three groups can be seen in Table 1. The first group consisted of students who were enrolled in an introductory plant class for non-majors, all outside of a college of agriculture. The purpose of separating this group from the others was to determine if the perceptions and knowledge of students outside of a

college of agriculture were different from those inside. Additionally, it was of interest to the researchers to determine what information about careers in agriculture was learned by students in an introductory plant class for non-majors. It proved of additional interest that this group had more upperclassmen than group two (Table 1). The second group consisted of students who were majors within a college of agriculture, but not in one related to the academic agricultural program of interest, ornamental horticulture. The purpose of selecting this group was to see how students within a college of agriculture perceived a career in the academic program of interest, and to compare their views to the other two groups. Moreover, this group consisted of predominantly sophomores. The third group consisted of students who were enrolled in the academic program of interest to determine the reasons why they chose this path, and to compare them with the other groups. The third group was all upperclassmen.

**Table 1. Breakdown of Participants by Focus Group**

| | Group 1 | Group 2 | Group 3 |
|---|---|---|---|
| No. of Participants | 10 | 10 | 8 |
| Males | 3 | 3 | 3 |
| Femaes | 7 | 7 | 5 |
| Major in College of Agriculture | 0 | 10 | 10 |
| Enrolled in an Introductory Plant Class for Non-Majors | 9 | 0 | 0 |
| Ornamental Horticulture Major/Minor | 0 | 0 | 8 |
| Sophomores | 1 | 8 | 0 |
| Juniors | 5 | 1 | 5 |
| Seniors | 4 | 1 | 3 |

## Results

**Objective 1: Determine students' key influences when choosing a major or career.** In an effort to address this research question, participants in all focus groups were asked questions about how they approached decisions about their majors and careers. Some major themes about students' processes when seeking career information appeared. Key influences of students in this area were a passion for the industry, desire to be happy, money, stability, security, and ability to make a mark.

*Passion for the industry or subject*

The majority of participants sought information about a career because of a passion that they felt for that industry or subject. One participant explained, "I chose my career because I have a passion for it, and I saw this as my opportunity to make a difference in the lives of young people." After this initial passion, students moved to the adults within their social systems for advice or guidance. In some cases, students looked at the adults around them to inspire passion for a certain career. One participant explained this by saying, "I look at people that I admire or that have jobs that I think would be a lot of fun for me to do and I see they have passion for it and I feel like I have similar passions or interests."

Although the majority of the participants chose their major because of a passion, there were a few exceptions to this. Some participants were not sure what they wanted to do and, thus chose a major by convenience. One participant summed this up by saying, "I think I kind of picked my major by default, because I had a lot of credit coming in that fulfilled it and I could pretty much graduate really soon or like take all the electives I wanted to."

*Desire to be Happy vs. Money*

Many of the participants expressed a desire to be happy in their intended career choice. This attitude was repeated in all three groups, although it was expressed more often in the two focus groups that included participants from the college of agriculture. In general, students had the perception that they would be happy in their future careers. One participant expressed this in the following statement, "What more could you ask for? Wake up every day and get paid to do something you want to do that you would take off to do if you were doing a different job."

However, participants recognized they might have to weigh their happiness against the salary they would make for a job. The general consensus of the two groups with students in the college of agriculture was that happiness should come before money. One participant expressed this by saying, "I definitely think you have to weigh your happiness versus the salary. Cause like even if the salary's like really big, eventually you might hate it enough that it's not worth the money. Like you have to do something that makes you happy." However, in the focus group without any students from the college of agriculture money was perceived as being of major importance, and often more important than happiness. This group recognized they were planning to work in career fields with high stress and pressure to excel and compete, but were willing to it because of the salary. One participant went as far as to say, "…if the job will pay you enough I don't care how boring it is, I'll do it."

*Stability, Security, and Making a Mark*

Participants in all groups had similar responses to what characteristics of a career were important to them. All groups were concerned with the stability of the job and were extremely aware of the current down

economy. One participant summed up what he/she was looking for in a career as "Job security. Something that will be there. That you know for sure it will be there." Another participant explained this desire by saying, "…having a job that you can have especially with the way the economy is, knowing that you can graduate and have, yeah, job security is huge." Another major concern for students that was often lumped with other career concerns was their desire to leave a mark or make a difference with their career. One participant expressed this desire by saying, "I chose my career because I have a passion for it, and it was what I saw as my opportunity to make a difference in the lives of young people." Another typical participant response was, "Yeah, I think that's something, everyone wants to leave their mark, everyone wants to have that 'legacy' whatever it may be for them."

**Objective 2: Investigate students' awareness and perceptions of a specific career in agriculture.** In order to assess this objective, questions were asked of the two focus groups that were not already in a plant related major about their awareness of careers in ornamental horticultural. Some noticeable differences existed between the group that included students who had taken an introductory class for plant majors and those who hadn't. Key findings in this area included a limited knowledge of careers in the field of ornamental horticulture, initial negative perceptions of these careers, but a shift to the positive once exposed to available careers.

*Limited Knowledge of Careers in the Field and Negative Perceptions*

Participants who did not take the introductory plant class had limited knowledge about ornamental horticulture prior to being given a description. The majority of participants only knew that ornamental horticulture had something to do with flowers. One participant said, "Doesn't that like have something to do with flowers?" Some participants thought the only careers available would be working in a flower shop. More than that, participants were unaware of careers in this field at all. A typical response was "I had no idea about any of these opportunities." In fact, many participants were not only unaware about careers in ornamental horticulture and agriculture but actually expressed a negative impression about careers in agriculture by themselves and their peers. One participant said, "A lot of people have a negative connotation of agriculture." In contrast, participants who had taken the introductory plant class were knowledgeable about the types of careers available prior to being presented with the list of opportunities.

*Once Exposed to Available Careers, Attitudes were Positive*

Most, but not all, participants who took the introductory plant class for non-majors said they would have considered getting a minor or major in a plant related field if they had they taken the introductory course earlier in their college career. One participant expressed this by saying, "I'm taking the class and I'm loving it, and I actually wished I had taken it early before my senior year, because I might have at least gotten a minor in horticulture." Another participant expressed this with even more enthusiasm by saying, "I wish I had known that that minor existed because I probably would have done it. It might have even been my major if I had taken it early enough." After being presented a definition of ornamental horticulture and a list of career choices, most participants, but not all, had positive reactions to the possibility of employment in this field. One participant expressed this by saying, "I think it sounds cool because it takes some creativity in like how you want to engineer [flowers] and use them, and then also it uses the sciences because you have to understand how the plants grow and things like that so it's kind of a well-rounded deal." However, some participants were concerned for the security of a job in ornamental horticulture, because of the struggling economy, even after being told there were jobs available in this area.

**Objective 3: Identify students' barriers and constraints in choosing a specific academic program of agriculture as a career.** Participants perceived barriers to entering the field of ornamental horticulture were mixed, but included: Lack of knowledge of careers available, bad job market, not enough money, and not masculine enough. Participants in all focus groups were asked what barriers, if any, they would see for entering the ornamental horticulture industry. Additionally, participants believed these barriers could be overcome if the industry was more visible in their daily lives.

*Lack of Knowledge about Available Opportunities*

The majority of the participants felt that the largest barrier for them entering the field of ornamental horticulture was that they knew nothing about what it was or what it had to offer. A typical participant response was, "I have no idea what this job would generally entail." Other participants thought they had never seen a career available in this area. One participant expressed this by saying, "I don't think I've ever seen an [ornamental horticulture] career." Some participants expressed a need to be educated more on what career options were available in this area. One participant summed this up by saying, "educate us on what there is."

*Bad Job Market and Not Enough Money*

Participants were ask what barriers they saw for entering the field of ornamental horticulture after

hearing a description and viewing a list of careers available in the field. One common theme among all groups was the idea that the job market was not good for this career and they wouldn't receive enough money. It is important to note that salary and job market for this career were not information provided to participants. Participants expressed their concern about money and the job market in ornamental horticulture in a multitude of ways. One participant articulated a concern for money in this career area by saying, "I don't see this field as being able to pay me enough money." Another participant said, "I mean I sort of have this preconceived notion that the job market isn't that good for ornamental horticulture." Other participants expressed an interest in the industry, but found money to be a major barrier. One participant expressed this by saying, "I'd consider it as a hobby, but it doesn't pay enough for a career."

*Not Masculine Enough*

The majority of participants, both male and female, from all three focus groups thought men would be unwilling to work in the field of ornamental horticulture. One participant expressed this perception by explaining, "I think guys would be deterred from it just because its flowers." Other participants confirmed this perception by expressing their views in similar comments. Another participant said, "Very few men can actually say I sell flowers." All groups expressed this perception emphatically. Another participant went as far as to call the field "girly," as expressed in the following quote, "Flowers are kind of girly, in a really girly, girly sense."

*Need for Visibility of Companies in the Industry*

Participants expressed that ornamental horticulture companies should market themselves directly to recruit students through a well-developed brand. Participants felt that with other industries they know exactly what type of company and specific names of companies they might work for when they have completed a degree. They are aware of the names of the top engineering firms, or top accounting firms, but they don't know of any companies that would employee people in the ornamental horticulture industry. The students suggested partnerships to promote the companies at the same time as promoting their career options. One participant expressed this view by saying, "yeah, I mean I think the industry in general is just not that well known. I mean how many flower companies can you name? And how many engineering firms, how many financial firms, how many restaurants? There's just not that much visibility compared to other markets, and I think that the industry as a whole needs to promote that in general."

This was an area that all focus groups expressed a need for the ornamental horticulture industry to improve. Another participant said, "Well I think that just the general point is that they need to brand themselves in the industry." The concept of the industry needing to market or brand itself continued to arise. Another participant said, "By not marketing themselves and putting it out there, like there are jobs for you to get, it kind of makes it sound to people like us that there really isn't much of a job industry, since you never hear about them asking for people to work for them."

## Conclusions and Discussion

Overall, this study indicates an increased need for aligning students' career needs with communication about academic programs and available careers, as seen by students' desire to major or minor in a specific academic agricultural program once they were made aware of programs of study in this area and available careers. Additionally, this research provides support for the importance of marketing and branding the agricultural industry, as specifically requested by students. Although this study was limited to the one institution under study, key findings suggest that increased communication at all levels is necessary to recruit qualified students, which aligns with the corporate literature on building relationships and trustworthiness with stakeholder and customer groups (Fill, 2002).

Students' lack of awareness and knowledge about careers in an agricultural field parallels previous conclusions (Kellogg Commission, 2001); however, this study found that not only were students not aware of career opportunities in this area, they actually had an initial negative perception about being in a college of agriculture. Additionally, participants were under the impression that careers were not available in this academic program area and those that were available were low paying positions. Another key finding of interest was that students already in the college of agriculture were more likely to choose happiness in their future career over a large paycheck.

It is not surprising that students were not willing to enter into a major or program of study prior to learning about it, as previous studies have determined that prospective students have a desire to find out if a program is a good match for their interests before they make a decision on a college or a major (DesJardins and Hendel, 1999). It is noteworthy that once learning about this specific program of study, participants found it a favorable career option. This indicates that the barriers to recruitment are not related to problems with studying an agriculturally related field, but rather with their lack of knowledge about careers in these areas.

Many of the participants' concerns were about the image of jobs in the area of ornamental horticulture and/or agriculture. Some of these were specific to ornamental horticulture, like working with flowers not being a masculine occupation. However, some of these concerns were about agriculture overall, with participants indicating that it seemed antiquated or unable to pay them enough money. Thus, this

indicates an opportunity for an academic program in agriculture to communicate its strengths accurately in an effort to engage a student that is interested in their program and can identify mutual goals as suggested by Stewart (1991).

## Recommendations

Although this study is limited in that it represents a case study of one land grant institution, these findings may be transferrable and have implications for all academic programs of agriculture. In addition to the traditional influence of family, speakers in the classroom, teachers, and classroom experiences the results of this study indicate an increased need for marketing of not only academic programs, but agricultural businesses as well. Students were unlikely to choose a career if they did not recognize a company or organization in that field that they would work for once they completed their degree. Thus, it is recommended that institutions of higher education work with the agricultural industry to market and brand themselves so that students will be aware of careers available in the industry.

As evidenced by the results of these focus groups, what is important in a career to this generation of students is the idea of "leaving a mark" or a legacy through their work. This generation of current and incoming college students has been influenced by movements toward globalism and social outreach in the 1990s and 2000s. They are more likely to be civic-minded, open to volunteerism, and serve communities nationally and abroad (Jonas-Dwyer and Pospisil, 2004). This may explain their desire to seek careers that offer the opportunity to leave a legacy; therefore, communicating that aspect of agricultural careers would likely aid in recruiting students to lesser known majors in colleges of agriculture.

Interestingly, the results of this study indicate that students within the college of agriculture are more concerned with personal happiness than making money. Academic programs in agriculture, which may not pay competitive salaries with engineering firms or big business, should try recruiting students within the college of agriculture who have decided that the pre-professional track, or other program of study, will not work for them for any number of reasons.

Finally, the results of this study indicate an increased need to improve communication through a strategic communication process, which is regularly recommended in corporate communication (Smith, 2002). The students in this group recognized and saw other businesses as prominent in their daily lives, causing them to think about these as potential careers for their future. Future research is recommended to determine how to move forward with an appropriate strategic communication plan for academic programs of agriculture.

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# Relationships of Learning Styles, Grades, and Instructional Preferences

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## Abstract

This study tested purported relationships between Gregorc learning styles and self-reported instructional preferences of college students. Answers on an instructional preference survey were also compared to the grades achieved by the participating students in an introductory biology course. Many of the long-assumed correlations between learning style and instructional preferences were not found in this study. Only the trends for the concrete sequential learning style were largely in agreement with previous literature. Compared to other learning styles, concrete sequential learners reported a significantly higher preference for organized and structured lectures, the use of workbooks and lab manuals, and projects with well-defined instructions. Irrespective of learning style, some instructional methods were rated as highly favorable by most students. The highest preferences were indicated for active learning techniques, for organized lectures with visual aids, and for multiple choice test questions. High overall course grades were significantly correlated to preferences for studying and working alone and for a dislike of group projects and computer-assisted studying modules.

## Introduction

Many learning style models have been proposed to explain differences in how students perceive, process, interpret, and retain information. The classic literature (e.g., Dunn and Dunn, 1979; Gregorc, 1979) suggests that students with different learning styles should have distinct preferences for different instructional activities. However, the purported instructional preferences are largely only assumptions based on the described characteristics of people from different learning style groups. Few studies have attempted to provide data for self-reported instructional preferences, particularly for contemporary college students.

Bohn et al. (2004) found no significant differences in the most preferred instructional tools between students with different learning styles. However, in that study, definitive conclusions may be limited by the small sample size (N=44) and the specific focus on instructional methods as utilized within one particular course. Seidel and England (1999) found some agreement of purported learning style preferences with self-reported learning success/performance. However, preferences for several teaching methods and testing techniques were similar among all students, regardless of learning style. This study may also suffer from small sample sizes because the total sample was split into a large number of learning style categories, resulting in a maximum sample size per category of only 18 students.

One of the most widely-cited and well-established learning style models is that of Gregorc (1979), which uses two types of learning orientations (concrete and abstract) and two types of ordering orientations (sequential and random). These orientations are then combined to form four learning styles: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR). Most people show a preference for one or two of the learning styles and the Gregorc Style Delineator can be used as a self-administered test to determine learning style preferences (Gregorc, 1982a).

Instructional preferences for each of the four Gregorc learning styles have been postulated (Gregorc and Butler, 1984; Kaplan and Kies, 1993), based largely on the attributes described in Gregorc's original study (1979). Concrete Sequential learners reportedly prefer step-by-step directions, hands-on learning materials, and clearly organized lectures. Abstract Sequential learners have been described as being skilled at written, verbal, and image translation, preferring presentations with order and substance, and favoring abstractions and simulated experiences. Abstract Random learners purportedly are attuned to atmosphere and mood, prefer unstructured information and busy environments, and favor abstract, subjective experiences. Concrete Random learners are described as intuitively successful in unstructured problem-solving experiences, and show preferences for trial-and-error, concrete examples, and practice.

The main objective of this study was to compare the long-assumed instructional preferences of Gregorc learning styles with the self-reported instructional preferences of college students. Specifically, this three-year study, involving 173 students, compared Gregorc learning styles to self-reported instructional preferences of students enrolled in an introductory biology course.

This study was also designed to further investigate trends from a previous study that suggested a

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relationship between grades and satisfaction with a cooperative learning project (Lehman, 2007). The previous study suggested that the high-achieving students tended to dislike group projects, fearing that their grades might be compromised by the work of others. Several survey questions were specifically included in the present study to attempt to distinguish between a dislike for group activities themselves versus a dislike for the potentially negative effects of group work on the grades received. Other relationships between academic achievement and instructional preferences were also investigated.

Because studies suggest that dominant learning styles may differ for students majoring in agriculture, life sciences, or other natural sciences as compared to students majoring in the humanities or social sciences (Cano, 1999; Roberts, 2006; Seidel and England, 1999), it is important to understanding the validity of purported instructional preferences that correspond to these learning styles. Likewise, understanding the relationships between instructional preferences and achievement levels can aid in the selection of methods that best enhance teaching and learning for students in these disciplines.

## Methods

This study was conducted at Longwood University (Farmville, VA) in a second-semester freshman introductory biology course during the spring semesters of 2006-2008. Nearly all students enrolled in the course were biology majors. A total of 173 students (47 males and 126 females) were included in the utilized portion of the data set for this three-year study. Because this study was conducted in regularly scheduled class meetings within the investigator's own classes, it was exempt from review by the institutional Human and Animal Subjects Research Review Committee. Nevertheless, students were told that participation was optional.

At the beginning of the semester, the Gregorc Style Delineator (Gregorc, 1982a) was used to determine the dominant learning style of each student. Gregorc (1982b) reports validity and reliability ranges for this instrument as 0.85-0.88 and 0.89-0.93, respectively. Gregorc (1982b) identified a score of ≥ 27 as an indication of a high preference for that learning style. In this study, the highest score (if ≥ 27) was used to place each student in a dominant learning style category. On the rare occasion when a student did not have any dominant learning style (score < 27 on all four scales) or had tie scores for two or more categories, the student was excluded from the data set.

After the completion of the Gregorc Style Delineator, each student completed a 19-question survey to rate their preferences for various instructional techniques. The first section of the survey consisted of 15 techniques to be assessed on a five-point Likert-type scale as follows: 1=strongly favor, 2=slightly favor, 3=neutral, 4=slightly dislike, and 5=strongly dislike. The second part of the survey consisted of four questions where student where asked to indicate their preference among two contrasting choices. For the purpose of some statistical analyses, the first choice was designated as "1" and the second choice was designated as "2." Percentages of the students' choices were also examined and reported.

Data were analyzed using JMP, Version 6 and SPSS, Version 14, with a p-value $<0.05$ indicating statistical significance. One-way analysis of variance (ANOVA) and Tukey HSD post-hoc tests were used to test for differences in grades and survey responses of students with different dominant learning styles. Further explorations of the data used ANOVA and correlation analyses to assess differences based on grades, gender, and numerical scores for the four learning style scales.

## Results and Discussion

### *Learning Styles, Gender, and Grades*

Using combined data from all three years, the distribution of Gregorc learning styles (Gregorc, 1979) in the course was as follows: 39% Concrete Sequential (CS), 12% Abstract Sequential (AS), 21% Abstract Random (AR), and 28% Concrete Random (CR). These percentages are similar to those found for this course during previous years in another study (Lehman, 2007).

When analyzed by gender, CS was the most common learning style among both males and females (though tied with CR in males). The predominance of other learning styles varied in males and females (Figure 1). This is largely consistent with gender differences seen in previous studies where Gregorc scores were analyzed (Lehman, 2007; O'Brien, 1991), though the percentages among males was more heavily skewed toward CR and CS in this study. When analyzed by numerical scores along the four cognitive style scales, only the AR score varied significantly with gender. Females scored significantly higher on the AR scale, as compared to males (mean  S.E. for females and males, respectively: 26.2  0.5 and 23.1  0.6). O'Brien (1991, 1994) also observed this gender difference in both college and high school students, though he also found significant gender differences for AS and CR scores in college students (O'Brien, 1991), which were not detected in this study.

The final grade received in the course was not significantly correlated to gender. The course grade also was not significantly different between the four Gregorc style categories, although the numerical score on the AR scale was significantly negatively correlated to grade in the course. This finding may be course and instructor specific. The instructor's AR score is the lowest of the four Gregorc delineator scores, indicating that students with an AR learning style are the most distant from the instructor's natural learning style (which might be reflected in

teaching style). Also, the course involves a substantial amount of hands-on, concrete learning through laboratory instruction. Both lecture and lab are highly structured and organized. These features may put AR learning styles at a disadvantage in this course.

Previous studies of correlations between grades and learning style have mixed results. Some studies have found no relationship (Harasym et al., 1995), while others have reported a significant correlation (Cano, 1999; O'Brien, 1994) between learning style and course grades or GPA. Interestingly, O'Brien (1994) also found evidence to suggest that the AR learning style may be at a disadvantage, especially as compared to the CS learning style which showed significantly higher academic achievement in a high school student population.

Some of the purported instructional preferences for CS learners were observed in this study. Students with the dominant learning style of CS reported a significantly higher preference ($p=0.0287$) for "clearly organized and structured lectures" as compared to AR, with means ± SE of 1.39 ± 0.12 and 1.95 ± 0.16, respectively. Numerical scores on the CS scale were correlated to two survey questions (Table 2). As predicted by the literature, higher CS scores were correlated with a higher preference for the "use of workbooks or lab manuals." The sequential learning style preference for "structured activities" (which included structured lectures and workbooks) was also found by Seidel and England (1999). When given a choice between "projects with well-defined step-by-step instructions and clear expectations" or "projects without well-defined instructions to allow for the freedom to be creative," a higher CS score was significantly correlated to the former choice. For students with the dominant learning style of CS, 76% selected this choice. The CR learning style numerical scores showed the opposite significant trends, compared to the CS trends, with the CR learning style expressing a dislike for workbooks, lab manuals, and projects with well-defined instructions.

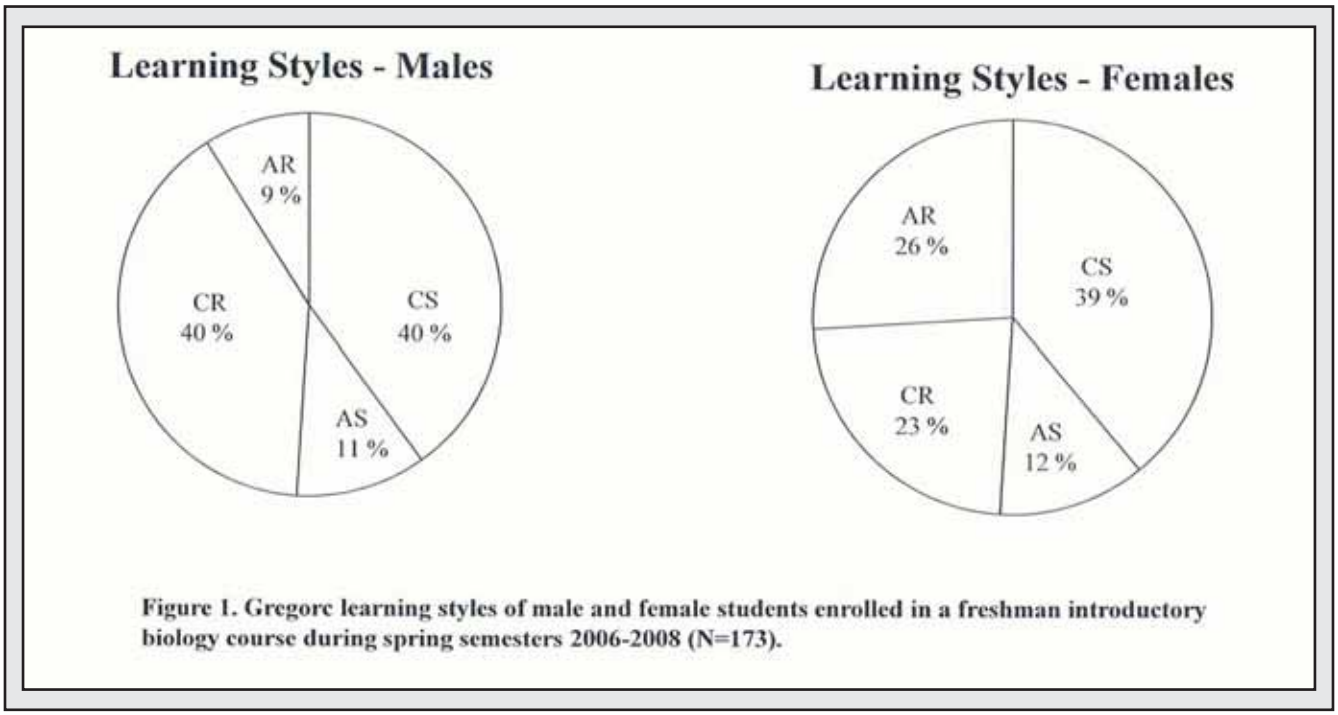


**Figure 1. Gregorc learning styles of male and female students enrolled in a freshman introductory biology course during spring semesters 2006-2008 (N=173).**

### *Learning Styles and Instructional Preferences*

Learning style numerical scores were not correlated to most self-reported instructional preferences on the survey. Likewise, no significant ANOVA results were found for the four dominant learning style categories with these purported instructional preferences (Table 1). Some other studies comparing Gregorc learning styles to instructional preferences of college students have also found no significant agreement (Bohn et al., 2004) or only partial agreement (Seidel and England, 1999) with the relationships originally proposed (Gregorc, 1979; Gregorc and Butler, 1984; Kaplan and Kies, 1993). Though these other studies had small sample sizes, they are in agreement with this study's finding that the long-assumed instructional preferences may not be entirely applicable to contemporary college students.

Significant numerical score correlations for the AR and AS scales showed that "problem-solving activities" were disliked by AR and favored by AS learners (Table 2). The classic literature seems to suggest that the preference for problem-solving activities should be related to the CR learning scale instead (Gregorc 1979; Gregorc and Butler, 1984; Kaplan and Kies, 1993).

Following the suggestion of Seidel and England (1999), student learning styles were re-classified to allow for dual or multiple dominance categories, such

**Table 1. Purported educational preferences that were not significantly related to learning study. Dominant Gregorc learning styles categorgories (ANOVA) and learning style numerical scores (correlation analysis) were compared to survey answers for instuctional preferences of 173 students enrolled in an introductory biology course. Purported correlations are based on Gregorc 1979, Gregorc and Butler 1984, & Kaplan and Kies 1993.**

| No significant correlation with learning style in this study: | Purported learning style correlation: |
|---|---|
| Hands-on activities (labs, models, etc.) | Concrete Sequential |
| Field trips | Concrete Sequential |
| Computer-assisted studying modules | Concrete Sequential |
| Group projects | Concrete Random |
| Independent study projects | Concrete Random |
| Educational games and simulations | Concrete Random |
| Lectures with a lot of information | Abstract Sequential |
| Reading assignments | Abstract Sequential |
| Video tapes/movies | Abstract Random |
| Group discussions | Abstract Random |

as "dual sequential" for a student who scored above the cut-off point of 27 on both the concrete sequential and the abstract sequential dimensions. However, analysis of the data with this new classification structure did not yield any new meaningful trends that were not already apparent with the original "highest score only" categorization, as used by Gregorc (1982a) or by the use of the actual numbers on the four dimensional scales. Overall, use of the actual numerical scores provided the highest ability to detect trends and was superior to either methods of attempting to establish discrete learning style categories.

Regardless of learning style, some instructional methods were more highly favored than others. The instructional methods with the highest overall preference scores were for active learning techniques, such as field trips and hands-on activities, and for lectures that were organized and included visual aids (Table 3). A strong overall preference for multiple choice questions (78% of students) was also indicated, as opposed to essay questions.

**Table 2. Significant Correlations between Student Survey Answers and the Corresponding Learning Style Numerical Scores**

| Survey Question | Concrete Sequential r[z] | Concrete Random r | Abstract Sequential r | Abstract Random r |
|---|---|---|---|---|
| Use of workbooks or lab manuals[y] | -.198** | .161* | .118 | .024 |
| Prefer: project with well-defined step-by-step instructions and clear expectations OR projects without well-defined instructions to allow for the freedom to be creative[x] | -.195* | .165* | .044 | .019 |
| Problem-solving activities[y] | -.056 | .041 | -.196** | .179* |

[z]r=Pearson product moment correlation coafficient
[y]survey answer scale: 1=strongly favor, 2=slightly favor, 3=neutral, 4=slightly dislike, and 5=strongly dislike
[x]survey answer scale: 1=first choice (step-by-step instructions), 2=second choice (without well-defined instructions)
* or** - significant at p=0.05 or 0.01, respectively

**Table 3. Instructional Techniques with the Highest Overall Preference, Regardless of Learning Style**

| Survey Question[z] | Mean ± SE | % Favored[y] |
|---|---|---|
| Hands-on activities (labs, models, etc.) | 1.42 ± 0.07 | 92 |
| Field Trips | 1.48 ± 0.07 | 88 |
| Clearly organized and structured lectures | 1.63 ± 0.07 | 81 |
| Lectures that include a lot of pictures, maps, and/or diagrams | 1.88 ± 0.08 | 81 |
| Educational games and simulations | 1.94 ± 0.07 | 78 |

[z]Scale: 1=strongly favor, 2=slightly favor, 3=neutral, 4=slightly dislike, and 5=strongly dislike
[y]% Favored = percentage of students answering 1 (strongly favor) or 2 (slightly favor)

### *Grade Correlations*

The overall course grade of individual students (a possible indicator of a student's ability level) was significantly correlated to their responses to several survey questions, with trends for students with higher grades reporting a dislike of group projects and a preference for studying and working alone (Table 4). This is in agreement with a previous study (Lehman, 2007), where the high-achievers reported dissatisfaction with the group project used in the course at that time. A relationship between high achievement level and preferences for methods involving independent study has been found in some studies (Stewart, 1981), but not in others (Ristow and Edeburn, 1983, 1984). One study (Skipper, 1993) implied that high ability students disliked independent study, but this may simply be a reflection of the way the question was asked ("best course develops independent learners") and

the student's view of this relative to other possible course goals. Lehman (2007) suggested that informal written and verbal feedback from students indicated that the highest achievers tended to dislike group projects, because they feared that their grades might be compromised by the work of others. The lack of a correlation between grades and two other survey questions supports this suggestion, since high-achievers did not report a dislike of ungraded group work and discussions.

Unexpectedly, the preference for "computer-assisted studying modules" was also correlated to the overall course grade, indicating that low-achievers tended to report a stronger preference for this instructional technique. Some studies suggest that computer-assisted instruction (CAI) has the greatest benefits for low-achievers (Deignan et al., 1980; Nordstrom, 1988). However, it should also be noted that CAI and student familiarity with computers may have changed greatly since this was studied in the 1980's. Therefore, more recent studies are needed to further investigate this suggested relationship between achievement level and CAI.

**Table 4. Significant Correlations between Survey Answers and Course Grades**

| Survey Question | Course Grade $r^z$ |
|---|---|
| Group projects where all members of the group get the same grade[y] | .311** |
| Independent study projects[y] | -.175* |
| Computer-assisted studying modules[y] | .203** |
| Prefer: studying with other people OR studying by yourself [x] | .165* |
| Prefer: working on a graded project by yourself OR working with a group (where all members of the group get the same grade)[x] | -.200** |

[z]r =Pearson product moment correlation coefficient
[y]survey answer scale: 1=strongly favor, 2=slightly favor, 3=neutral, 4=slightly dislike, and 5=strongly dislike
[x]survey answer scale: 1=first choice (step-by-step instructions), 2=second choice (without well-defined instructions)
* or ** = significant at p≤ 0.05 or 0.01, respectively

### *Future Study Directions*

The next important question is whether the self-reported preferences found in this study are an accurate reflection of the instructional methods that are most beneficial for students of particular learning styles and ability levels. In other words, do instructional preferences necessarily correlate to the best methods for learning and achievement? Using Felder and Silverman's (1988) learning style classifications, Johnson and Johnson (2006) found some correlations between college student instructional preferences and achievement. Though the sample size of that study (N=48) limited definitive conclusions, it does suggest a possible awareness among college students of activities that are beneficial for their own learning. Whether or not each individual's optimal learning conditions can be categorized into discrete learning style categories that relate to particular instructional preferences remains under investigation.

## Summary

Overall, this study found that traditionally classified learning styles were not correlated to most self-reported educational preferences. Only the trends for the concrete sequential learning style were largely in agreement with previous literature, suggesting that many purported learning preferences may not be evident among contemporary college students. Students of all learning styles indicated a preference for active learning techniques, organized lectures, and multiple choice test questions. Preferences for working independently were linked to high-achieving students and preferences for computer-assisted instruction were linked to low-achieving students. All of these findings are particularly true for the agricultural and life science college student population upon which this study is based. Additional studies of this nature for other academic disciplines in the humanities and social sciences and at other levels of education would help to further clarify how widely these findings can be generalized to current populations of students.

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# The Impact of Audio Technology on Undergraduate Instruction in a Study Abroad Course on English Gardens[1]

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## Abstract

This study investigated the effectiveness of audio podcasts as a means of disseminating course content to students in informal learning environments like public gardens and parks. The investigation was organized into three major areas: (a) student's utilization of audio podcasts; (b) the effects of audio podcast on knowledge gain; and (c) students' perceptions of audio podcasts.

Twenty-two undergraduate students participated in a 21-day study abroad course on the history of the English landscape, garden design, and horticulture. This course included instruction in both the classroom and on-site at public garden locations throughout southern England. All 22 students were provided with two to four pages of written text describing key historic and horticultural information regarding 12 English gardens. Instructional audio narratives for iPod of 20-30 minute duration were developed for each of the 12 historic gardens. Written exam scores differed little between audio users and non-users. However, students with the audio narratives scored significantly higher on two of the three oral exams. Rather than multiple choice questions as in the written exams, the oral exams utilized more open-ended questions that required the students to integrate course content in order to demonstrate a higher level of overall meaning. In a subsequent survey, the audio users expressed positive reactions to this learning technology, and these reactions, together with the positive learning outcomes, suggest that audio can enhance teaching effectiveness in informal learning environments like public gardens and parks.

## Introduction

The study of historic gardens can increase the sensitivity of landscape design and horticulture professionals to the range of meaning and values associated with gardens and landscapes, enhancing their ability to appreciate new ideas about aesthetic theory. One of the principal reasons for landscape designers and horticulturists to visit gardens and parks of other countries, especially historic gardens, is to find works that inspire them and that can serve as models for their own creative endeavors. Most educators in landscape design encourage their students to learn from and be inspired by successes of the past, but this fuller appreciation is effectively obtained only when the student understands the historical and cultural context for what they are observing.

Through collaboration among instructors in the Department of Horticulture and Landscape Architecture and Department of History at Purdue University, a new senior level study abroad course was developed titled, *In the English Landscape*. In this course, students visit between 12 and 15 major historic gardens in southern England, and receive instruction from professors of both history and landscape architecture-horticulture. The principal aim of this course is to encourage students to look deeper into the meaning of historic English gardens and to understand how certain elements and aspects of gardens are tied to particular moments in history. Temporarily removed from their familiar home environments and relocated in the English countryside, students are taught to read the sites and landscapes for horticultural particulars, design elements, and reflections of historical and aesthetic traditions. The instructors of this course began with the idea that on-site instruction at historically important gardens in England would create an enriching and more effective learning experience than the traditional classroom.

As a part of this new course, written instructional materials for each garden were developed to complement the on-site oral instruction. To create a more effective communication medium for teaching in outdoor environments, a series of instructional audio podcast narratives were newly developed by the instructors and incorporated into the course. In part, the need for this alternate delivery method was driven by limitations in oral communication due to the large size of the group (being too dispersed within a populated public venue often with physical limitations to close association) combined with environmental factors (wind, precipitation) that often made note taking on site prohibitive. The podcast type method of delivery provides an alternate form of direct communication between the educator and the

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learner (Evans, 2007). The term "podcast" originates from the combination of the brand name "iPod®," Apple Inc.'s popular media player with "broadcast." First introduced as a medium for the dissemination of audio and video content in music, entertainment, and news, podcasts have become a popular mechanism for delivering supplementary learning materials to students at all levels of education. Schlosser (2006) pointed out that the use of audio in education is not new, but is experiencing a renaissance fuelled by the ubiquity of portable audio players, broadband internet, and software tools that allow the relatively easy creation and distribution of audio files. Most existing uses of podcasting in higher education focus on the use of the technology to deliver instructional content such as lectures (Lee, et al., 2007). The podcasts created for this course were specifically designed to overcome the physical limitations of delivering course content and to supplement the material presented in lecture and assigned readings with the goal to improve student learning.

The audio podcasts were developed for use with site maps/garden plans. Throughout each garden, major elements are discussed at individual audio stops of 2-3 minute duration when cued by the user on their iPod or MP3 instrument, with each garden narrative lasting approximately 30 minutes. The stopping points are organized based on proximity, as a chronological or designer intended itinerary would be impractical based on the limited time of class visit.

Advocates of podcasting believe that it can offer unique educational benefits to students, but evaluation is needed to determine whether podcasts can help improve student learning. The effects of podcasts toward reaching desired outcomes for learning have been explored in previous studies. The research examining educational outcomes for podcasts has mixed results. Hew (2009) cited two major approaches. The first analyzed podcast effectiveness using participant's self-reports. Data sources in this approach typically include students' retrospective self-perception data acquired using questionnaires or interviews. The second approach explores podcast effectiveness using experimental, quasi-experimental, or ex-post facto designs. Data sources in this approach typically include test or quiz scores. In a review conducted by Hew of eight studies utilizing the first approach of self-reporting, the use of podcast significantly enhanced student learning. Hew (2009) noted that other researchers who used student test and quiz scores, rather than relying on student self-reporting, often showed no effect of the podcast technology. For example, Apt and Barry (2007) showed that physiology students compared by written examination after six weeks of the course showed no significant differences in test scores between groups provided with podcast lectures and those given an exact transcript of the podcast in printed form. These results raised questions about the use of podcasts to improve student achievement. In an evaluation combining traditional methods of assessing knowledge in the form of multiple choice questions with a constructivist component in the form of open-ended questions, Novey and Hall (2006) reported that auditory communications that combine sounds and an audio recorded narrative can also have a positive effect on cognition. For example, their findings indicate that most visitors to Carlsbad Cavern National Park who used the audio tour gained substantial knowledge about the park and were more likely to understand the parks interpretive themes. While the pedagogical aims between our garden study program and this museum/exhibit tour are different, the positive learning outcome in this study indicates that the use of podcasts as an innovative learning tool may have significant benefits for adult learners.

Hew (2009) cited a study by Brittain et al. (2006) that examined which types or characteristics of courses, if podcasted, would most benefit students. In a survey of 70 first-year, dental students, they found that information dense course content with heavy reliance on visuals benefited learning significantly if podcasted. For example, the course indicated by most students that would benefit them to have podcasts was histology, which involves a greater amount of details and diagrams. These authors suggested that students could concentrate better on what was being said during the lecture rather than attempting to capture via note taking all of the presented material. The audio podcasts allowed students to listen to the lecture repeatedly for specific information they missed during the class.

This study investigated improving learning outcomes in a study abroad course on English gardens through using audio technology in real time association with garden sites. Presented is an examination of (1) practical considerations for student utilization of audio podcasts; (2) the effects of audio podcast on knowledge gain; and (3) students perceptions of audio podcasts.

## Materials and Methods

Participants in the study (N=22) were primarily horticulture and landscape architecture students enrolled in the course *In the English Landscape* taught by professors in the Department of Horticulture and Landscape Architecture, and the Department of History at Purdue University. The subject matter provides coverage of the broad historical background relating to the gardens, including historical events, artistic and cultural trends, changing social and economic conditions and horticultural developments.

At the beginning of the course in May 2008 students were randomly assigned to two treatment groups, Group A and Group B. Three gardens were selected for the study. Each of the three gardens were given a rating by the teaching faculty of high, medium, or low complexity based on its size, the depth of historical context, the extent of symbolic

content, and horticultural richness. Garden 1, Westbury Court, was assigned a low complexity rating. Garden 2, Sissinghurst Castle, was assigned a medium complexity rating, and Garden 3, Stourhead, was assigned a high complexity rating.

All students in the course received a course reading packet that included a brief (2-3 page) introduction to each of the gardens visited. In addition, all students attended introductory lectures during the first week of the course that introduced foundation concepts to be explored during the four week course of study. During the first week of the course, prior to garden visits, the eleven students assigned to Group A received audio podcast narratives for each of the three gardens included in the study. These audio narratives were downloaded on each student's iPod or MP3 player. An earlier verbal survey of students enrolled in the course revealed that 100% of them possessed an iPod or MP3 player. Students were provided with guidance by the instructors on how to access the podcast narratives, but were not otherwise given significant assistance. The eleven students assigned to Group B did not receive audio podcasts for these three gardens; however they did receive audios for the other gardens studied in the course.

All teaching methods were designed to teach the same material. The course reading packet contained brief descriptions of each garden studied in the course, highlighting their unique features and describing the distinctive character of each. It was distributed to all students on the first day of the course. Traditional PowerPoint slide-based lectures were conducted during scheduled class hours during the first week of the course. These lectures presented a broad outline of England's political, economic, and cultural history that has had a significant influence on the development of garden design styles and theories. Historical facts about the gardens investigated during the course and in-depth explanation about these gardens' interpretive themes were also presented in lecture. The audio podcast narratives covered the same material as in classroom lecture and textbook reading assignments. These podcast; however, were produced as a series of garden tours to be used by the students to access information about the gardens in real time association during site visits. Abt and Barry (2007) described the benefits of making the process of learning more active and engaging by including multimedia. In using podcasts we aimed to make the content relevant in context to individual learners as they experienced each of the sites. The podcasts allowed students to repeatedly listen to the discussion while simultaneously viewing garden elements associated with those concepts.

Both written quizzes and oral interviews were used to assess the effect of the audio podcast narratives on the knowledge gained by participants. Participation in this study was voluntary, but all students chose to participate. They were informed that neither the quizzes nor the oral interviews for the three study gardens would contribute to their course grade. They were told that they were participating in an evaluation of a new teaching technique and were given no other information.

### *Written Quizzes and Oral Interviews*

Immediately after each garden visit the participants completed written quizzes. Each of the quizzes for the three gardens in the study assessed students' recall of historical facts and design techniques associated with the gardens. Each quiz contained three sections composed of multiple-choice, true or false, and matching questions. The first section included five questions related to background and tradition focusing on cultural, economic, moral, and political factors that influenced the making of the garden; section two contained two questions related to design techniques; and section three included five questions related to amenities and components of the garden. The correct answers to the questions were available from various course media and were not exclusive to the audio tour.

After completing the quizzes the participants were interviewed individually. These interviews were designed to test the students' depth of understanding beyond the basic level of factual recall assessed in the written quizzes. Students were asked to discuss three fundamental ideas related to the making of the gardens including (1) the design philosophies held by garden makers of the associated period, (2) the symbolism employed in the garden that conveys the ways in which the garden addresses human concerns, and (3) the horticultural aspect of the garden—identifying the role of ornamental plants in shaping gardens and landscape plans (see Table 1). Each participant was given three minutes to respond to each of the three questions for a total of nine minutes for each interview conducted. All interviews were conducted and scored by the same researcher. The student responses to each interview question were assessed on a 4-point scale based on rubric scores (see Table 2). The rubric scores were assigned in ½ unit intervals so performance between two response values could be recognized as intermediate. The overall responses to the three questions were examined collectively and an average score was assigned.

Finally, after all other data were collected, study participants were asked to complete a 12-question survey to help quantify their actual use of, and assess their reactions to the audio podcasts. The first eight questions on their reactions to the podcast narratives were a 5 point agree/disagree response scale: 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree. The remaining four questions requested that students estimate the actual duration of their use of the podcast narratives. The possible responses were: 0=did not use, 1=0-25%, 2=26-50%, 3=51-75%, 4=76-100%.

**Table 1. Oral Interviews were conducted to Test the Students' Depth of Understanding beyond the Basic Level of Factual Recall assessed in the Written Quizzes. Students were asked to Discuss three Fundamental Ideas Related to the Making of Gardens.**

| Design Fundamentals | Questions |
|---|---|
| Design Philosophy/Approach | Please discuss the design techniques employed in the garden in the context of the historical period/periods that relate to it. |
| Symbolism | Please discuss any symbolism employed in the garden – relate it to a possible theme (meaning or idea of the garden) that can be derived from its inclusion. |
| Horticultural Aspect | Please discuss the horticultural aspects of the garden. What types of plants were used and how? Discuss how the plantings were arranged and how the planting concept may have been altered over the life of the garden. |

**Table 2. Grading Rubric for Oral Interview Responses**

| Assigned Value of Responses | Content<br>Importance of answer, relevance, accuracy of facts, overall treatment of topic | Completeness<br>Level of detail, depth, development of ideas, appropriate length. |
|---|---|---|
| 1 | Lacks focus or relevance, contains multiple fact errors or omissions. | Does not provide adequate depth. Important details or facts are omitted, unclear or undeveloped. Answer is too short. |
| 2 | Answer would benefit from more focus, contains some fact errors or omissions. | Additional depth needed in places, important details or facts sometimes omitted or not fully developed. Answer may be too short. |
| 3 | Answer is adequately focused, information is generally relevant and accurate. | Provides adequate depth, few needed details or facts are omitted, major ideas adequately developed. Answer is proper length. |
| 4 | Tightly focused, contains relevant information with no fact errors. | Provides good depth and detail, ideas well developed, facts have adequate background. Answer is proper length. |

## Data Analysis and Results

Written and oral quiz score data were analyzed using SAS (SAS Institute, Cary, NC). Data were subjected to two-way analysis of variance (ANOVA) and the separation of means was tested with student's t-tests. A level of $= 0.05$ was selected a priori to indicate significantly different mean values. Statistical analysis of survey data were generated in Excel (Microsoft Corp., Redmond, WA).

Twenty of the 22 participants responded to the survey, including all 11 of the students from Group A (received podcast narratives for the three study gardens). Over all responders, 65% (13 of 20) indicated that they had listened to the audio in the 76-100% range of duration. Of the 11students in Group A, 54.5% (6 of 11) indicated they had used the podcasts 76-100% of the time, while another 27% (3 of 11) were in the 51-75% range.

### *Knowledge Gain*

The written quiz scores were only minimally impacted by the use of podcast narratives (Figure 1). For Garden 1 (Westbury Court) the difference in mean scores between Group A ($\bar{x}=9.91$) and

**Table 3. Student Audio Users' Responses to Statements about the Audio Podcast Narratives**

| Survey Item | Mean[x] | SD | Percent[y] | | |
|---|---|---|---|---|---|
| | | | Strongly Agree or Agree | Neither Agree nor Disagree | Disagree or Strongly Disagree |
| • The audio podcast narratives were informative. | 4.5 | 0.51 | 100 | 0 | 0 |
| • The audio podcast technology was easy to use. | 4.1 | 0.72 | 90 | 5 | 5 |
| • My professor's use of the audio podcast narratives increased his teaching effectiveness. | 3.95 | 0.60 | 90 | 5 | 5 |
| • My professor's use of the audio podcast narratives promoted student learning. | 3.9 | 0.55 | 80 | 20 | 0 |
| • Having access to these audio podcast narratives throughout the course was an advantage to student learning. | 4.1 | 0.72 | 90 | 5 | 5 |
| • I enjoyed using the audio podcast narratives. | 3.55 | 0.76 | 60 | 30 | 10 |
| • Should audio podcast narratives be used, when possible, in other classes? | 3.8 | 0.62 | 70 | 30 | 0 |
| • Using the audio podcast narratives caused me to communicate less with my classmates while in the gardens. | 3.45 | 1.32 | 55 | 20 | 25 |

[x]Response scores were based on the scale: 1=strongly disagree, 2=disagree , 3=neither agree or disagree , 4=agree , 5=strongly agree
[y]Based on 20 students responding to the survey.

B ($\bar{x}$=8.45) was statistically significant at $p$=0.003. However, there were no differences observed between written exam scores for either Garden 2 (Sissinghurst Castle) or 3 (Stourhead).

Compared to the written quiz scores, oral interview scores were positively impacted to a greater extent by use of the podcast narratives (Figure 2). For Garden 2 (Sissinghurst Castle) the Group A mean score ($\bar{x}$= 3.14) exceeded the Group B score ($\bar{x}$=2.45) ($p$=0.037) and for Garden 3 (Stourhead) the Group A mean ($\bar{x}$=3.14) was also significantly higher than the Group B mean ( $\bar{x}$ =2.41) ($p$=0.011). The use of narratives failed to positively impact oral interview-assessed learning for Garden 1 (Westbury Court).

### *Student Perceptions*

Most of the audio users found the podcasts to be informative and a helpful learning tool (Table 3). Ninety percent agreed that the podcasts had a positive effect on the instructor's teaching effectiveness. More than half of users enjoyed using them and 70% of students agreed that this technology should be used in other classes where applicable.

## Discussion

### *Utilization of the Narratives*

Nearly all audio users in this study found the audio podcasts to be informative and easy to use. A majority of students utilized the audios to a significant degree, reporting that they listened to approximately 75-100% of each podcast recording. Audio podcast users were observed listening to the recordings in real time association with highlighted features throughout the garden. The results indicate, as evidenced by the duration of listening reported, that students spent sufficient time in the garden to explore areas as directed by the audio. Although the time spent in the garden by non-users was not measured it appeared to the instructors that audio users spent more total time in the gardens than non-users. More study is needed to determine if a correlation exists between student knowledge gain and duration of time spent in the gardens. In principle, if the audio increases the time one spends in the space, the greater the potential is for learning (Borun, 1996; Falk, 1983). Educators may judge this as a favorable outcome.

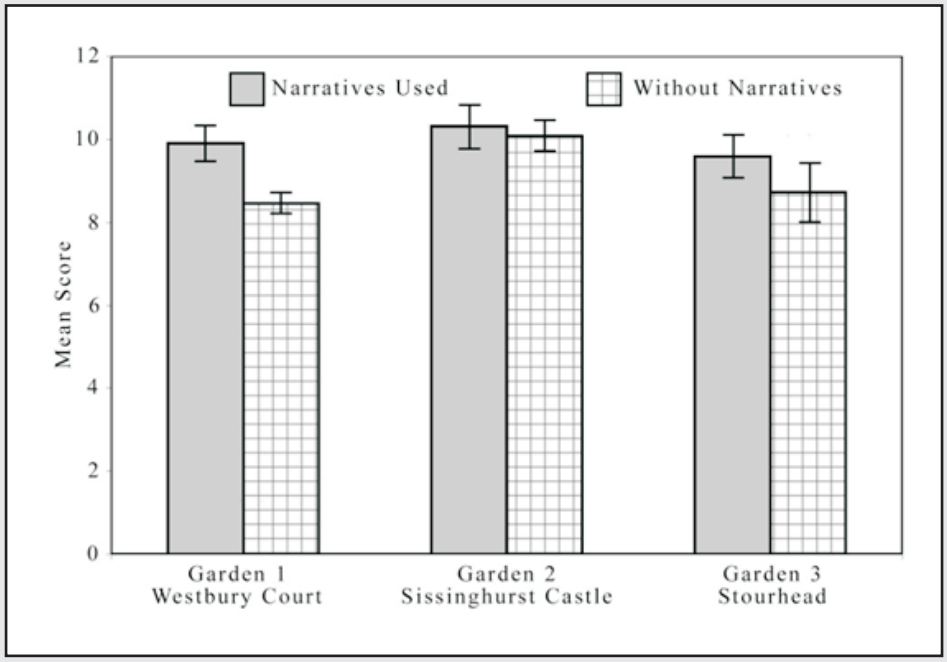


**Figure 1. Comparison of written test scores indicate minimal impact by the use of podcast narratives**

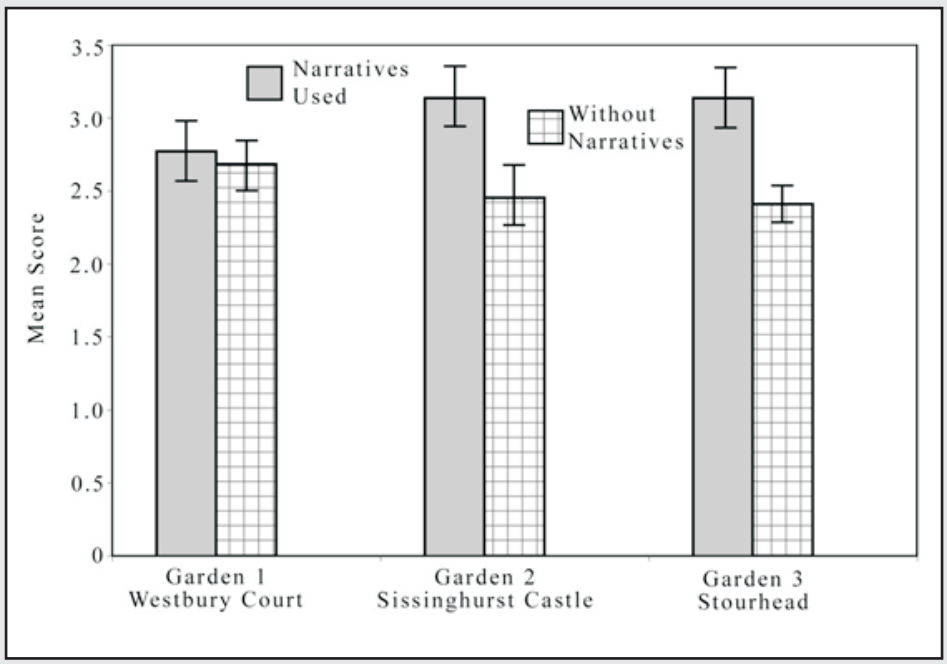


**Figure 2. Comparisons of oral test scores indicate a significantly positive impact by the use of podcast narratives.**

### *Knowledge Gain*

The use of audio podcasts appeared to have little impact on the learning of historical facts and design techniques as measured by performance on the written quiz. There was an improvement in performance by Group A (narratives used) for Westbury Court, the garden of lowest complexity. These results suggest that the written instructional resources provided to all the students were adequate to convey this type of information. Hew (2009) cited similar results in a study conducted on students in a first year undergraduate exercise physiology module. Apt and Barry (2007) utilized an experimental research design to examine the effect of podcasts on student learning. Fifty students were randomly assigned to either a podcast group or a control group. The podcast group listened to six podcasts over six weeks, while the control group was given the exact transcript of the podcasts in printed form. After six weeks, both groups were examined using a 32-question multiple-choice test. The control group improved their test performance by 43%, whereas the podcast group improved by 46%. The difference between the groups was a mean effect size of 0.19. This suggested that the use of podcasts might not result in a worthwhile improvement in student achievement over-and-above the use of written material.

Our study revealed, however, a notable increase in learning and apparent greater depth of understanding of garden context and interpretive themes for student Group A with audio narratives when measured by the oral interview scores. For both the Sissinghurst Castle and Stourhead sites, a significant increase in mean oral interview scores was observed associated with audio narrative usage. These two sites were rated at the intermediate and high level of complexity. This suggests that the greatest value of audio narrative usage is likely to be derived by students in situations where greater explanation is needed to foster understanding.

### *Student Perceptions*

Results of this study were encouraging with respect to students' attitudes toward the audio podcast narratives. Overall, students embraced this new technology as a beneficial learning tool and

indicated that this type of learning supplement should be used, when appropriate, in other classes. Hew (2009) cited several student-self report studies that suggest similar results. For example, in a study conducted by Bongey et al. (2006), 246 college biology students were surveyed regarding their experience in using podcasts. They found that most students perceived that podcasts were a useful tool in helping them increase their understanding of materials covered in lectures. Another study by Clark et al. (2007) surveyed 30 post graduate marketing students on their experience of using podcasts to improve learning. They found that 96% of the students felt they had gained learning benefits from using podcasts. Students surveyed by Lane (2006) reported that podcasts were helpful when preparing for examinations.

In addition to the 12 specific questions included in the survey reported here, students were asked to provide general comments about the audio podcasts. Of particular interest was the students' creative use of the audios. Several commented that they used the audios to review material for quizzes and also in the preparation for their final class project, which was a written journal documenting their study abroad experience. One student remarked that he would listen to the audios prior to visiting each garden to become familiar with the garden layout in order to take full advantage of the visit. The following are comments (in their own words) from those students who responded.

*Student #1*

For me I found [the audios] to be quite helpful especially at the gardens where there was so much to see and understand. Personally I found it real effective to sit down the night before we were to visit the garden and listen to the audio casts. While listening I liked to examine the map so I was able to get a sense of how I should move through the site. Because I had gone through the notes the night before I was able to walk through the site and know the areas that I needed to visit to become more familiar with and take any additional notes.

*Student #2*

In having this information in a convenient and easy-to-use way made it very beneficial to learning more detailed information we were not able to acquire during the preparatory classes.

While at each destination I could just put on my headphones and get an audio tour of each section of the gardens and each design feature that was implemented. With the audio narrative I was able to get specifics that were pertinent to each garden and each garden feature.

These podcasts were also beneficial for review during the trips to and from our destination gardens. We were able to review some of the critical information to help us further with answering the questions in our study guide or to ready ourselves for the quizzes that were conducted periodically throughout the trip.

The podcasts offered during the study abroad trip were an incredibly useful asset. Not only did they provide valuable information for the class, it was done in a way that we, as students, can utilize very effectively. (I still listen to the narratives every now and then to refresh the information). It is easy to say that everyone has an MP3 player nowadays and by relating a way of teaching with this technology that is used every day, one can have the greatest impact.

*Student #3*

I was able to walk around the garden listening to information about the section I was in. Although I had previously learned about some of the gardens, it was very helpful to be able to hear and recall more information on the garden. After we explored the garden we were given worksheets to see how much we learned about the garden we just visited. I feel without the podcast I would not have been able to recall certain information from the particular garden. Also at the end of the class we had to do a final project talking about all the gardens we visited. Having the podcast to reflect on was a lot of help. I was able to go back and listen to the podcast and hear information that I could not remember off the top of my head. I feel that this is a great tool for anyone viewing the garden.

## Conclusions

Our findings suggest that the use of instructional audio podcast narratives as a supplemental learning device can be effective in informal learning environments like gardens and parks. The following implications are drawn from the study results.

Audio podcast technology can be used effectively to supplement or change the structure of traditional methods of delivering course content outside the classroom. Tools of technology, such as podcasting, allow instructors to construct a teaching and learning environment that can foster learning among students with diverse learning styles (Lyles et al., 2007). Facts and fundamental concepts can be introduced through audio narration providing students with independent learning at their own preferred pace, as students have full control over the rate at which information is presented to them. Podcasts also allow students to gain exposure to the audio information multiple times at their own convenience. Previous studies in e-learning (Evans, 2008; Evans and Gibbons, 2007; Evans et al., 2004) have suggested that well-designed virtual learning materials, by increasing the amount of control learners have over the learning process, can be more efficient and effective than traditional alternatives.

Results of this research indicate that student learning is improved significantly by using the audio podcast narrative in the study of historic gardens. Whereas most students in the course utilized the

audios, there was some variation in the total amount of time students spent with this technology. Although modern students are accustomed to digital technologies in many areas of their life (e.g. computers, entertainment, and communication media, etc.), the use of audio technology as a learning tool is still unfamiliar to many students. It was apparent from discussions with students that some additional time was required to become accustomed to use of these audio tools. Notwithstanding, for those students who utilized this technology, the audios had a positive effect on their learning. Although our results did not demonstrate that audio podcasts greatly improved student retention of historical facts, audios did help students score higher when examined on their ability to integrate new facts about gardens into an overall meaning.

The educational benefits of audio podcast technology were supported by a student survey, as well as student testimonials that shed light on the role that audio podcasting played in their approach to learning the course material. Student testimonials provided insight on how audio podcasting allowed them to employ their own particular learning styles to succeed. Students indicated that they utilized the audio podcasts outside of class, re-listening to the podcast narratives to prepare for testing and complete the final course project. The audio podcasts allowed them to review material to gain better understanding. In addition, students commented that being able to hear about garden elements as they experienced them was highly conducive to learning. They were able to set an appropriate pace for themselves as they traveled through the gardens, having full control over broadcast timing of podcast content, which allowed for better control over supplemental note taking and personal reflection time.

The audio-recorded narratives can easily be transmitted with technology familiar to most students, and the audio podcasts offer an effective medium for communicating information in an outdoor (or out of classroom) setting to large student groups. The increasing popularity of personal digital devices for popular entertainment provides a means of delivery of instructional course content with a technology already embraced by, and familiar to, most students.

Audio podcasts can be an effective tool to engage students, to support multiple learning approaches, and to enable students to conveniently access information about gardens, parks, museums, and similar venues in real time association during site visits. This methodology has the potential to provide students with significantly enhanced understanding of these sites by allowing them to integrate meanings and the intellectual background of sites with their physical and sensory realities.

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# Assessment of Graduate Student Productivity and Satisfaction

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## Abstract

The relative quality of graduate programs in the agricultural sciences is important for recruitment of students and for program improvement. The National Research Council (NRC) conducted a survey of doctoral programs across the country in 2006, but most areas of agricultural science and master's students were not included. Programs not included may desire to conduct surveys similar to the NRC study to fill this void. The authors conducted a survey of graduate students in the College of Agricultural and Life Sciences at the University of Florida, patterned after the NRC study. Master's and doctoral students indicated general satisfaction with their program. Most students were generally satisfied with advice received and resources available. Differences exist between Master of Science and doctoral students in terms of productivity, which is not unexpected given the goals of the separate programs and the time committed to complete the degree. More opportunities to gain teaching experience would be helpful for students who anticipate an academic career. The results of this study can be used by other institutions in surveying graduate students who were not part of the NRC project.

## Introduction

The College of Agricultural and Life Sciences at the University of Florida maintains one of the largest graduate enrollments of any college of agriculture and related sciences in the United States (FAEIS, 2008). With more than 1,100 students enrolled, graduate degrees are offered in 23 fields of study. Graduate education is a vital part of the mission of the College and of the University.

The major goal of graduate education is to prepare students for academic, government or private sector careers in their chosen field or for further study. Identifying and addressing students' needs and expectations allows institutions to attract and retain quality students as well as to improve the quality of their programs (Elliot and Shinn, 2002). Student outcomes, including productivity while enrolled in a graduate program, can be a key measure of the quality and effectiveness of the degree program (Hatcher et al., 1992; Redd, 1998). Student satisfaction has also been found to be one of the factors that affects the quality and overall effectiveness of a program (Aiken, 1982; Astin et al., 1987; Bailey et al., 1998).

In a summary of graduate students at the University of Maryland Baltimore County (Univ. of Maryland Baltimore County, 2000), students reported overall satisfaction with the quality of instruction, quality of their program and level of challenge. Less satisfaction was indicated regarding professional development opportunities (Univ. of Maryland Baltimore County, 2000). Although the survey was administered prior to the NRC study, the university stated as its goal to gauge student satisfaction in graduate programs.

A similar, but broader-focused, study at the University of Colorado-Boulder (2005), which also pre-dated the NRC study but was designed to collect similar information, included both master of science and doctoral students. Overall satisfaction with research opportunities was high; doctoral students had published more frequently than master's students; most indicated they had some experience in teaching; and the majority of respondents indicated satisfaction with their relationship with their research advisor (Univ. of Colorado-Boulder, 2005).

Results of the graduate student survey at Oklahoma State University in 2008 reported strengths and weaknesses of the graduate program as reported by currently enrolled students (Oklahoma State Univ., 2008). Perceived program strengths included relationship with faculty, faculty expertise, curriculum, research opportunities, and relationship with other students, among others. Perceived program weaknesses included course availability, course content or rigor, relationships with faculty, and financial support (Oklahoma State Univ., 2008). The Oklahoma State study addressed programs to a greater extent than student satisfaction and did not address student productivity during the graduate program.

Barrick et al. (2006) investigated the perceived current and ideal roles of graduate student faculty mentors at the University of Illinois. Graduate students reported that the availability of the mentor

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for help with research, regular and constructive feedback on progress toward degree completion and on their research, and information on career opportunities were currently less than their ideal expectations (Barrick et al., 2006). Patterned after an earlier study at Wisconsin-Madison, the Illinois study was narrowly focused on faculty mentoring as it is related to student satisfaction.

To meet the expectations of graduate students, to help ensure student success, and to provide information that can be used to strengthen graduate programs, data regarding student progress toward earning the degree as indicated by their productivity, as well as their satisfaction with the program, is essential. With increased information covering productivity and satisfaction, recommendations for change in programming could be warranted. Further, this study could provide guidance for other colleges that desire to investigate graduate student productivity and satisfaction, similar to the NRC study, especially for programs not included in the NRC study and for master's degree students.

## Purpose and Objectives

The purpose of the study was to examine the overall productivity and satisfaction of graduate students enrolled in the College of Agricultural and Life Sciences. Specific objectives included:

1. Assess the productivity of graduate students enrolled in the University of Florida College of Agricultural and Life Sciences.
2. Assess the satisfaction of graduate students enrolled in the University of Florida College of Agricultural and Life Sciences regarding their graduate program.

## Methodology

*Population.* The population for the study was all students enrolled in a graduate program offered through the University of Florida College of Agricultural and Life Sciences during the spring semester, 2009. A total of 1,113 students were included in the study.

*Instrument.* In 2006, the National Research Council (NRC) conducted a study of selected doctoral programs in the United States. The survey instrument used in the NRC study focused on satisfaction and productivity of doctoral students and was adapted for use in this study (Ostrike et al., 2009). The primary change in the NRC instrument was to revise selected questions so that responses from master's and doctoral students could be separated since the NRC instrument focused only on doctoral education. The instrument included a total of 50 items and used a branching logic to guide students to sets of questions based on their specific degree (master's or doctoral). The NRC study also collected information regarding programs, departments and the institution; those portions of the NRC study were not included in this survey.

*Data Collection.* The survey instrument was administered electronically. Email addresses for all enrolled graduate students were obtained. An initial email was sent to all College of Agricultural and Life Sciences graduate students on March 1, 2009, with a link to the survey web site. Two follow-up email reminders were sent to non-responders, asking for their participation. A total of 492 usable responses were received by April 1, 2009.

## Results

*Demographics.* Generally, the respondents reflected the demographics of the [College] graduate student population. Of the 492 respondents to the survey: 49% were master's students, 51% were doctoral students; 43% were male, 57% were female; 48% were married or living in a relationship; 92% have no children; 72% are U.S. citizens; and 71% are White, 14% Hispanic, 14% Asian, 5% Black, 4% Native American or Pacific Islander.

*Productivity.* Presentations and publications are common metrics of student research productivity. As shown in Table 1, students increase the number of presentations as they continue their graduate program. The most common location for doctoral student presentations is on-campus conferences followed by national meetings. Master's students presented at similar locations but at a lower rate.

Respondents also indicated that they expected to generate from none to six or more publications from their thesis or dissertation. The most frequent response was three publications. (Table not included per reviewer recommendation.)

Both doctoral and master's students continue to publish during their graduate program, as seen in Table 2. Both groups of students also authored or co-authored refereed articles most frequently, followed by abstracts, prior to enrollment in the graduate program. After enrollment, graduate students also primarily publish authored or co-authored refereed articles followed by abstracts (Table 2).

*Goals and Training.* Graduate student career goals do not change dramatically before and after the students enroll in the graduate program. The primary goal at both times is research and development, followed by teaching, professional service, management/administration, and other (data not shown).

Students were asked to indicate whether they had participated in 11 formal or informal instruction, practice or development training activities (Table 3). The four activities reported most frequently were: writing proposals for funding, oral communication and presentation skills, preparing articles for publication, and conducting independent research/scholarship, with participation ranging

**Table 1. Percent of Students who have Made Research Presentations, Including Poster Presentations, by Number of Years since Matriculation and Location of Presentation**

| | Years Since Matriculation | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | % of Master's Students (N=208) | | | % of Doctoral Students (N=242) | | | | |
| Location | 1 year n = 100 | 2 years n = 80 | > 2 years n = 28 | 1 year n = 72 | 2 years n = 51 | 3 years n = 44 | 4 years n = 48 | > 4 years n = 27 |
| On-campus Conference | 20 | 55 | 40 | 38 | 64 | 74 | 61 | 87 |
| Regional Meeting | 16 | 39 | 27 | 34 | 62 | 54 | 60 | 63 |
| National Meeting | 13 | 42 | 42 | 39 | 52 | 71 | 63 | 70 |
| International Meeting | 8 | 13 | 14 | 24 | 44 | 63 | 46 | 71 |

**Table 2. Percent of Students who have authored and/or Co-authored Publications Before and During Enrollment, by Year of Matriculation**

| | % of Master's Students (N=208) | | | % of Doctoral Students (N=242) | | | | |
|---|---|---|---|---|---|---|---|---|
| Publications | 2008 n=100 | 2007 n=80 | 2006 or before n=28 | 2008 n=72 | 2007 n=51 | 2006 n=44 | 2005 n=48 | 2004 n=27 |
| Before Enrollment | | | | | | | | |
| Refereed articles | 17 | 13 | 20 | 46 | 58 | 63 | 61 | 58 |
| Book chapters | 0 | 2 | 0 | 20 | 17 | 5 | 0 | 17 |
| Book reviews | 0 | 2 | 0 | 3 | 5 | 0 | 0 | 17 |
| Abstracts | 11 | 12 | 10 | 41 | 38 | 44 | 53 | 50 |
| Popular press | 4 | 8 | 0 | 20 | 30 | 23 | 17 | 29 |
| EDIS* | 8 | 2 | 6 | 10 | 5 | 17 | 9 | 17 |
| After Enrollment | | | | | | | | |
| Refereed articles | 19 | 32 | 24 | 35 | 63 | 69 | 67 | 78 |
| Book chapters | 2 | 2 | 0 | 0 | 19 | 23 | 25 | 10 |
| Book reviews | 0 | 0 | 0 | 6 | 5 | 0 | 4 | 10 |
| Abstracts | 14 | 29 | 22 | 34 | 46 | 60 | 61 | 64 |
| Popular press | 0 | 20 | 6 | 11 | 40 | 35 | 38 | 33 |
| EDIS* | 10 | 42 | 0 | 19 | 24 | 28 | 24 | 33 |

*EDIS – Electronic Data Information Source, [Cooperative Extension Service]

**Table 3. Percent of Students who have Participated or Plan to Participate in Formal or Informal Instruction, Practice or Development Training**

| Activity | Percent | | |
|---|---|---|---|
| | Formal | Informal | Do not plan to participate |
| Writing proposals for funding | 49 | 34 | 26 |
| Oral communication and presentation skills | 48 | 49 | 16 |
| Preparing articles for publication | 42 | 54 | 12 |
| Conducting independent research/scholarship | 42 | 49 | 18 |
| Teaching/pedagogy | 38 | 43 | 29 |
| Working in collaborative groups | 36 | 53 | 20 |
| Research/professional ethics | 30 | 51 | 24 |
| Preparation for job interviews | 29 | 48 | 28 |
| Speaking to non-academic audiences | 27 | 55 | 27 |
| Project management | 26 | 54 | 24 |
| Supervision and evaluation | 25 | 50 | 32 |

Note. Respondents could indicate more than one type of program.

**Table 4. Graduate Student Teaching Experience by Matriculation Date**

| Experience | % of Master's Students (N=208) | | | % of Doctoral Students (N=242) | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2008 n = 100 | 2007 n = 80 | 2006 or before n = 28 | 2008 n = 72 | 2007 n= 51 | 2006 n = 44 | 2005 n = 48 | 2004 or before n = 27 |
| Mentor a high school student | 13 | 19 | 15 | 16 | 18 | 15 | 18 | 14 |
| Mentor/Tutor an undergrad | 38 | 38 | 31 | 49 | 49 | 46 | 48 | 52 |
| Mentor/tutor A grad student | 7 | 17 | 23 | 26 | 38 | 32 | 32 | 52 |
| Grade papers for an undergrad class | 56 | 57 | 46 | 73 | 51 | 63 | 72 | 57 |
| Lead discussion Sections | 49 | 42 | 15 | 56 | 44 | 42 | 42 | 48 |
| Lead lab sections | 32 | 17 | 23 | 47 | 28 | 49 | 58 | 33 |
| Guest lecture | 25 | 49 | 23 | 71 | 51 | 73 | 72 | 86 |
| Teach a course based on set curriculum | 17 | 19 | 23 | 42 | 33 | 37 | 30 | 29 |
| Teach a course based on curriculum you developed | 7 | 15 | 23 | 29 | 29 | 24 | 15 | 16 |

**Table 5. Formal, Periodic Assessment of Academic Progress**

| Assessment of Progress | Percent | |
|---|---|---|
| | Yes | No |
| Program provides a formal, periodic assessment of student's academic progress | 75 | 25 |
| Assessments are helpful | 80 | 20 |
| If assessment is helpful, was feedback timely | 78* | 12 |

* Five percent of respondents indicated that feedback was timely but not helpful.

**Table 6. Source of Career Advice**

| Source of Career Advice | Percent |
|---|---|
| An individual who serves as both an adviser and mentor | 35 |
| Adviser | 23 |
| Committee chair | 12 |
| University-wide career office | 12 |
| Mentor | 7 |
| Other | 7 |
| Graduate program director/coordinator | 4 |
| Program staff | 1 |
| College office | 0 |

Note. Respondents could indicate more than one source.

from 34 to 54% for each. The activities that graduate students participated in least frequently were formal programs on preparing for job interviews (29%), speaking to non-academic audiences (27%), project management (26%), and supervision and evaluation (25%).

*Teaching Experience.* Respondents indicated the extent of their involvement in teaching, whether completed or planned, during their graduate studies (Table 4). The most common experience for doctoral students was grading papers for an undergraduate course, followed by leading discussion sections. The most common experiences for master's students were also grading papers for an undergraduate course and leading discussion sections, followed by mentoring/ tutoring an undergraduate student (more frequently for students who matriculated in 2006 or before).

*Satisfaction.* Students responded to a series of questions and statements associated with their satisfaction with various parts of the graduate program. Three-fourths of the respondents indicated that the graduate program provides a formal, periodic assessment of their work, 80% perceived the assessments to be helpful, and 78% indicated the assessment was timely. A small number (5%) indicated that assessments were timely but not helpful (Table 5). Eighty-two percent of the students indicated that they were provided written expectations about academics when they enrolled.

Respondents identified the sources of any career advice they had received (Table 6). The most frequently named source was an individual serving as adviser and mentor (35%), followed by adviser (23%), committee chair (12%) and university-wide career office (12%). No student identified the college office as a source of career advice.

Nearly three-fourths of the students indicated that they had access to career advice, but 61% indicated that they had not taken advantage of that opportunity.

Students rated their relationship with their adviser and with faculty in the program on a scale ranging from highly interactive, supportive to distant, antagonistic or hostile (Table 7). Both groups of students rated their relationship with their adviser as highly supportive (59% Master's, 68% doctoral). Students most frequently rated their relationship with other faculty as somewhat supportive (42% Master's, 44% doctoral). All but 7% of the students indicated that other students in the program were somewhat or very supportive. Three-fourths of the students were satisfied or very satisfied with the social interaction activities, and 90% indicated they felt they "belonged" in the program.

Respondents also indicated their satisfaction with various aspects of the program (Table 8) on a 5-point scale from 1=Not satisfied to 5=Satisfied. Both groups rated teaching by faculty the highest (4.27 master's, 4.02 for doctoral). All program aspects were

**Table 7. Relationship with Faculty Adviser and Faculty in Program**

| | Percent | | | | |
|---|---|---|---|---|---|
| | Highly interactive, supportive | Somewhat supportive | Neutral | Somewhat Unsupportive | Distant, antagonistic or hostile |
| Master's students | | | | | |
| Faculty Adviser | 59 | 24 | 11 | 5 | 2 |
| Faculty in Program | 36 | 42 | 20 | 2 | 0 |
| Doctoral students | | | | | |
| Faculty Adviser | 68 | 20 | 7 | 3 | 2 |
| Faculty in Program | 32 | 44 | 20 | 4 | 1 |

**Table 8. Satisfaction with Aspects of the Graduate Program**

| | Mean Rating | |
|---|---|---|
| Program Aspects | Master's Students | Doctoral Students |
| Teaching by faculty | 4.27 | 4.02 |
| Intellectual environment of institution | 4.24 | 4.05 |
| Intellectual environment of program | 4.17 | 3.97 |
| Quality of the program | 4.15 | 4.07 |
| Curriculum | 3.87 | 3.71 |
| Research experience | 3.19 | 4.00 |
| Thesis and dissertation supervision | 2.88 | 3.76 |

Scale: 1 = not satisfied to 5 = satisfied

**Table 9. Perceived Adequacy of Support Available**

| Support | Percent | | | | | |
|---|---|---|---|---|---|---|
| | Excellent | Good | Fair | Poor | N/A | Don't know |
| Library resources | 49 | 38 | 8 | 3 | 1 | 1 |
| Computer resources | 41 | 37 | 14 | 5 | 1 | 2 |
| Recreation/athletic facilities | 34 | 31 | 11 | 2 | 11 | 12 |
| Personal workspace | 34 | 30 | 15 | 8 | 11 | 3 |
| Other research, field, or laboratory facilities | 31 | 39 | 11 | 4 | 8 | 7 |
| Health care | 20 | 30 | 18 | 9 | 12 | 10 |
| Social interaction space | 16 | 24 | 22 | 26 | 8 | 4 |

rated above the mid-point of the scale except one. Master's students rated thesis and dissertation supervision 2.88 on the 5-point scale.

Students rated seven areas of support on a 4-point scale, from Excellent to Poor (Table 9). At least 50% of the students rated each of the support sources as Good or Excellent, except for social interaction space. Library resources were indicated as excellent most frequently (49%), followed by computer resources (41%).

Approximately 50% of the respondents indicated they had received funding for travel to professional conferences from the Graduate School or the College. Nearly half of the students were research assistants, one-fifth were teaching assistants, and one-fifth received a fellowship, with the typical stipend between $15,000 and $20,000.

## Conclusions, Discussion and Recommendations

Based on the results of the survey, the following conclusions and recommendations are posited. Differences exist between Master of Science and doctoral students in terms of publication and presentations of research. Doctoral students have typically published or presented at twice the rate of master's students, similar to findings at the University of Colorado-Boulder (Univ. of Colorado-Boulder, 2005). This would be expected since doctoral students would have had more experience and perhaps more assistance in research. Opportunities for continued participation in these activities are recommended.

The largest portion of graduate students indicated their career goals to be in research and development. Likewise, the largest participation in training programs was in activities related most closely to research. Therefore, it appears that training programs are supportive of students' career goals. However, if the preparation for an academic career is central to the mission of the graduate program, additional training opportunities in teaching may be warranted. Less than half of the doctoral students have had experiences in teaching a course, similar to findings at Colorado (Univ. of Colorado-Boulder, 2005); interestingly, less than a third indicated a career goal of teaching. To meet future needs, more students may need to be encouraged to pursue teaching and be afforded teaching opportunities to complement their academic preparation in research.

Generally, students provided positive responses regarding the assessment of their academic progress. Concern is raised, however, about the 20% to 25% who indicated that formal and periodic assessment was not provided and/or not helpful. These results are similar to those reported by Oklahoma State (Oklahoma State Univ., 2008). In subsequent discussion, Graduate Coordinators in the college purported that all students are being evaluated, but they may not be aware that they are being formally evaluated. The goal should be that all students are provided periodic, formal and helpful assessment of progress.

Students were generally positive about career advice and relationships with faculty, which differed from Oklahoma State (Oklahoma State Univ., 2008). More information is probably needed to ascertain why a small proportion of the students indicated that advisers and faculty are unsupportive.

Overall, graduate students indicated that they were satisfied with various aspects of the program. Individual graduate programs may need to conduct follow-up studies to gather additional information regarding satisfaction with the curriculum.

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# Ten Years into the 21st Century Core Curriculum: Our Experience, Insight, and Future

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## Abstract

The last ten years of applying a new core curriculum to undergraduate programs has become a valuable learning experience for the College of Agriculture and Life Sciences, for the University of Vermont, and for other colleges and universities that are implementing, modifying, or assessing their general education requirements. Today there is a national trend to upgrade general education throughout higher education in America. As the world becomes a more mutually dependent society in the center of massive social, political, economic, and cultural changes, higher education in America is redefining itself in general education to prepare students for the 21st century and beyond. This article covers the ten year experience of implementation and evaluation of the College of Agriculture and Life Sciences' core curriculum, the growing general education movement in America, and what we have learned that can be helpful, not only to our College and the University of Vermont, but to other colleges and universities that are modifying their general education.

## Introduction

In September 2001, the College of Agriculture and Life Science [CALS] at the University of Vermont [UVM] adapted a new core curriculum (see Table 1). Based on competencies of knowledge, skills and values, this core curriculum represented a new focus of general education required by all CALS undergraduate majors. It took roughly five years of committee work to establish the new core curriculum and get it approved by the faculty of the most diverse school or college at UVM. CALS majors range from traditional science, e.g. Animal Science, Food and Nutrition, Molecular Genetics, to social science, e.g., Community and International Development, Community Entrepreneurship, Public Communication. Based on the assumption that students should graduate with specific knowledge, important values, and skills in critical thinking, communication, teamwork, complex problem solving, and interpersonal skills, the new core curriculum was voted in by the faculty in May 2000. (Patterson et al., 2001)

Students in the College of Agriculture and Life Sciences would fulfill the core curriculum through satisfactory completion of an integrated series of courses and academic experiences such as internships and research apprenticeships. These competencies were deemed essential for a person's effective function in the 21st century society, and they would foster an attitude that promoted lifelong learning and responsible citizenship.

CALS Departments and Programs with undergraduate majors were given a full academic year to prepare for the new core curriculum by revising their programs and major checklists to meet the new core curriculum requirements that were implemented the fall 2001 semester. During the past ten years of implementation, a two-semester first-year Program was developed; all CALS undergraduate checklists were updated; the CALS Administration weighed in; online checklists were developed at the University level; some core curriculum evaluations were completed; the original core curriculum was reexamined and redefined; and the universal concept of general education has become a UVM and a national priority.

## Ten Year Experience since Implementation

### *Foundations Program*

During the time between the CALS faculty approval of the new core curriculum in May 2000 and its implementation the fall semester of 2001, all departments revised their checklists and altered, if necessary, their courses to meet the new requirements. The biggest change, however, was the development and implementation of a two-semester first-year program, entitled, Foundations.

Previously, there was a required two credit course for all new first-year CALS students, called Beginnings, that was offered every fall semester. The major goal of Beginnings was to help students make the transition from high school to college. In addition, the former CALS distribution requirements included courses in both oral communication and information technology. The new core curriculum included these two skill courses and added the concept of developing a sequence of courses, in which advanced courses would build on the skills of previous ones.

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The year-long Foundations Program integrated the first-year transition concepts of the Beginnings course with skills of the two courses of oral communication and information technology. Developed and currently taught by two faculty members who were on the original committee that developed the new core curriculum, Foundations provides all CALS first-year students with the basic skills of oral presentation and computer technology. Students then take additional "build on" courses throughout their undergraduate major in which to further implement and develop these Foundational skills.

Beginning the fall 2001 semester, CALS 001, Foundations: Communication Methods was a required public speaking course for all new first-year students. The spring 2002 semester, all CALS first-year students then took CALS 002, Foundations: Information Technology. The Foundations Program has been a successful integration of CALS core curriculum requirements to the benefit of CALS first-year students.

### *CALS Administration*

After a few years of implementation, the CALS Administration took a few steps to deemphasize the new core curriculum. They began to believe that the CALS core curriculum was a factor in keeping students from entering the college. They believed that some students were turned off to either applying or transferring to CALS when they compared the CALS core curriculum with the general requirements of other UVM schools and colleges. Thus, the Administration moved the CALS core curriculum to a more difficult page to find on the UVM website.

In addition, this CALS Administration received some negative feedback on the term "requirement." Some students were unhappy having to take any general mandatory course; regardless of how important or useful it was to them, especially the CALS first-year students who realized that cohorts in other schools and colleges did not have to take a "required" course. The term "requirement" was a negative term for some students. Thus, the administration was successful in getting the course instructors and the CALS faculty to agree to change the definition of the Foundation program from "requirement" to "highly recommended."

The result has been that a vast majority (approximately 95%) of CALS first-year students still take the Foundations courses, although more students take the fall oral communication course than the spring information technology course, indicating that first-year students learn that they do not have to take a "highly recommended" course.

### *Undergraduate Checklists*

The sixteen CALS undergraduate Bachelor of Science majors incorporated the CALS core curriculum into their undergraduate major checklists. CALS faculty advisors generally use checklists to explain the CALS core curriculum and major course requirements to their undergraduate advisees. In addition, faculty regularly fill in the blanks on the checklists with courses that students have passed that meet the requirements.

However, how the CALS core curriculum (see Table 1) has been defined and listed is almost unique to each of the 16 checklists. In compliance with the highly decentralized nature of UVM and to get faculty to approve the CALS core curriculum, the original committee gave each department the final authority on how they would meet the core curriculum. Hence, the consequence was non-standard compliance with the spirit of the core.

Here are some examples on how the different undergraduate major checklists have dealt with the core curriculum:

A list of the core curriculum categories with blanks to fill in for the course that has fulfilled the requirement.

An inventory of combined courses that meet the core curriculum and the undergraduate major. The courses are not identified as meeting either the core curriculum or the major, but simply listed in the order in which they should be taken.

A list of only the CALS core competency courses that are not met by the undergraduate degree requirements.

A separate listing of core curriculum knowledge, skills and values, and how each requirement is met by a particular course, set of courses, or the program undergraduate degree requirements.

A thorough CALS core competency list, including the definitions of the knowledge, skills, and values; a list of courses that fulfill each competency, including the "build on" courses that will meet the requirements to "redraft 3 papers," and give "3 graded speeches;" and written definitions of critical thinking skills, interpersonal skills, citizenship & social responsibility, environmental stewardship, and personal growth.

Only six of the 16 checklists even mention the two complex CALS core competencies of critical thinking and interpersonal skills. Three of the six, all from one department, list courses and specify that these complex skills are "fulfilled by curriculum requirements" and are developed by the major "…through a series of courses and experiences…" Two checklists simply list the names of the complex skills and that they are satisfied by "program core requirements." And one checklist was never updated and still contains the original 2001 text that, "(c)ompetency may be met by the satisfactory completion of any course or series of courses…"

One course checklist misinterpreted the writing and oral communication sequence to first take a foundational skill course and then "build on" courses, by incorrectly stating that the student can meet the competency by taking either a foundational skill course or a course or series of courses that grade skills.

Beginning the fall 2010 semester, physical student folders, in which all the paperwork has been kept in the department offices for advisers to use, have been eliminated. The new student folders are now electronic and are accessible to CALS advisors and administrators through the UVM computer system. Since written material can be posted on to the electronic folders, advisors are still encouraged to use the written checklists. Whether or not undergraduate majors will continue to use the written checklists and post them on the electronic folders or completely drop them and simply use the University CATS system is not known at this time.

### *CATS Report*

While there are many ways in which the CALS core curriculum is listed on undergraduate checklists, there is a common approach on the internet Degree Audit program called CATS – Curriculum Audit Tracking System. The CATS system was developed in 2005 and is managed by the UVM Registrar's Office. Administrators, faculty and students can access a CATS student record by submitting the student's UVM nine digit ID code. The CATS system is defined as, a "curriculum audit report" that "tracks your (student) progress toward completion of your degree program." In addition, although it is stated as an "advising tool, not an official document," the CATS report is checked by a CALS administrator who works with advisors to insure that it is complete for fulfilling all degree requirements of graduating CALS seniors.

**Table 1. General Education Comparison: AACU, CALS, and UVM**

| AACU Essential Learning Outcomes | CALS Core Curriculum, now entitled Core Competencies | Proposed UVM General Education |
|---|---|---|
| **Knowledge of Human Cultures and the Physical and Natural World**<br>Through study in the sciences and mathematics, social sciences, humanities, histories, languages and the arts. **Focused** by engagement with big questions, both contemporary and enduring | **Knowledge: Students develop a fundamental base of knowledge that will serve as a foundation for lifelong learning.**<br>**A. Science**: Students use the scientific method to understand the natural world and the human condition<br>**1. Physical and Life Sciences** (2 courses)<br>**2. Social Science** (2 courses)<br>**B. Humanities & Fine Arts**: Students develop an understanding and appreciation for the creative process and human thought. (2 courses) | **Knowledge: Students will have a collegiate-level knowledge of**:<br>· **Physical & Life Sciences**: The content and approaches used in the physical and life sciences including basic laboratory methods.<br>· **Social Sciences**: The content and approaches used in the social sciences<br>· **Humanities & Fine Arts**: The content and approaches used in the humanities and fine arts<br>· **Health, Environment and Sustainability**: An understanding of human health and wellness, the environment and connection between the two. |
| **Intellectual and Practical Skills, Including**<br>Inquiry and analysis<br>Critical and creative thinking<br>Written and oral communication<br>Quantitative literacy<br>Informational literacy<br>Teamwork and problem solving<br>**Practiced extensively**, across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance | **Skills: Students develop abilities and use tools to effectively communication, analyze, problem solve, think critically and work with others.**<br>**A. Communication Skills**: Students express themselves in a way that is easily understood at a level that is appropriate for the audience.<br>**1. Oral**: Students show confidence and efficiency in speaking before a group. (1 public speaking class, plus 3 graded speeches in additional courses)<br>**2. Written**: Students effectively communicate in writing. (1 English writing course, plus 3 redrafted graded papers in additional courses)<br>**B. Informational Technology**: Students demonstrate mastery of technology for communication, data gathering and manipulation, and informational analysis. (1 information technology course)<br>**C. Quantitative Skills**: Students demonstrate the ability to understand and use numbers.<br>**1. Mathematics:**(1 math course)<br>2. **Statistics**: (1 statistics course)<br>**D. Critical Thinking Skills**: Students demonstrate ability to comprehend, judge, and present written-oral arguments and to solve problems. Students learn to distinguish between fact, conjecture, and intuition.<br>**E. Interpersonal Skills**: Students demonstrate the ability to work well with other people by understanding and using skills of leadership, conflict resolution and group process. | **Skills**: Students will have collegiate-level skills that enable them to communicate effectively, gather and analyze information, solve problems, think critically, and work well with others.<br>· **Quantitative Reasoning**: Students are able to apply mathematical techniques appropriately, including algebraic and symbolic manipulation, logical thinking, and statistics and probability.<br>· **Communication:** Students are able to communicate effectively in writing in a manner that is appropriate for both general and specialized audiences. Students are able to express themselves clearly and effectively to convey their ideas and to inform or persuade by oral communication. Augmentative or alternative communication may be used where appropriate<br>· **Critical and Creative Thinking** Students are able to acquire, integrate, and interpret information; understand logical connections between ideas; detect inconsistencies in reasoning; formulate reasoned conclusions; be aware of personal biases and perspectives; and distinguish between fact, conjecture, and intuition. Students are able to raise significant questions, generate original ideas, use abstract concepts in developing thoughts, and be open to alternative systems of thought. Students demonstrate an understanding of the issues and processes involved in making ethical decisions.<br>· **Scientific Reasoning**: Students are able to 1) recognize patterns in observed phenomena, 2) generate hypotheses, 3) predict logical consequences of hypotheses, and 4) evaluate whether a particular conclusion is justified based on evidence.<br>· **Information Literacy**: Students |

**Table 1. Continued**

| AACU Essential Learning Outcomes | CALS Core Curriculum, now entitled Core Competencies | Proposed UVM General Education |
|---|---|---|
| | | are able to 1) find information and evaluate it for accuracy, thoroughness, and reliability; 2) use information to make decisions and solve problems; 3) use information in a manner that is responsible, ethical, and legal; 4) apply appropriate technologies to collect, analyze, and manage data and other information; and 5) use technology to communicate effectively with others. |
| **Personal and social Responsibility, including**<br>Civic knowledge and engagement – local and global<br>Intercultural knowledge and competence<br>Ethical reasoning and action<br>Foundations and skills for lifelong learning<br>**Anchored** through active involvement with diverse communities and real-world challenges | **Values: Students are exposed to values that are expressed through relationships with community, the environment, and themselves that are consistent with the missions of the College of Agriculture and Life Sciences and the University of Vermont campus compact known as "Our Common Ground."**<br>**A. Citizenship & Social Responsibility**: Students develop an understanding appreciation and empathy for the diversity of human experience and perspectives. Students are exposed to solving problems for a community and contributing to the common good.<br>**B. Environmental Stewardship**: Students develop asensitivity for the interconnected relationship between human beings and the natural world and the responsibility for stewardship of the environment. | **Diversity and Cultural Competency**: Students will have an understanding of the diversity of human experiences, cultures, and perspectives<br>· **Collaboration and Leadership**: Students are able to work well with others by using skills in leadership, conflict resolution, and group process. Students demonstrate an understanding of personal civic responsibility, including the need for engagement, constructive debate, and community/global service. |
| **Integrative and Applied Learning, including**<br>Synthesis and advanced accomplishment across general and specialized studies<br>**Demonstrated** through the application of knowledge, skills and responsibilities to new settings and complex problems | **C. Personal Growth**: Students develop an understanding and appreciation of a healthy lifestyle and a love for learning that will lead to continuous growth and development throughout their life-span. Students continue to improve self by developing and affirming the values of respect, integrity, innovation, openness, justice, and responsibility. | |

For every CALS major the CATS report has divided the core curriculum into two sections: the "Distribution Requirements" section and the "Advanced Requirements" section. The "Distribution Requirements" section lists all the core curriculum requirements that are met by full courses, e.g., an oral communication course, two humanities and fine arts courses, a math course, etc.

The CALS core curriculum requirements for students to take additional "build on" skill courses for three graded speeches and three redrafted graded papers are not dealt with by the CATS system. "Advanced Requirements" are those curriculum requirements that are met by a combination of courses and experiences, e. g. Critical Thinking Skills, Interpersonal Skills, Personal Growth, etc. They are also not dealt with by the CATS system, which simply states, "CALS core curriculum requirements beyond the distribution requirements will be satisfied by successful completion of all courses required in the major, as verified by your advisor."

### *CALS Curriculum Committee*

In spring 2009 the CALS Curriculum Committee was asked by the administration to revisit and revise, if necessary, the CALS core curriculum that was adopted by the CALS Faculty and went into effect the fall 2001 semester. Periodic re-examination of the CALS core curriculum was actually a recommended procedure of the original committee that got it approved by the CALS Faculty in 2000. Interestingly, by 2008, the Curriculum Committee members were all new, so they were able to review the CALS core curriculum with a fresh perspective with over eight years of implementation experience. Ultimately the Committee brought a recommendation to the general CALS Faculty who approved it in September 2009. Essentially, the CALS core curriculum was reconfirmed, with a few minor changes:

The name was changed from CALS core curriculum to CALS core competencies to better reflect the meaning of the CALS general education requirements.

Two "build on" skills requirements were dropped, under the assumption that students were already applying the skills in many classes at this time. The Information Technology requirement to take an "additional course or series of courses that uses computers for a minimum of two applications in total" in which Information Technology is applied was dropped, as was the Quantitative Skills Application which was met by "satisfactory completion of one course that utilizes principles from math or statistics."

Interpersonal Skills and Critical Thinking Skills were kept on the CALS core curriculum, but the statements of how they were to be completed were taken off. Both of these complex skills had original sentences that stated the "competency may be met by satisfactory completion of any course or series of

courses." Again, the thought of the CALS Curriculum Committee was that the skills "…to comprehend, judge and present written-oral arguments and to solve problems…to work well with other people in understanding and using skills of leadership, conflict resolution and group process," were still important, but they were wide-ranging competences that were not met by one course or even a series of courses. The thought was that these competencies were naturally met by courses, experiences and the maturing of students at UVM.

## Evaluation

### *CALS Advisory Board*

The CALS Advisory Board, a three-year term of 18 industry leaders, elected officials, students, and Vermonters, meets twice a year to provide feedback and advice to the CALS Dean and administration. In addition, they review the College Strategic Plan and provide information on future trends of agriculture and life sciences.

In October 2007, the Advisory Board was led through a process to give feedback on the CALS core curriculum. The members were given five different colored stickers; each one rated a different number, from one to five. The Board members were told that they were to read a list of topics that were printed on several large papers attached to the wall, and then to individually rate their top five choices in terms of the "most critical to personal and professional success after college." They were not told that the list was the current CALS core curriculum, only that the listed topics were knowledge, skills, and values for them to rate. Their top choice would get the sticker rated five points, the next choice received the sticker with four points, down to their fifth choice which received the one point sticker.

After each CALS Advisory Board member posted their five different colored stickers on their top five choices, they were then asked as a whole group if there were any topics to add to the lists. There was a short discussion, but there was no consensus of any additional knowledge, skill, or value to be added. They were then told that this list represents the current CALS core curriculum and were given the opportunity for more discussion. The vast majority of the members were not aware that the list they rated was the CALS core curriculum. After the process and discussion, members were positive and, in fact, enthusiastic about the current core curriculum.

The results of the CALS Advisory Board process led to an interesting conformation and ranking of the CALS core curriculum. Detailed in Figure 1, there were two related ratings of the items – the number of stickers for each item and the total number of points. Skills received both the highest number of stickers and points as well as the lowest number of each. The Advisory Board rated the top two CALS core Competencies as Interpersonal Skills – "the ability to work well with other people by understanding and using skills of leadership, conflict resolution and group process" (19 stickers, 69 points), and Written Communication – "effectively communicate in writing" (12 stickers, 38 points). The lowest rated Competencies were Math – "the use of numbers for problem solving" (4 stickers, 8 points) and Statistics – the use of numbers for data analysis and inference" (4 stickers, 8 points).

The CALS core competency values received stickers and points that rated them in the middle of the Advisory Board ranking. Citizenship and Social Responsibility – "an understanding, appreciation, and empathy for the diversity of human experience and perspectives, and solving problems for a community and contributing to the common good" received 11 stickers and 37 points. Personal Growth – "an understanding and appreciation of a healthy lifestyle,

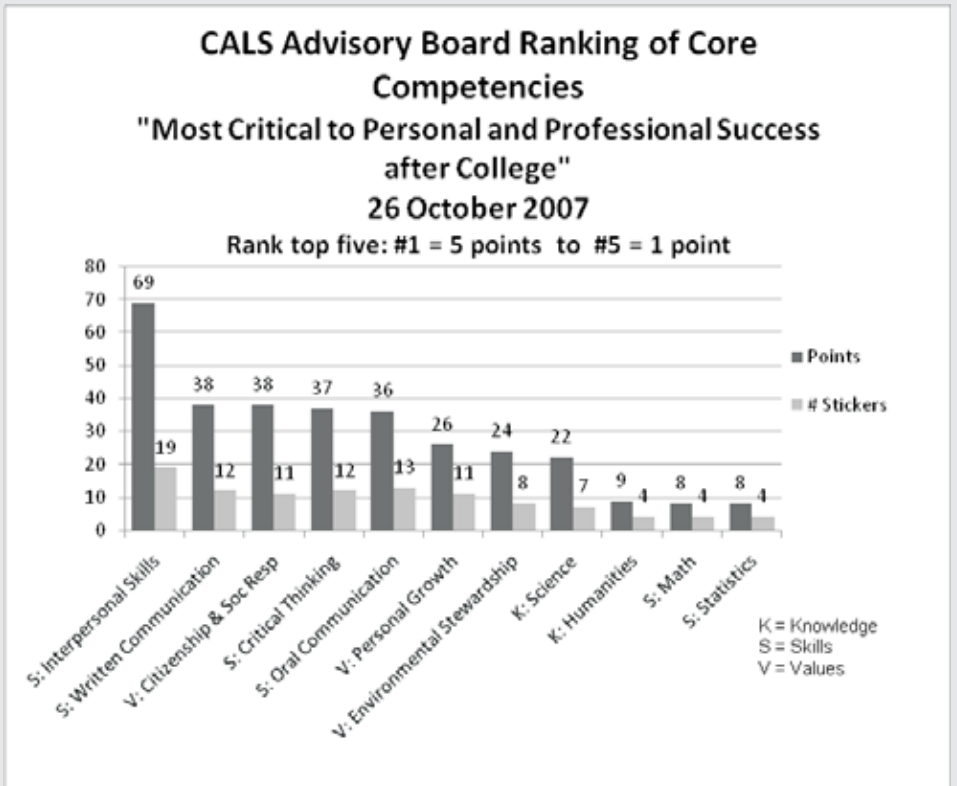



**Figure1.CALS Advisory Board Ranking of Core Competencies.**

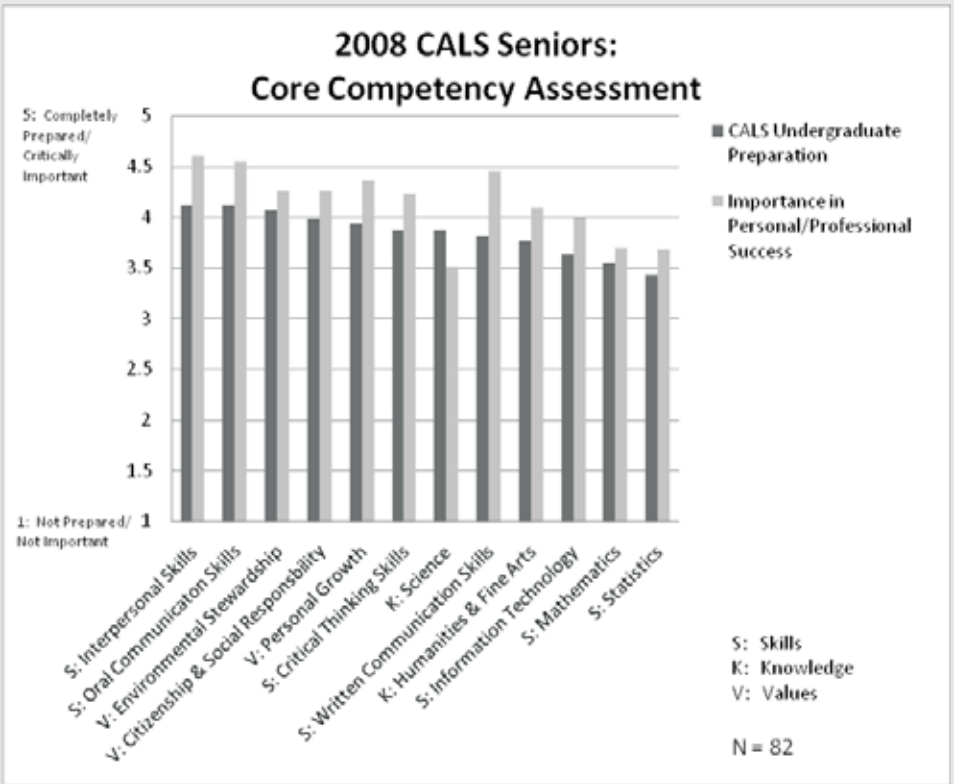
a love for learning that will lead to continuous growth and development, and development and affirmation of the values of respect, integrity, innovation, openness, justice, and responsibility," received 11 stickers and 26 points. Environmental Stewardship – "a sensitivity for the interconnected relationship between human beings and the natural world and the responsibility for stewardship of the environment," received 8 stickers and 24 points.

In general, the CALS Advisory Board confirmed the CALS core curriculum through this process and discussion.

### *CALS Graduating Seniors*

In April of the spring 2008 semester, an email was sent to all graduating CALS seniors, asking them to complete an on-line questionnaire. Eighty-two students, approximately 40% of the CALS graduating class, filled out the questionnaire, which asked them to rank the CALS core competencies according to two levels – how well they were prepared for each competency by their undergraduate CALS program, and how important they rated each competency for their future personal and professional success. See the results in Figure 2.

Interestingly, the graduating CALS seniors rated the CALS core competencies very similarly to the ratings of the CALS Advisory Board, regarding the importance of personal and professional success. For example, exactly as the Advisory Board, the CALS seniors gave Interpersonal Skills the highest rating (4.6), and the two lowest




CALS Core Competencies
K = Knowledge: Students develop a fundamental base of knowledge that will serve as a foundation for lifelong learning.
S = Skills: Students develop abilities and use tools to effectively communicate, analyze, problem solve, think critically, and work with others.
V = Values: Students are exposed to values that are expressed through relationships with community, the environment, and themselves that are consistent with the mission of the College of Agriculture and Life Sciences and the University of Vermont campus compact known as "Our Common Ground."

2008 CALS Seniors Assessment of CALS Core Competencies, ranked from high to low in terms of "How fully has your CALS undergraduate program prepared you in each category?"

S: Interpersonal Skills: Students demonstrate the ability to work well with other people by understanding and using skills of leadership, conflict resolution, and group process.

S: Oral Communication Skills: Students show confidence and efficacy in speaking before a group.

V: Environmental Stewardship: Students develop a sensitivity for the interconnected relationship between human beings and the natural world and the responsibility for stewardship of the environment

V: Citizenship & Social Responsibility: Students develop an understanding, appreciation, and empathy for the diversity of human experience and perspectives. Students are exposed to solving problems for a community and contributing to the common good.

V: Personal Growth: Students develop an understanding and appreciation of a healthy lifestyle and a love for learning that will lead to continuous growth and development throughout their lifespan. Students continue to improve themselves by developing and affirming the values of respect, integrity, innovation, openness, justice, and responsibility.

S: Critical Thinking Skills: Students demonstrate ability to comprehend, judge, and present written/oral arguments and to solve problems. Students learn how to distinguish between fact, conjecture, and intuition.

K: Science: Students use the scientific method to understand the natural world and the human condition.
S: Written Communication Skills: Students effectively communicate in writing.
K: Humanities & Fine Arts: Students develop an understanding and appreciation for the creative process and human thought.
S: Information Technology: Students demonstrate mastery of technology for communication, data gathering and manipulation, and information analysis.
S: Mathematics: Students demonstrate the use of numbers for problem solving.
S: Statistics: Students demonstrate the use of numbers for data analysis and inference

**Figure 2. 2008 CALS Seniors: Core Competency Assessment.**

ratings to Mathematics and Statistics (3.6). Oral Communication skills (4.55) and Written Communication skills (4.45) completed the top three personal and professional ratings.

The seniors rated every CALS core curriculum higher in terms of the importance of personal and professional success, than how well they were prepared, except for Science, in which the students rated their preparation higher than their future importance. The average distance between the two levels of ranks was approximately 0.4 out of the scale of 1 to 5. The highest difference was Written Communication Skills (1.1), while the lowest difference was Mathematics (0.2). The reverse difference for Science was 0.4.

Graduating seniors clearly indicated that the CALS core Competencies were important to their future personal and professional success. Although there was a difference in rating among the competencies, the average of the senior ranking was 4.2 out of 5. The most important feedback came in the difference between the higher future importance and the lower current undergraduate preparation, which clearly suggested that students did not feel that their undergraduate education completely prepared them for their future needs.

## General Education Movement in America

Core curriculum was the term used by CALS ten years ago to define the general requirements that all undergraduate programs had to meet. Today there are still many terms used to define the same idea, e.g. liberal studies, core competencies, general studies, however, the most prevalent term used today is the one used in this article, general education.

### *AAC&U General Education*

As the world shifts to "an interdependent … community in the midst of profound social, political, economic, and cultural realignments" (AAC&U, 2010a), the Association of American Colleges and Universities [AAC&U] has become a national leader in highly influencing American higher education to develop a consensus of general education to help all students of the 21st century "…thrive in a knowledge-intensive economy, a globally engaged democracy, and a society where innovation is essential to progress and success" (Humphreys, 2006, p.1). Since 1991, AAC&U has held an annual, weeklong conference for faculty and administrators to evaluate and advance the general education on their campus. (Gaston and Gaff, 2009)

AAC&U has a membership of over 1,200 representatives from all sectors of higher education and has developed a national campaign, "LEAP – Liberal Education and America's Promise…organized around a robust set of Essential Learning Outcomes." (AAC&U, 2010b) Through many years of working with hundreds of colleges and universities, the business community, and accreditation requirements, AAC&U has developed a list of general education knowledge, skills and responsibilities, and learning outcomes that all students, regardless of their undergraduate major, should learn.

Today, AAC&U is the foremost organization that colleges and universities will contact regarding general education. It has an extensive resource website on general education (http://www.aacu.org/resources/generaleducation/index.cfm) that lists initiatives, publications, campus examples, meetings and institutes. The aim of AAC&U is "… to ensure that every undergraduate student experiences a relevant and challenging general education curriculum." (AAC&U, 2011)

The original CALS core curriculum is very similar to the AAC&U Essential Learning Outcomes. The CALS knowledge, skills, and values directly line up with the AAC&U knowledge, skills and responsibilities and learning outcomes (see Table 1).

The majority (56%) of the 433 higher education chief academic officers polled by Hart Research Associates (2009) indicated that the priority of general education has increased at their institution, and a much larger majority (89%) specified that their general education program was undergoing assessment or modification (pp. 1-2).

Although AAC&U has a very strong influence on American colleges and universities in establishing, upgrading and unifying general education, there is even a more powerful general education authority in America today – Council for Higher Education Accreditation.

### *Higher Education Accreditation*

General education has recently become one of the major themes of the six Regional Accrediting Organizations that reaccredit American colleges and universities every ten years. These organizations are affirmed by the Council for Higher Education Accreditation [CHEA], the "largest institutional higher education membership organization in the United States, with approximately 3,000 degree-granting colleges and universities." (CHEA, 2006a) The Regional Accrediting organizations are uniform in consistently applying the academic "quality, improvement, and accountability expectations that CHEA has established." (CHEA, 2010)

The CHEA higher education accreditation policy, revised in 2006, states: "All eligible organizations must meet the general standards enunciated in this recognition process. The recognition process will place increasing emphasis on the effectiveness of accreditation organizations in assuring the academic quality of institutions and programs through standards, policies, and procedures that address appropriate rigor, degree nomenclature, and at the undergraduate level, a general education program designed to ensure breadth of knowledge and at all levels, advanced intellectual inquiry" (CHEA, 2006b, p. 20).

In 2009, the University of Vermont was reaccredited by the New England Association of Schools and Colleges, one of the six Regional Accrediting Organizations. A major concern of the regional accrediting evaluation team was the complete lack of a university-wide general education for all UVM students. In response to the accreditation report, the university president wrote that UVM would work with the senate and the undergraduate schools and colleges to develop a "comprehensive undergraduate general education requirement which will entail well-rounded assessment procedures…" (Fogel, 2009, p. 3).

It is clear that all universities and colleges in America that now go through regional accreditation will be evaluated on their general education requirements, and will be recommended to upgrade if not meeting the CHEA standards.

### *University General Education*

In the fall 2009 a committee was formed to develop the UVM undergraduate general education. Consisting of faculty members from each of the seven schools and colleges, and chaired by an Associate Provost, the committee met for the entire school year and developed a list of knowledge, skills, and competencies for all UVM undergraduates, again, very similar to the ten year old, CALS core curriculum, now called core competencies (see Table 1). In addition general suggestions for evaluation of the general education were created by this committee. At the time of this writing, the committee has been expanded and is using the 2010-11 academic year to work with the undergraduate staff, faculty, and administrators in departments, schools, and colleges, to educate them on the importance of general education and to develop their support when it comes to a vote in the Faculty Senate. At this time, it is unsure whether or not general education will be approved by UVM faculty to be implemented throughout the entire undergraduate curriculum at UVM.

## What We Have Learned

### *Learning from Initial Guiding Principles*

For the last ten years, the initial guiding principles of the committee, that helped get the CALS core curriculum approved by the faculty, have been a highly learning experience. In particular three principals have had a major impact on the implication of the core curriculum:

- Completion of a course or series of courses (approved by advisor) is assumed to satisfy the competency. In other words, specific courses would be matched to specific competencies.
- Where possible, the design will include sequences of courses yielding an integrated experience, with advanced courses building on earlier ones.
- The student's department and advisor serve as the ultimate judges regarding decisions of the appropriate selection of courses and non-course experiences (Patterson et al., p. 14).

The CALS Departments solely used the principle of courses to meet general education requirements. This was also adopted by the University CATS online system. Thus some very complex, but critically important, general education goals, e.g., critical thinking, interpersonal skills, environmental stewardship, that were not met by one or more courses, were simply avoided completely on the checklist or dealt with by indicating they were simply satisfied by program core requirements.

Having students take additional "build on" courses after taking foundational courses in writing and oral communication represented an important step in the development of an integrated experience. Very much like building on courses, from general to specific, in every undergraduate major program, the integration experience of skill courses is an important concept for general education, and is a significant consideration for all general education programs.

The variety of how the different departments have dealt with the CALS general education requirements is a clear indication that general education should be the responsibility of a higher up single administration that will give general education more consistency and clarity. This organization should also be in charge of evaluation to determine how well students are meeting the general education objectives, and to give feedback to the different schools and colleges, and, ultimately, to each undergraduate program.

### *Universal General Education*

There should be a universal general education text that is used in every undergraduate checklist, as well as any electronic system. CALS ten year experience in having each independent department differently adopt the general education requirements clearly indicates that there should be a universal general education wording for all undergraduate programs.

Having the same general education text in all checklists will help undergraduate students to transfer from one program to another, and between the now universal colleges and schools at the same university. In addition, all general education competencies should be written into the universal text, even those complicated competencies that are not met by a single or group of courses, as it is critical that students completely understand what all the goals of general education are.

Even though CALS was the first college at UVM to update the general education into the 21st century, the implementation experience of the last ten years suggests that general education is still viewed as a group of courses for all undergraduate students to complete before doing their major, rather than it

being integrated into all undergraduate programs as a main focus throughout the entire four-year agenda. Thirty years ago, Gaff (1980) wrote an article in which he described the problems of a general distribution system as "…fragmentation of the curriculum, erosion of an accepted education rationale, lack of commitment on the part of the faculty, loss of interest by students, and absence of any central administration or supervision of the general education program" (p. 51). This still holds true today.

It is clear in the AAU&C literature (2010a, 2010b) that general education should be a focus not only of specific general education classes, but throughout all classes and learning experiences in each undergraduate major. Thus, a major sea-change for most undergraduate programs would have to take place in order to move general education from the outside edge to the central core of each program.

### *General Education Evaluation*

A clear and direct evaluation of general education needs to be developed and implemented on the University level to determine if undergraduate students are meeting the goals of general education in all colleges and schools. The only evaluations done in the CALS ten years – assuming competence by passing a general education course, polling the CALS Advisory Board, and asking graduating students for their opinions – were indirect methods and did not truly evaluate whether undergraduate students had met the objectives of general education. There are many forms of direct evaluation, including:

• Developing and using rubrics to assess whether students have met particular general education goals;

• Contrasting the results of first-year students and graduating seniors using a professional student assessment system, e.g., CLA [College Learning Assessment], CAT [Critical Thinking Assessment Test], MAPP [Measure of Academic Proficiency and Progress], CAPP [College Assessment of Academic Proficiency] (National Institute for Learning Outcomes Assessment, 2010);

• Creating a capstone course experience for all undergraduate seniors, where they are responsible for demonstrating general education objectives through their undergraduate major ;

• Evaluating general education through faculty-evaluated internships, or service learning experiences;

• Having students develop an online portfolio in which students collect and manage data, documents, videos, etc. to demonstrate general education goals throughout the four years of their undergraduate program.

## Summary

Ten years ago, a general education assessment survey of 226 higher education administrators in every state, clearly indicated that, "(c)olleges and universities that have worked to improve their general education curricula have derived important benefits. They tended to improve the quality and coherence of education for students, renew faculty members, and strengthen aspects of their institutions" (Gaff and Wasescha, 2001, p. 251).

It is clear that there is a massive push in America today for higher education to develop, upgrade, implement and evaluate general education. AAC&U and CHEA are two important and highly influential organizations that are helping American colleges and universities to move general education into the 21st century and beyond. The implementation of the University of Vermont College of Agriculture and Life Sciences' core curriculum for the past ten years has been an important learning experience in which many concepts and ideas have been identified that can be applied to other colleges and universities to help them improve their process of developing general education.

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# Lessons Learned in an International Service-Learning Collaborative: Shea Butter Case Study[1]

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## Abstract

A multi-institutional, multi-disciplinary service-learning collaborative was created to examine the role of higher education in promoting sustainable development. Several institutions in the U.S. and in West Africa worked with two communities in sub-Saharan Africa to examine ways to boost economic security through the improved processing and marketing of shea butter, an agricultural product with a local, regional, and international market. By increasing the complexity of a service-learning effort, the authors learned that investing time in project management, understanding and working around communication differences, and clearly articulating partner roles are the three critical lessons to incorporate into an international service-learning project. The paper highlights unexpected challenges and provides a discussion of lessons learned and an outline of best practices for future endeavors.

Keywords: agriculture-based service-learning, international service-learning, sustainable development, shea butter

## Introduction

Over the past five decades, the West has spent $2.3 trillion in foreign aid with no significant rise in living standards (Easterly, 2006). Recognizing this problem, the development community has begun to move away from traditional top-down models to those that are community-based and built from the bottom-up (Calderisi, 2006; Easterly, 2006; Ayittey, 2006). These bottom-up models can promote sustainable development by empowering communities to help themselves (Mortensen and Relin, 2006; Yunus, 2003; Prahalad, 2006).

Service-learning provides a way for higher education to engage students in community problem-solving and complex development issues. Because no single academic discipline in isolation is sufficient to understand the requirements of a sustainable community solution, several institutions in the U.S. and in West Africa representing a wide variety of disciplines collaborated together with two communities in Mali to explore a more collective approach for higher education and its role in sustainable development.

This paper presents the lessons learned in forming an international service-learning collaboration. By increasing the complexity of a service-learning effort, the authors learned that investing time in project management, understanding and working around communication differences, and clearly articulating partner roles are three critical components to incorporate into complex service-learning projects.

### *Community Partners and their Natural Resource*

The project described in this paper began as a response to support women in rural Mali to boost their economic security. Mali, a land-locked sub-Saharan West African country where over 70% of the population is engaged in subsistence farming, is one of the most material-resource poor countries in the world.

Shea Yeleen International (SYI) is a non-governmental organization (NGO) dedicated to community grass-roots empowerment in rural West Africa through organizing and training women-owned cooperatives to produce, market, and sell high-quality shea butter and educate consumers in the

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U.S. about natural body care products and fair trade (Shea Yeleen International, 2010). The U.S./Malian NGO introduced the academic collaboration to two different communities in Mali, for whom the production, processing, and marketing of products from the shea tree offered an opportunity to boost their economic well-being.

The shea tree provides many benefits: shea bark is used for medicine; the nutshell contains a mosquito repellant; and the nut is used in making butter, soap and in manufacturing chocolate (as a cocoa substitute). As butter, shea is used for cooking, for cosmetics as a skin moisturizer, and as a health aid to treat a variety of skin ailments (Chalfin, 2004). Shea products have a local, regional, and international market. Mali has the second largest estimated production in tons of shea kernels per year (Lovett, 2004). However, most shea is exported as a nut, thus yielding little financial gain for local communities. Making shea butter is both labor- and time- intensive, thus there is a high potential that increased production, improved processing and quality control, and enhanced marketing of shea butter could directly translate to improved economic well-being of rural Malian women, who have historical rights to this commodity. Many of these women are often denied credit, lack formal business training, have few technical skills, and have little or no access to tools or transportation, which has greatly limited their access to the shea butter market. One fear identified at the onset of the collaboration was that as shea butter production becomes profitable, control would pass to men despite shea's historical association with women. Thus, one recurring emphasis in the service-learning collaborative was to focus on small-scale, fair trade, cooperative-based production, staffed by and benefitting Malian women.

The first community, Dio Gare, is a Malian village with a largely informal workforce engaged in subsistence farming, where female members produce shea products for personal consumption and for sale in the local village-level market. The women wanted assistance in organizing themselves into a cooperative and increasing their current level of production. The second community, located in Zantiebougou, Mali, is a formally organized women's cooperative, the Coprokazan Cooperative, which processes shea butter commercially (Coprokazan, 2009). Here, the women requested assistance in diversifying their product line, improving their butter's quality, and developing their foreign market.

Thus shea butter production at two different economic scales presented itself as an extraordinary opportunity to engage university faculty and students in service-learning experiences focused on the sustainable development of an agricultural product. The primary objectives of the project were creating an economic advantage for Malian shea butter producers and creating a hands-on learning experience for American students; contributing to sustainable development while educating students through a participatory bottom-up approach was the overarching goal. The project execution was driven by a belief that a 'collective learning' model with members from different disciplines and institutions could achieve a greater end result than any individual member could have achieved alone. It was postulated that by deliberately creating a diverse international collaboration, the synergy created by multiple groups would create more effective problem solving.

### *Members of the Service-Learning Collaboration*

The anchor institutions, Montana State University (MSU) and the l'Institut d'Economie Rurale (IER), the national agricultural research institution in Mali, had worked together for a decade on agricultural research projects (Moore et al., 2002) but found there was in some situations little farmer-level uptake of their work (Dunkel et al., 1998). Interested in strengthening the information flow between the scientists and small-scale farmers, the Institut Polytechnique Rural de Formation et de Recherche Appliquée (IPR/IFRA), Mali's School of Agriculture and Applied Research, was approached to begin a new collaborative effort that could reach students in agriculture in Mali.

Long- term success in any service-learning effort must include vested permanent colleagues that understand the local conditions and are motivated to follow through with a community (George and Shams, 2007). To coordinate the efforts of the two Malian institutions, an Agri-Business Center was envisioned to serve as a permanent home for the innovations brought forth by the U.S. and Malian faculty/student teams.

A cohort of seven Malian mid-career academics representing the two agriculture-based institutions spent two years in the United States for extended professional development and to build bridges with American faculty. These Malians became the founding members of the Agri-Business Center, and worked together with the American teams in the U.S., on-site in Mali, and as the project progressed, through the Internet using Skype technology.

To gain a range of viewpoints, two non-agriculture institutions were added to the collaboration: the University of St. Thomas (UST) in Minnesota and Chief Dull Knife College (CDKC) in Montana. UST has a well-established service-learning and study-abroad program, while CDKC, a tribal college, emphasizes traditional wisdom and values collective concepts. It was believed that deliberate collaboration with two non-agricultural organizations would spread awareness of agricultural issues to other disciplines and institutions as well as adding new perspectives to the long-term agricultural research relationship between MSU and IER.

From the onset, the collaboration emphasized non-competitive relationships based on mutual

respect, and each institution in the collaboration structured their student experiences differently and was challenged to find its own disciplinary fit.

At MSU, faculty committed to design mentored research experiences for undergraduate students that fulfilled the university's core requirement for original research or creative activity. A two-semester capstone-like course was designed to provide research skills and communication techniques to succeed in a challenging cross-cultural environment and was open to upper-level undergraduate students from any discipline. Students could choose a natural science, social science, or humanities version of the course. The course focused on Mali, West Africa, and one available option was that a student could choose to work on some aspect of shea butter production. In the second and third years of the project, a chemistry student, a photography student and an industrial engineering student chose to focus on shea quality control.

At UST, faculty from different disciplines committed to adapt existing courses within their own departments that would lend themselves to the Shea Project. Students enrolled in discipline-specific capstone (or capstone-like) courses that could easily adopt discovery and service-based learning pedagogies. To create a working team, all of the students focused on shea butter production and met together in a weekly one hour class to exchange ideas, provide unity, and discuss logistics. In the first year of the project, mechanical engineering, communications and French language students worked together. In subsequent years, additional engineering students and graduate students in business administration were added.

At CDKC, a new set of courses was developed: Introduction to Sociology and Sociology Field Methods. The Shea Project was one of several options available to CDKC students.

As part of the service-learning pedagogy, students were asked to prepare for their community engagement before they visited the community. In addition to having a shared reading list to explore the larger societal interconnections affecting the community's request, students were asked to keep a journal in which they reflected on a set of guiding questions focusing mostly on issues of intercultural awareness (Shams and George, 2006). The overall experience was designed to develop more than just a disciplinary solution to one part of a complex problem.

### *Joint Actions*

In the first year of the project, SYI and UST worked with women in the Dio Gare community, who desired to become organized and increase their production capacity. SYI agreed to provide on-site support to form a legal structure and UST communication students produced informational training videos on how to form a cooperative. To increase their production capacity, UST engineering students designed a hand-powered mixer, and French language students acted as cultural liaisons and translators.

In the second and third years of the project MSU, CDKC, and IER worked with the Coprokazan Cooperative, a pre-existing network of producers. Here the primary needs were improvement and certification of quality, product line diversification, and expansion of markets. A MSU student in chemistry built an “easy-to-use” quality analysis kit, a photography student made a photographic visual quality aid that presented the precise color variations desired by the African and American markets, and an industrial engineering student examined the steps needed for the dissemination of these quality assurance products. IER (the national agricultural research organization in Mali) developed an ethnographic case study to determine barriers to adoption of innovations improving shea butter quality (Kante, 2007). CDKC examined the shea tree's place within Mali's culture and the role of both men and women in its cultivation.

In the last two years, IPR/IFRA (Mali's school of agriculture) and UST MBA students documented the shea supply chain and produced a marketing plan and a distribution and operations analysis. A second group of UST engineering students re-designed the manual mixer after analysis of an extended field demonstration. Over the past five years, there have been many immediate benefits for the stakeholders; however, the overall effort could have been stronger if the coordinators of this project would have invested more time in project management, project assessment, and inter-institutional communication and would have more clearly articulated partner roles and responsibilities. The following is a discussion of these lessons learned and an outline of best practices for future endeavors in this area.

## Discussion

### *Lesson 1: Invest Time in Project Management*

Complex organizational structures require a clear project charter. Working with two communities caused confusion between the institutions. For example, engineering students at UST designed a manual shea mixer for use by SYI in the Dio Gare community. In conversations with other MSU and UST students and faculty, the members of the Coprakazan Cooperative specifically stated they did not want to change their process technology but requested assistance in business and quality assurance. Without a clear project charter with each community, one group of students could easily believe that the role of another student team was out of scope. A written charter or a project mission statement would have clarified the intent of the collaboration. At times it was unclear if the different disciplinary teams were focusing on 'shea butter production' or working together with a community partner to solve an issue.

It is critical for all institutions to agree to an organizational architecture. During the first years of the collaboration, the organizational architecture was vague and evolving. UST had made the initial connection with SYI and had agreed to assist shea producers in the Dio Gare community. In a subsequent year, MSU and CDKC added the Shea Project as one of several available to its students, but their students focused on the Coprakazan Cooperative. However, one of the MSU students and one of the members of the Malian Agri-Business Center traveled to Dio Gare to conduct their field work without the involvement of SYI. Some project misunderstanding resulted because SYI should have been notified of the site visit. The relationships between the non-governmental organization, the community partners, and the academic institutions could have been more clearly articulated. Over the years, the members of the Agri-Business Center members were both academic collaborators and 'community partners' or the recipients of the project deliverables. Gathering all the stakeholders together and investing more time in the project planning and feasibility stage could have highlighted the need for better organizational understanding.

A charter and a clear organizational structure give a good foundation to any project, but to avoid ambiguity in the execution stage, a solid project methodology must be put in place for the students and faculty involved in the service-learning experience. Tools commonly used in management would have helped direct this multi-institutional project. For example, a project milestone chart can introduce a visual map all members can understand and access. This is especially valuable in an academic environment where students are engaged with a project for a relatively short amount of time. A 'who is doing what' with a 'what has been done already' visual management tool can aid members in understanding the larger structure of the effort. The lesson learned is to invest time and funds into project management tools or seek the expertise necessary for help in setting up a systems understanding of the project interconnections. A project overview map highlighting project milestones could have provided some scaffolding to aid in the effort required to manage a diverse ensemble of people. Planning an international experience with multiple participants and coordinating with on-site partners takes up a significant amount of time, and using project management software could have helped the faculty manage their time and avoid replicating tasks.

The community will have its own structure and self-management tools. The project management tools mentioned in this section are to be implemented by the academic institutions and not imposed on the community. However, students work in finite time frames based on an academic calendar that may or may not synchronize with the community's needs. Thus, project phases should be agreed upon in advance. A clear discussion with the community can avoid unrealistic expectations or a communication disconnect.

Due to the high amount of ambiguity and unknown challenges present in this service-learning experience, another project management tool that should have been implemented is the introduction of risk management. Collaborations should discuss project risks openly and have several options available to mitigate risk. An interesting observation by the authors is that the two cultures, American and Malian, approached risk management differently. Americans have a predisposition to getting tasks done in an efficient manner, with a "just do it" attitude that readily accepts a multiple solution scenario. Malians are, in general, more deterministic. As documented in the ethnographic study by Kante (2007), when Malian farmers were asked if they would try a new approach to shea processing, one farmer answered, "Most people want to 'wait and see' how it will work. If the experience doesn't work, they won't [use the] approach." In the U.S., it is common to adopt new technologies because changing how one accomplishes a task is viewed as an individual decision. In Mali, few rural women want to be early adopters of new technologies, preferring group consensus to change how a task is accomplished.

In the example of designing a new technology, such as the shea mixer, the steps of product development require iteration. First there is a prototype, then a demonstration unit, afterwards a production prototype, and finally a product. The design of the device is driven by user reaction as well as device performance. The end product often looks radically different from the first prototype. This idea of solution iteration was not clearly understood by the community partners. An important lesson learned was that the cyclical process of design, testing and redesign is not common knowledge. The fact that it may take multiple attempts to converge upon an appropriate solution must be clearly articulated and explained to all members of the collaboration.

### *Lesson 2: Understand and Work Around Communication Differences*

It is important to set up a permanent project repository that includes both primary and secondary information. For a multi-institutional effort, a project website is essential. Primary information includes trip reports and original group or research reports. Secondary information includes copies of other relevant reports and background literature. A project repository can minimize project reinvention with each new group of students and can help avoid backtracking. If at all possible, have one group of students speak to the following group of students. Copies of final reports and presentations of one cohort of students can also be part of the preparatory materials for the next cohort of students.

In the Shea Project presented in this paper, the project repository was well-managed by a project webmaster (www.montana.edu\mali). The coordina-

tors of this project would like to emphasize that the time and skill needed to maintain a website should not be underestimated. One lesson learned would be to establish upfront which documents will be required or useful for the project repository. This could be stated in the project charter.

A clear statement of the documentation of project deliverables would have helped distinguish between what students needed to produce to obtain academic credit and what students were actually delivering to their community partner. Not everything in an academic report will be of use to the community partners. For example, the engineering students received two semesters worth of capstone credit. They were asked to document their entire design methodology as well as keep dated log books. SYI wanted an abbreviated non-technical report and the production drawings of the mixer. The women's group in Dio Gare would have wanted a non-verbal or visual documentation or training session on how to use and clean the mixer. As the senior engineering students finished up their coursework it was difficult to add additional project deliverables that their classmates (students working with local industrial clients) did not have. If possible, translate an abbreviated report into the local language or present information in a visual format to address different communication styles, however, faculty need to realistically budget both time and funds to accomplish a successful transfer of student work in a variety of formats.

The most serious communication challenge was the lack of an intellectual property agreement, which resulted in confusion over the ownership of the deliverables created by the students. The final reports of the MBA students, the shea quality photographs, and the details of the chemistry shea-quality kit were not posted in the project repository because of ownership questions. A clear statement and policy of the assignment of the intellectual property could have been addressed at the beginning of the project and signed and understood by all participants.

Discuss the differences among groups, institutions, and cultures with respect to the sense of time, style of feedback, and financial management openly and often. What is common practice in one culture may be unusual in another culture. For example, American faculty can obtain a cash advance from their institution or often pay for something in advance using their personal funds and get reimbursed. Our Malian colleagues were not comfortable paying for project expenses using their personal funds. Credit cards and cash advances are also not common in Mali. Thus, the financial management for any diverse collective should be discussed and agreed to early in the collaboration.

The authors also underestimated the effort required to communicate across institutions. Even if an individual faculty member understood what was happening in another institution, the students had little contact with students in the other institutions unless an effort was made to bridge the groups. As the project evolved, formal and frequent multi-media (Skype, website updates, face-to-face, video/phone conferencing) debriefing sessions helped to disseminate the steps taken by other members of the collaboration and create a better sense of a collective.

Finally, expect hesitancy or inability to communicate in writing or electronically by an oral culture in contrast to expectations in a technologically-oriented written culture. Oral-based cultures and written-based cultures view communication channels in vastly different ways.

### *Lesson 3: Clearly Articulate Partner Roles*

Be clear that the community partner drives the service-learning experience, establish consensus, and then clearly articulate the role of all the partners, especially the community. True solidarity expects effort from all parties. For example, in this project, the engineering team left a prototype processing device for an extended field test. Upon returning in a year's time, it was found that the device had not been used. Interestingly, the device was not used because it was unclear to the community partner who should use the device. The American team, culturally conditioned to accept and test new technologies, had never considered that a different culture would not use a technology because it gave one member of the group an advantage. A clear articulation of the stages of technology development and the role of the community group could have prevented the field testing delays.

Agree upon the project deliverables and stakeholder responsibilities. Write a memorandum of understanding to clarify intent, and in an oral-based culture, repeat the responsibilities verbally. Be as specific as possible. Discuss stakeholder motivations and expectations. In a complex project, do not assume any of the collaborators' roles.

In this project, the U.S. and Malian colleagues had envisioned the formation of an Agri-Business Center that could serve as a group of regionally based scientists to provide training and expertise in field-deployable technologies and best practices. Though the benefits of establishing a central focal group is in principle good, the reality was that there were many obstacles and in the end the Agri-Business Center did not materialize as expected. First of all, the Malian members had full time jobs already- so it was unclear when they were to devote time to a new organizational structure. Secondly, how was this group to function financially? It was naïve for the authors to add the formation of a new center in addition to engaging their students with the community partners in a service-learning experience. The authors believe it is essential to work with our academic counterparts in another country or in another culture, but it is not feasible for us to envision or try

to create new group structures. One lesson learned is that it is much simpler and more effective to work with existing on-the-ground organizations than to try to establish a new organization.

Invest time or seek guidance in proper stakeholder assessment. Early in the effort have each stakeholder define a successful project. This vision of success should contain as concrete a picture as possible. The number of years in the future should be specified. The vision should provide a basis for formulating the project objectives, output and outcomes. Indicators that measure aspects of a project's performance need to be stated. These terms need to be articulated and not assumed. In this project, our lesson learned is that we should have asked the two communities for greater detail in describing their desired future state that was needed to achieve their goal of increased economic security. For example, the women from Dio Gare could have specified that their vision of success was that within XX years they would like to be incorporated as a cooperative, or that within XX years they would like to increase their shea profits by XX%. Without concrete indicators, it is difficult to measure the consequences of the project's outcomes.

## Summary

By increasing the complexity of a service-learning effort, the authors learned that investing time in project management, understanding and working around communication differences, and clearly articulating partner roles were three critical lessons to incorporate into an international service-learning project. International development-oriented service-learning efforts can help promote a bottom-up approach to empowering communities, but the management of several student/faculty teams at different institutions could have benefited from a stronger organizational structure. Equally important, service-learning initiatives should remember to invest sufficient time in defining a vision of success with a community partner. A clearly-articulated vision provides the basis for formulating the objectives (the desired long-term impact of the project) that will result if the outcomes (the consequences of the student activities) are achieved.

**Use the following list as a sidebar.**

Best practices in forming an international service-learning collaboration:

1. Complex organizational structures require a clear project charter.
2. Institutions need to agree to an organizational architecture.
3. Project phases should be agreed upon in advance and incorporated into a visual milestone map.
4. Establish consensus and clearly articulate the roles and responsibilities of all the partners, especially the community.
5. The cyclical process of design, test, and re-design should be explained to all stakeholders.
6. Establish upfront the required format for project documentation and the use of the project repository.
7. Clarify the difference between academic deliverables and the deliverables presented to the community partners. Agree upon the community deliverables with a concise memorandum of understanding.
8. Implement an intellectual property policy.
9. Discuss differences with respect to time, style of feedback, and financial management.
10. Invest time or seek guidance in proper stakeholder assessment. Define a concrete vision of success.

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# Instructors' Social Media Use and Preferences in Agriculture Classes

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## Abstract

The purpose of this study was to assess how college agriculture instructors use social media in their classes and view social media's place in education. The majority (61.3%) have used social media in class. The social medium used the most was online forums, followed by video-sharing sites (e.g., YouTube) and Facebook. The media types used the least were microblogs (e.g., Twitter) and non-Facebook social networking sites (e.g., MySpace, LinkedIn). With the exception of online forums and video-sharing sites, participants, in general, did not want to use social media to deliver instructional information. They were most opposed to using microblogs and non-Facebook social networking sites. Participants expected communication with students to increase if social media were used in class. Participants perceived that it was at least probably important that students know how to use online forums, video-sharing sites, and blogs for future careers. Microblogs and non-Facebook social networking sites were seen as the least important for future careers. Future studies should address the appropriateness of social media in education, as well as student perceptions of social media in education.

## Introduction

Educational and communication technologies' effects have been shown to vary between what students and instructors perceive. Jones and Johnson-Yale (2005) reported that faculty members believed email had increased and improved communication with students and their teaching, they were more likely to think Internet use had hurt student work than to think it aided student work. Students, on the other hand, believed Internet use had improved their academic experience (Jones, 2002) and has been beneficial to them overall (Rhoades et al., 2008). Students also reported that the Internet had improved their relationship with professors, with about half indicating that email "allows them to more freely express their ideas to professors" (Jones, 2002, p. 9). Internet and email served as mediums for students and professors to communicate with each other about class and assignments (Jones, 2002).

Rhoades et al. (2008) found that 98.8% of agriculture students surveyed owned a computer in an assessment of students at a land-grant university, which was up from the results found by Johnson et al. (1999) that showed 62.3% of the students owned a computer at a different land-grant university. In the Rhoades et al. (2008) study, students used the Internet most often for search engines, online course management systems, and Facebook or MySpace. The students also found the Internet to be beneficial. As for faculty use of technology, the majority of faculty members surveyed by Jones and Johnson-Yale (2005) had been using computers for at least a decade. Ninety-two percent were using email to communicate with students, and 55% were using course websites to communicate with students. Sixteen percent of participants had taught an online course.

Thompson (2007) discussed the transition of higher education to meet the needs of Millennials, who are students born after 1982 (Eubanks, 2003). Alluding to Millennials and their connection to social media, Thompson (2007) stated that faculty members not using Facebook were "missing an opportunity to capitalize on their students' involvement with (Facebook)" (p. 2). Rhoades et al. (2008) also reported that social media offered a "unique new teaching opportunity to instructors" (p. 114). Of the students surveyed by Rhoades et al., 85.2% had Facebook accounts. Facebook is the largest online social network with more than 500 million active users

[1]Graduate Student
[2]Professor
[3]Assistant Professor
[4]Associate Professor

worldwide, with 50% of its users logging on every day (Facebook, 2010). Though it could be a boon for college educators, Thompson (2007) noted that it would take time for higher education to catch up to the capabilities offered by Web 2.0 technology, specifically its two-way communication capabilities.

Social media's impact in education is beginning to be researched. Head and Eisenberg (2010) used focus groups and a survey to study student use of Wikipedia for coursework. Wikipedia is an online encyclopedia that has its content created by its users without the filters of a traditional encyclopedia. The majority of surveyed students used Wikipedia even if they were explicitly told by instructors to not use Wikipedia. The students understood the limitations of Wikipedia and circumvented them by only using the site at the beginning of the research process. Wikipedia was used to get background on their topics. The students then went to more academic sources, which are the sources the students cited. Wikipedia was not being used as a replacement for scholarly sources but instead as a supplement to find those sources.

Holmberg and Huvila (2008) documented a case of Second Life being used as part of a distance education course in Finland. Second Life is a three-dimensional world that allows its users to navigate it as avatars. Unlike alternative online environments, Second Life offers the ability to more closely model a real world learning environment; the students and the educator can be in the same physical location in the Second Life world, complete with chairs, desks, and a classroom. The majority of learners reported that barriers for asking questions and participating in discussions were lowered when using Second Life. Compared to other online environments, respondents said the site was more fun and lessened the psychological distance between students.

Because YouTube is being increasingly used in classrooms, health education faculty members' use and perceptions of the site were assessed (Burke et al., 2009). YouTube was seen as a free source that could help the learning process. All of the faculty members who used YouTube reported that it was an effective teaching tool. The majority of the YouTube users were using the site for in-class discussions and providing informational materials. Negatives related to YouTube use were time spent tracking down appropriate videos and making sure the videos would work in the classroom.

Because society has adopted social media so quickly and in ever-increasing numbers, educators are beginning to discover social media as an instructional tool. The purpose of this exploratory study was to determine how social media was being used in colleges of agriculture. The objectives of the study were to:

1. Describe if and for what purpose instructors are using social media.
2. Describe instructors' interest for using social media to present educational information.
3. Describe changes instructors expect educational social media use to have on students.
4. Describe instructors' perceived importance of social media for students' future careers.

## Methods

The population of interest in this study was university instructors in agriculture. The sampling frame comprised instructors who were members of the American Association for Agricultural Education (AAAE) and/or attendees of the Southern Association of Agricultural Scientists (SAAS) annual conference. The two groups were approached through separate avenues. AAAE members were approached through the AAAE listserv, and SAAS attendees' email addresses were used from their most recent attendance of the SAAS conference. This created two sets of responses and corresponding response rates.

AAAE is an organization "dedicated to studying, applying, and promoting the teaching and learning processes in agriculture" (American Association for Agricultural Education, 2010, para. 1). SAAS brings together individuals in agriculture from education and industry "for the purpose of improving or developing their capabilities relating to educational activities in service to the public arena" (Southern Association of Agricultural Scientists, n.d., para. 1) with sections for agricultural communications, agricultural economics, agricultural education, agronomy, animal science, biochemistry, horticulture, plant pathology, and rural sociology. These organizations were used for the study because their memberships consist of instructors at the collegiate level.

There were 729 usable email addresses for SAAS and 202 respondents, for a 27.7% response rate. For AAAE, there were 593 usable email addresses on the AAAE listserv and 192 respondents, for a 32.4% response rate. Two response rates are being reported because it was not possible to match non-respondents' email addresses that could be on both lists because the addresses for the AAAE listserv were not available. Of the 338 total respondents, 98 were members of both groups, 19 reported they were members of neither group, and 23 did not respond to the question. Only those who taught college courses and completed the questionnaire were included in the study, leaving 232 participating instructors as the final sample.

Recommendations by Dillman et al. (2009) were used for contacting potential participants. Three waves of emails were used to contact potential participants in fall 2009. Participants were sent emails until the number of responses gained from each contact was not substantial enough to warrant further email solicitation. The emails provided a brief introduction to the survey and asked recipients to follow a link in the email to an online questionnaire.

Early respondents were compared to late respondents to help assess the representativeness of the

results for non-responders. Lindner et al. (2001) include comparing early and late respondents as a way of handling non-response error. Early respondents were operationally defined as the first 50% of respondents, and late respondents were defined as the last 50% of respondents. The groups were not significantly different, indicating the results could be generalized past the sample for all items.

The questionnaire was developed from questionnaires that assessed social media use by communicators in agriculture (Rhoades and Aue, 2010), that addressed technologies students reported they should know for future careers (Irani and Telg, 2002), and that addressed faculty perceptions of the effects of student Internet use (Jones and Johnson-Yale, 2005). Descriptive statistics were used to describe the participants' educational use and preferences for social media. The social media types addressed in the study were Facebook, non-Facebook social networking sites (e.g., MySpace), blogs, microblogs (e.g., Twitter), wikis, online forums, and video-sharing sites (e.g., YouTube).

Content validity was assessed by a panel of experts comprising agricultural communications faculty members from three universities (Dooley, 2001). A pilot test was also used to help ensure the validity of the instrument. Reliability was assessed post hoc using Cronbach's Alpha. The scores by section were 0.83 for preferences for delivery of instructional information, 0.78 for changes social media would cause, and 0.91 for what social media students should know for future careers. The study was approved by the University of Florida Institutional Review Board, and all participants provided written consent.

## Results and Discussion

The majority of respondents (62.1%, n = 144) have used social media in class before. How social media were used depended on the social media type. There were three usage options available to participants: assignments, out-of-class discussions, and communication. Assignments could include having the students create or view social media content for a grade. Discussions could include using the social media as a means of discussion or topic of discussion. Communication was a means for instructors to contact students and give them information related to the course and to have students interact with the instructor.

Online forums were the most widely used social media type for all uses, with discussion being the highest (42.7%, n = 99) (Table 1). Video-sharing sites were the next most-used social media type, with assignments (26.7%, n = 62) and discussion (25.4%, n = 59) being the way they tended to be used. Facebook (28.4%, n = 66) and microblogs (7.8%, n = 18) were mostly used for communication. The most prevalent use for wikis was for assignments (17.7%, n = 41),

**Table 1. Participant usage of social media by type and purpose for use (N = 232)**

| Social Media Type | Assignments (%) | Out-of-class Discussions (%) | Communication (%) |
|---|---|---|---|
| Online forums | 33.2 | 42.7 | 33.2 |
| Video-sharing sites | 26.7 | 25.4 | 6.0 |
| Facebook | 4.3 | 9.9 | 28.4 |
| Blogs | 13.4 | 16.8 | 6.5 |
| Wikis | 17.7 | 10.3 | 9.1 |
| Microblogs | 3.9 | 4.7 | 7.8 |
| Non-Facebook social networking | 0.4 | 1.7 | 3.0 |

[z]Participants were able to select multiple purposes for each social media type; therefore, totals do not accumulate to 100%.
[y]Survey administered fall 2009 to a national sample of college agriculture instructors.

**Table 2. Participant agreement for wanting to deliver instructional information through social media (N = 232)**

| Social Media Type | Disagree (%) | Mostly Disagree (%) | Neutral (%) | Mostly Agree (%) | **Agree (%)** |
|---|---|---|---|---|---|
| Online forums | 7.8 | 6.1 | 20.0 | 37.4 | 28.7 |
| Video-sharing sites | 19.9 | 13.0 | 26.8 | 30.3 | 10.0 |
| Wikis | 28.4 | 16.8 | 31.0 | 17.7 | 6.0 |
| Facebook | 32.9 | 24.7 | 19.9 | 16.5 | 6.1 |
| Blogs | 27.6 | 18.5 | 31.0 | 17.7 | 5.2 |
| Microblogs | 46.1 | 18.1 | 26.7 | 6.9 | 2.2 |
| Non-Facebook | 53.2 | 24.2 | 18.6 | 3.5 | 0.4 |

[z]Participants responded once for each social media type. Due to rounding, totals may be slightly above or below 100%.
[y]Survey administered fall 2009 to a national sample of college agriculture instructors.

and the main use for blogs was discussion (16.8%, n = 39).

Social media were used more for out-of-class discussions than for assignments and communication, though the category was not consistently highest for different social media types. How social media were used varied by type. For example, Facebook was used mostly for communication, while wikis were used mostly for assignments. These trends of different social media types being used for different purposes are consistent with the uses shown by Burke et al. (2009), Head and Eisenberg (2010), and Holmberg and Huvila (2008), which utilized specific social media for specific purposes. A more in-depth analysis would be necessary to understand why specific social media are used for specific purposes, though it could conceivably be based on capabilities that differ among the different social media types.

For the most part, participants did not want to deliver instructional information through social media (Table 2). The majority of participants indicated they disagreed or mostly disagreed with the statement "I would like to give instructional information to students through [social media type]," for Facebook, microblogs, and non-Facebook social networking sites. The majority of those who responded to the question (66.1%, n = 152) agreed or mostly agreed that they would like to give instructional information through online forums. For video-sharing sites, more respondents agreed or mostly agreed (40.3%, n = 93) than disagreed or mostly disagreed (32.9%, n = 76) with the statement.

Non-Facebook social networking sites and microblogs were the social media types participants least wanted to use. For non-Facebook social networking sites, the majority of participants disagreed or mostly disagreed (77.4%, n = 179) with wanting to deliver instructional information through that medium. Respondents also disagreed or mostly disagreed to deliver instructional information through microblogs (64.2%, n = 149) and Facebook (57.6%, n = 133).

Understanding that instructors are generally neutral or opposed to using social media to deliver instructional information is important, but understanding how they arrived at that stance is also important. While the question should be answered empirically, possible explanations include instructors' lack of knowledge regarding social media, discomfort with technology, social media not being able to provide what the instructors need, or other factors related to the instructor and social media.

More participants expected student productivity (37.4%, n = 86) and amount of communication with students (78.7%, n = 181) would increase as a result of social media in education than those who expected they would decrease (Table 3). In contrast, more participants expected the quality of student work

**Table 3. Changes participants expect from social media in classes (N = 232)**

| | Major Decrease (%) | Moderate Decrease (%) | No Change (%) | Moderate Increase (%) | Major Increase (%) |
|---|---|---|---|---|---|
| Amount of communication | 3.5 | 6.1 | 11.7 | 62.6 | 16.1 |
| Quality of communication | 10.0 | 25.8 | 32.3 | 27.9 | 3.9 |
| Student productivity | 7.0 | 13.5 | 42.2 | 35.2 | 2.2 |
| Quality of student work | 8.7 | 18.3 | 59.0 | 13.5 | 0.4 |

[z]Participants responded once for each social media type. Due to rounding, totals may be slightly above or below 100%.
[y]Survey administered fall 2009 to a national sample of college agriculture instructors.

**Table 4. Participants' perception of how important it is that students know how to use social media for future careers (N = 232)**

| Social Media Type | Not important (%) | Probably not important (%) | Neutral (%) | Probably important (%) | Important (%) |
|---|---|---|---|---|---|
| Online forums | 5.7 | 6.1 | 16.1 | 41.7 | 30.4 |
| Video-sharing sites | 8.7 | 12.1 | 26.0 | 35.5 | 17.7 |
| Blogs | 10.4 | 11.7 | 25.2 | 35.2 | 17.4 |
| Facebook | 13.9 | 19.9 | 16.0 | 32.0 | 18.2 |
| Wikis | 10.9 | 13.1 | 27.1 | 31.9 | 17.0 |
| Microblogs | 18.6 | 20.3 | 25.5 | 22.1 | 13.4 |
| Non-Facebook | 21.2 | 28.1 | 22.5 | 19.9 | 8.2 |

[z]Participants responded once for each social media type. Due to rounding, totals may be slightly above or below 100%.
[y]Survey administered fall 2009 to a national sample of college agriculture instructors.

(27.0%, n = 62) and quality of communication (35.8%, n = 82) to decrease than those who expected it to increase as a result of social media in education. These results are similar to the results from Jones and Johnson-Yale (2005) that showed instructors reported that Internet use had increased communication. Like the Jones and Johnson-Yale (2005) finding that instructors were more likely to believe Internet use had hurt and not helped student work, more participants in the current study expected the quality of student work to lessen than those who expected it to improve. As noted in the introduction, the perceptions that instructors have related to the relationship between Internet use and quality of student work are incongruent with students, the majority of whom reported that Internet use has helped their education (Jones, 2002).

As for importance for social media in future careers of students, the majority of participants reported online forums (72.1%, n = 166), video-sharing sites (53.2%, n = 123), blogs (52.6%, n = 121) and Facebook (50.2%, n = 116) were at least probably important for students to know (Table 4). More participants perceived non-Facebook social networking (49.3%, n = 114) and microblogs (38.9%, n = 90) as not important than as important. Though not a majority, more participants reported wikis (48.9%, n = 112) were at least probably important than those who reported they were probably not important. Based on these results, instructors see the significance of social media for students' future career successes, especially blogs, online forums, Facebook, and video-sharing sites.

## Summary

Social media are an increasing part of society and education. As such, understanding instructors' views on social media in education is important. The current study assessed college agriculture instructors' uses and preferences for social media in education. While the majority of instructors were using social media in education, they were mostly opposed – with the exception of online forums and video-sharing sites – to using them to deliver instructional information. While instructors expected the amount of communication with students to increase if social media were implemented into education, they did not expect increases in the quality of communication, quality of student work, or student productivity. Aside from microblogs and non-Facebook social networking sites, more participants perceived that it was at least probably important that students know how to use social media for future careers.

Social media are being used in class for varying purposes, which indicates that many instructors are purposefully using social media. They are not being indiscriminately applied to random settings. The effectiveness and appropriateness of these applications was not assessed in the current study but should be in future studies. Appropriateness refers to the capabilities of the technology and how it is being applied. Effectiveness refers to the ability of implementations to affect educational success.

Though the results from this study indicate instructors do not want to present instructional information through most social media, that does not mean that doing so is right or wrong. It is an indication of preferences. The effectiveness and appropriateness of social media use in education should be addressed to make that assessment. The next step for understanding social media's place in education is to assess students' usage and preferences for social media. Knowing how both instructors and students view social media in education provides a more thorough picture than only knowing one group's perspective. As for future careers, employers' perception of the importance of social media for their organizations should be addressed.

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# TECHNICAL EDUCATION IN AGRICULTURE AND NATURAL RESOURCES

PANEL ON TWO-YEAR PROGRAMS
Commission on Education in Agriculture and Natural Resources
NATIONAL ACADEMY OF SCIENCES, Washington, D.C.
1971

## PREFACE

The Panel on Two-Year Programs was formed by the Commission on Education in Agriculture and Natural Resources with two responsibilities: To review the status and trends in two-year post high school education programs and to identify problems and suggest solutions. In carrying out this assignment, the Panel turned its attention to a number of issues:

- Defining the roles and goals of the technical programs in agriculture and natural resources.
- Designing the most suitable curriculum.
- Defining the optimum preparation for faculty members in two-year colleges.
- Providing adequate inservice training programs.
- Avoiding excessive duplication in offerings among institutions in the same geographic area.
- Designing effective recruitment, counseling and placement programs.
- Building workable administrative structures.
- Obtaining adequate funding.
- Achieving adequate recognition, assistance and leadership from the four-year institutions.

The Commission itself had two major goals. The first was to foster improvement in the education of undergraduate and two-year students in the agricultural and natural resource fields by continually reviewing trends in education for undergraduate and technical majors; stimulating discussion and evaluation of undergraduate courses and curricula; and preparing recommendations for the development of academic programs in the future. The second was to assist in the development of the agricultural and natural resource aspects of general education. Its attention was directed primarily to course and curricular content, but it was also concerned with teaching materials, instructional technology, preservice and in-service faculty education and related matters.

This report is primarily directed to the attention of administrators and faculty in two-year programs, administrators and faculty in four-year colleges of agriculture and natural resources, departments of agricultural education, the staffs of federal, state and local education agencies, and employers in business and industry.

The Panel recognizes and appreciates the help of those who met with it on occasion or offered comments on earlier drafts of the report, including Charles Cameron of the Agricultural and Technical College at Alfred, New York; Howard Sidney, Agricultural and Technical College at Cobleskill, New York; Ralph Matthews, California Community Colleges; W. T. Mooney, El Camino College, California; and D. S. Metcalfe, University of Arizona, a member of the Commission.

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## INTRODUCTION

The explosive growth of community colleges across the country, and the concurrent national emphasis on post-high school vocational and technical education, have great significance for agriculture and natural resources. Nearly 20,000 students are currently enrolled in agricultural and natural resource curricula in community colleges, technical institutes, area vocational schools, and two-year divisions of four-year colleges and universities – in more than 600 separate curricula, nearly 250 institutions, in 43 states.

Vocational programs – as distinguished from technical ones – represent an important segment of education in agriculture and natural resources, and provide an alternative to baccalaureate or technical programs for many students, but are not considered in detail here. Vocational training in agriculture and natural resources has, in the past, been offered primarily in high school. Recently, however, a number of post-high school vocational programs in agriculture and natural resources have been introduced. These programs typically last one year, but may range from less than six months to more than two years.

This report omits detailed consideration of college parallel programs, which usually extend two years but may last only one. Such programs, offered by community colleges and university centers, are rapidly becoming a dominant factor in higher education in agriculture and natural resources. In fact, largely because of transfers from community colleges and regional campuses, junior class enrollment in colleges of agriculture now exceeds that of sophomores.

## ROLE AND STATUS OF THE TECHNICIAN

The term "technician" has no universally accepted definition, either as to level of training or kind of work. It is generally agreed that technicians have a certain amount of specialized education or training in science and technology. They occupy a position intermediate between that of the scientist, engineer or professional practitioner on the one hand, and the skilled or semi-skilled vocational worker on the other.

One definition of the agricultural technician is as follows:

"An agricultural technician is a worker located between the skilled worker and the professional in the job classification structure, in his work performance, and in his educational attainment. He possesses the skill and ability, working independently or with minimal supervision from a professional, to analyze and interpret information, diagnose problems, make decisions, and make practical applications of theoretical knowledge in performing specific tasks in a specialized field in the production, processing, distribution, or marketing of goods and services in agriculture. He must exercise cognitive skills primarily but also must be able to supervise and perform manipulative skills." [1]

In agriculture and natural resources, there has been relatively little effort to conceptualize the role of the technician, compared to the attention devoted to it in engineering, the physical sciences, and medicine. An exception is forestry, where the Federal Government and some states have established civil service positions for forestry technicians. The Society of American Foresters used these terms:

[1] Report of a National Seminar on Agricultural Education, "Preparing Agricultural Technicians", The National Center for Advanced Study and Research in Agricultural Education, July 20-24, 1964, The Ohio State University.

"The forest technician differs from the semi-skilled worker (aide) in his knowledge of forestry theory and methods and from the forester in his more limited or specialized background and in his use of technical skills in support of forestry activities. The senior (advanced) forest technician occupies the area between the skilled forest worker and the forester at the end of the spectrum closest to the professional forester. The forest technician requires an education and training sufficient to enable him to understand the reasons for, and the purposes of, the operations for which he is responsible. He should understand technical terms and appreciate the professional point of view. The forest technician does not need either the depth or extent of scientific understanding required of a forester, but he does need a practical working knowledge of the same subject matter."[2]

### Technicians and Status

A general attitude in our society is that the only truly educated college man is the one who has completed four years of work. It seems to matter not if this is an inferior experience for the particular student, the central idea is that it must be four years. As the AAAS Commission on Science Eduation says:

"Higher education, in general, has failed to accept technical education as a specialized part of its own structure – as it has accepted medical and engineering education, for example – and has not offered the full measure of cooperation that must exist if technical education is to be able fully to carry out its mission.

"A share of the confusion about the place of technical education in the educational system arises from the fact that there still is lack of understanding by many of the distinction between manual arts, vocational education, and technical education. Each has its unique and essential role in education, but their immediate objectives and characteristics are quite different.

"The scientific community is not fully aware of the function and academic requirements of technical education, nor that the assistance of scientists and engineers is urgently needed, particularly at the local level, in the development of technical curricula, the preparation of science and mathematics courses, and the initial preparation and continuing education of teachers in technical education programs."[3]

While some college faculty members share the prejudice toward four-year curricula the attitude is most tenaciously held by the nonacademic public, and particularly by the parents of high school students, who are looking forward to more education for their offspring. The four-year college degree has become a status symbol of unique importance, a view that had its beginning many decades ago when only the elite and affluent could afford to go to college, and "college" meant four years. Society tends to hold in high esteem those who can deal with abstract, theoretical ideas, and to downgrade those whose special aptitudes are technical and manipulative.

Our economy faces an increasing demand for workers with technical skills, and provides even higher monetary rewards for their services. It is quite possible, therefore, that technical competence also will become a measure of status and affluence, redressing the balance in attitude regarding the relative worth of four-year and less-than-four-year training.

### Demand for Technicians

Technician occupations are growing rapidly and in recent years the employment of technicians has been increasing faster than that of the engineers and scientists they assist. This growth stems from the needs of an expanding and increasingly technical economy and a growing recognition of the importance of technicians – factors that have greatly intensified the demand.

The Bureau of Labor Statistics projects an increase of about 650,000 technicians over the 1963-75 period, a rise from the 845,000 employed in 1963 to about 1,495,000 needed in 1975.[4] The increase in requirements for life science technicians is expected to be the most rapid, 139 percent over the 1963-75 period. A large number of the technicians needed in field of agriculture and natural resources fall into this category.

It has been estimated that in addition to the technicians required to fill new positions, more than 15,000 will be needed each year to replace those who retire, die, or transfer to other occupations.

[2] Society of American Foresters, "Forest Technician Training Programs in the United States – A Progress Report". Journal of Forestry, Vol. 65 (7); 484-487. Washington, D.C., 1967.

[3] "Technical Education, A Growing Challenge in American Higher Education". A report by the Commission on Science Education of the AAAS. AAAS Publ. 68-14.

[4] Technician Education Yearbook, 1967.

Underlying the increase in demand for technicians are the expansion of industry, continued growth in research and development expenditures, and increasing complexity of modern technology. Production methods are becoming ever more complicated, requiring technical knowledge of the product and its use. Product development itself is usually in charge of scientists and engineers who require assistance from technicians to make their work more efficient. While education is often discussed from the standpoint of the needs and desires of students, the basic drive is a reflection of the requirements of the economy and the opportunities it offers.

### Supply of Technicians

Technical training is important not only to the employer, but to the many young persons who, unable or unwilling to undertake four-year college instruction, are interested in practical matters and capable of assuming formal study beyond high school. In the past, their alternatives have been limited: now, post high school vocational and technical programs provide opportunities for high school graduates to develop or enhance their employability.

Harris has stated: "Near the top of the list of major problems facing America is the education and training of youth for 'middle-manpower' occupations."[5] He goes on to say that not only must the job seeker be willing to work, but he must also be capable of doing some specific kind of work. Competence and skill of a generally high order is necessary. He feels that more than half of our high school graduates eventually will find their place in 'middle-manpower' jobs for which two-year college programs will be optimal preparation.

Today's enrollee in a baccalaureate program is often required to present high scholastic credentials from high school and must generally obtain good grades in college board examinations. Usually, he has had a greater depth of training in the physical sciences and mathematics, the biological sciences, the social sciences, and languages than the student who is not continuing on to a four-year college.

Baccalaureate programs in agriculture and natural resources place decreasing emphasis on vocational and technical education, and concentrate more on principles and theory in science and technology. The first two years of a baccalaureate program concentrate primarily on the basis sciences and humanities; familiarity with the particular subject matter of the professional degree does not occur until the third and fourth year. Still further, an increasing portion of the baccalaureate graduates continue for advanced degrees and are even less likely to enter practical, operational employment.

### Technical Students

It should be recognized that students in two-year technical programs are in some ways similar to and in some ways different from students in four-year programs. This results from the self-generated sorting that takes place in any system where individuals may choose different paths for achieving self-satisfaction and monetary reward.

Two-year students have the same measure of interest and motivation as four-year students in pursuing their educational objectives. They possess the same personal qualities – ambition, a sense of responsibility, and the ability to motivate and get along with people. Perhaps more two-year students generally know how to get a job done because they have an inclination for the practical. They are not as adept in dealing with abstractions and theory, and in putting these in written terms. And because educational tests tend to favor the very aptitudes in which the practically oriented person is deficient, technical students generally show up less well in college board scores and academically rank lower in their high school class. The discerning educator recognizes these differences, but he does not consider them weaknesses, and considers two-year training a worthy educational goal for many young people.

[5] Harris, Norman C. "Meeting Educational Needs for the Middle Level of High School Graduates". School of Education Bulletin, University of Michigan, February, 1963:.

### Growth of Community Colleges and Technical Institutes

Most technical curricula are offered by community or junior colleges, and technical institutes. The numbers of these institutions, and their size, have been increasing rapidly, at a rate of about one a week.

"The fastest expanding institutions of education in the United States are the community colleges, technical institutes, and post high school area vocational-technical schools. Approximately 78 two-year colleges were established in 1967. It is estimated that nearly 100 two-year community colleges will be established in 1968. It is anticipated the two-year community colleges will continue to expand to meet the needs of high school graduates and others for continuing education for changing and emerging technologies. Many area vocational-technical schools have been and are being established to provide post high school technical education."[6]

The comprehensive community colleges and technical schools ordinarly maintain an open-door admissions policy. These institutions offer post-high-school education for all individuals regardless of their intellectual level, interest, or physical skills. All applicants who are high school graduates or who have passed a high school equivalency test are usually admitted although some may not be admitted to technical programs.

### Federal Legislation

Federal support for the establishment of technician programs, has been increasing. The need for educating highly skilled technicians was recognized and supported by Federal legislation under Title VIII of the National Defense Education Act of 1958. The primary purpose was to train skilled technicians required by national defense.

Other significant legislation in the support of technician training programs includes the Vocational Education Act and Higher Education Facilities Act of 1963, which authorized billions of dollars for the construction of facilities of public and non-profit private colleges and an Amendment to the Higher Education Act of 1965.

### Goals of Technical Education

The primary objective of technician education is to produce a graduate competent to perform a technician-level task. Corollary to this, technician education should prepare students for jobs that actually exist. In other words, technician education should be job-oriented and market-oriented.

The technician must be capable of working and communicating directly with engineers, scientists, production personnel, and other managerial and professional persons, in his specialized area of work. He should also be an active, well-informed member of society.

The successful technical education graduate should be trained broadly enough to be able to select his field of preferred employment, within a job cluster. Any further training required by the employee would be in employee policies and procedures, and specific techniques used by the professional for whom he is working.

## DEMAND FOR TECHNICIANS

For the last two decades the demand for professional employees at the four-year level has exceeded the supply. While the employment situation softened somewhat in 1970, the long-run outlook is good. The use of technicians to extend the influence of the professional workers appears to be a partial solution to this shortage.

While data relating specifically to agriculture, forestry and management of renewable natural resources are less complete than for technicians in certain other fields, the needs are apparent. Studies are being conducted to determine the areas of greatest need and the special curriculum requirements of various technical specialities. Demand for these technically trained graduates is increasing each year as more post-high school institutions initiate programs and as employers learn to appreciate what the technicians can do. But more liaison between schools and employers is needed to acquaint prospective employers with the capability and availability of graduates.

### Change in the Agricultural Economy

Changes in modern agriculture have created a need for more technically trained employees. There will also be a need for competent people in many new areas of specialization created by advances in technology. The Bureau of Labor Statistics (9) states that while less than 5 percent of the total civilian labor force is employed on farms, the number of people who work in jobs closely related to agriculture has been growing – a number of these positions can be filled by persons with training at less than the baccalaureate level.[7]

Even with increased efficiency in output per worker, agriculture still employs six million farm workers. Furthermore, labor on the farm accounts for a small part of the entire agricultural labor requirements. According to the United States Department of Agriculture, six million people have jobs providing the supplies farmers use for production and farm living. Eight to ten million people have jobs storing, transporting, processing and merchandising the products of agriculture. In fact, three out of every ten jobs in private employment are related to agriculture.

Agriculture and natural resources, as do other fields, require much technical work between the vocational and the scientific professional levels. In the past, much of this technical work has been done by a combination of bachelors' degree holders, student candidates for bachelor degrees, or persons with only on-the-job experience.

### Change in Baccalaureate Education

Baccalaureate courses in agriculture and natural resources have traditionally had a strong vocational orientation. This is less true now, custom having gradually given way to emphasis on developing an understanding of basic principles which cut across disciplines. The four-year graduates from modern curricula do not pursue a technician role.

Today, also, more baccalaureate students go directly to graduate work than did formerly. In some colleges the proportion already is 50 percent or more, leaving fewer students for the jobs traditionally open to four-year graduates. Those with a bachelor's degree who do take jobs are qualified to fill positions at the professional level requiring greater knowledge and responsiblity than formerly. All this change has left an employment gap in the agricultural and natural resource economy: the need, then is to provide educational programs to train persons to fill this void in manpower.

### New Careers

In addition to the traditional occupations, new technical careers are on the horizon, for example, those evident in teaching and agricultural extension.

Many of the so-called professional jobs performed by such agricultural extension specialists as 4-H club leaders could be handled very effectively by a technician. In education, much could be done to increase the productivity of the professional by providing him technicians to do such routine work as preparing demonstration materials.

Closely allied to education is agricultural research. The use of technicians in carrying out the routine operations would materially increase the productivity of the professionals and reduce the over-all cost of a new discovery – a new variety, product or technique.

In veterinary medicine, technicians could handle a number of jobs under the supervision of the professional. For example, technicians could do routine vaccinations or pregnancy testing, and greatly enhance the productivity of the professional veterinarian.

Agriculture will no doubt be faced with more and more labor union negotiations. In California, for example, some of the large

[6] "Methods of Teaching Agricultural Occupations in Community Colleges and Area Vocational School", Final Report, Project No. 8-0008, to Bureau of Research, USOE. August 1968. By Howard Sidney, Chairman, Division of Agriculture, Cobleskill Agricultural and Technical College, Cobleskill, New York.

[7] Occupational Outlook Handbook, Bureau of Labor Statistics, U.S. Department of Labor, Bulletin No. 1550, 1968-69 Edition, p. 792.

farms are now unionized. The area of labor-management relations could well be one where technically competent personnel will be required and where presently few, if any, are available.

Other areas where there may be need for technicians include intrastate inspection of meat or other agricultural products and range management technicians.

### Rural America

The President's Task Force on Rural Development has described the role of technical education in meeting the employment and education needs of rural America in these terms:

"Estimates in 1960 placed underemployment in the Nation at 8.4 percent for rural nonfarm and at 26.0 percent for rural farm forces. This is equivalent to 1.5 million man-years annually that are not fully employed in producing wealth for the Nation to share. This is a wasteful loss – first to the underemployed who are not compensated for idle skills, and second, to each of us in society who cannot benefit from wealth that is not produced. Simply put, you cannot cut up a pie that hasn't been baked. Thus each of us has an economic interest in the education of other people wherever they are and whomever they are, regardless of race, class or place of residence.

"Educational programs should be developed to assure people living in the small cities, towns and on the farms of rural America of educational opportunities – including preschool, general education and vocational and occupational education that are comparable in quality and quantity to those provided others in our society.

"There is urgent need for work experience programs, subprofessional job training, adult education, broad vocational and technical training, retraining, testing, occupational counseling, community colleges and areawide special education, especially at an early age, for educationally underprivileged rural residents.

"Rural youth, particularly, are faced with the prospect of migration. To meet the needs of contemporary society, they need both a higher quality of general education and a wider offering of vocational education and technical education. The latter can be helped by more multidistrict area vocational and technical schools and by amending the Vocational Education Act to provide that Federal funds for vocational education be granted in lump sums to States, leaving it up to States and local school districts to allocate the funds among different types of vocational education."[8]

## TECHNICAL EDUCATION PROGRAMS

### Present Offerings

Technical education programs in agriculture and natural resources have grown rapidly in number and enrollment during the past several years. A study conducted by Fred Manley during 1967-69 indicates that significant growth occurred in just two years, from 1966-67 to 1968-69. Table I shows that enrollment increased 34% in both years, and the number of institutions offering programs grew by 39% and 23%.

California had the largest enrollment in 1968-69, followed by New York, Illinois and North Carolina. These four states enrolled 55% of all students that year.

The largest enrollment in 1967-68 was in agricultural business technology curricula, followed closely by those in ornamental horticulture technology. Table II shows enrollment by curriculum, and the number of institutions offering each type of program, for 1966-67, and 1967-68: data for 1968-69 were not available.

**TABLE I**

Enrollment, Institutions and States offering two-year technical education programs in Agriculture and Natural Resources, 1966-67, 1967-68, and 1968-69.

| | 1966-67 | (% Change) | 1967-68 | (% Change) | 1968-69 |
|---|---|---|---|---|---|
| Enrollment | 10,290 | (+34%) | 13,786 | (+34%) | 18,434 |
| Number of Institutions Offering | 142 | (+39%) | 197 | (+23%) | 243 |
| Number of States Offering | 35 | (+ 6%) | 37 | (+16%) | 43 |

### Curriculum Organization and Content

Most of the institutions that offer technical programs also offer college parallel programs that give the students the first two years of a four-year baccalaureate program. The college parallel program has an objective that is different from the technical programs and consequently should differ in content.

Two-year college parallel programs, which prepare the student for transfer to a baccalaureate curriculum at the end of the second year, might well offer few if any technical subject matter courses in the first two years. Emphasis is usually on basic biological, physical, and social science courses.

If the student is to take his place in one of a closely related cluster of technical positions after two-years training, he must bring certain minimum preparation when he matriculates. If he is not prepared for a technical program, – but has the nature, ability and desire – he should be counseled to enter a "pretechnical" post high school program. Such a program, designed flexibly to meet the needs of the individual student, should in most instances be offered by the institution that offers the technical program.

### Curriculum Content

The primary objective of a two-year technical program is to develop technical skill – to prepare the student for an occupation, or a "cluster" of closely-related jobs. Technical subject matter courses should be emphasized, and offered early in the

[8] "A New Life for the Country". The Report of the President's Task Force on Rural Development, U.S. Government Printing Office, March 1970.

**TABLE II**

Enrollment and number of institutions offering two-year Technical Programs in Agriculture and Natural Resources, By Curriculum

| Curriculum | Enrollment 1966-7 | 1967-8 | (%Change) | No. Institutions Offering 1966-7 | 1967-8 | (%Change) |
|---|---|---|---|---|---|---|
| Agricultural Business Technology | 2,702 | 3,688 | (+32%) | 102 | 137 | (+34%) |
| Ornamental Horticulture Technology | 1,935 | 3,495 | (+29%) | 74 | 85 | (+15%) |
| Forestry and Resource Technology * | 1,256 | 1,753 | (+40%) | 29 | 42 | (+45%) |
| Agricultural Engineering Technology | 1,051 | 1,669 | (+59%) | 43 | 66 | (+53%) |
| Animal & Poultry Technology | 1,420 | 1,593 | (+12%) | 46 | 47 | (+ 2%) |
| Crop Technology ** | 789 | 1,004 | (+27%) | 32 | 40 | (+25%) |
| Food Technology | 399 | 531 | (+33%) | 17 | 19 | (+12%) |
| Soil Technology | 221 | 308 | (+39%) | 7 | 11 | (+57%) |
| Other | 594 | 608 | (+ 2%) | 14 | 17 | (+21%) |
| Totals | 10,367 | 13,759 | (+33%) | 364 | 464 | (+24%) |

* Includes forestry, wood utilization, fisheries and wildlife, and outdoor recreation technology.
** Includes agronomic and horticultural crops.

program. The following content guidelines are commended to the attention of those planning to develop technical curricula.[9]

- The curriculum must give the student competence in the following:
  - Proficiency in the use of the scientific method of inquiry and observation and in the application of the basic principles, concepts, and laws of physics, chemistry, and the biological sciences.
  - Facility with mathematics
  - A thorough understanding and facility in use of the materials, processes, apparatus, procedures, equipment, methods, and techniques commonly used to perform the laboratory, field, or clinical work; and the capability to use them to provide the specialized services required in the technology.
  - An extensive knowledge of a field of specialization, with an understanding of the application of the underlying physical or biological sciences as they relate to the engineering, health, agricultural, or industrial processing or research activities that distinguish the technology of the field
  - Communication skills that include the ability to record, analyze, interpret, and transmit facts and ideas orally, graphically, or in writing with complete objectivity; and to continuously locate and master new information pertinent to the technology.
- The curriculum must contribute to the development of certain personal characteristics that are desirable and in some measure necessary. As employees and as citizens, technicians must have some understanding of social and economic factors, a knowledge of the organization of society in general and their employer's organization in particular, and acceptable personal attitudes based on an understanding of person-to-person relationships.
- The curriculum must provide a broadly based competency in a field of applied science of sufficient depth that the graduate technician may be employed in one of a cluster of related work opportunities in his field. Upon employment, a brief period of orientation to his particular duties in the employer's organization, together with continued on-the-job study, permits him to advance to higher levels of productivity and increased responsibility.
- The curriculum must be of "college level and intensity", providing the special knowledge, skills, competencies, and experience needed for beginning employment, within a period of about two years.
- The curriculum has no predetermined implication as to transferability to a baccalaureate or a professional curriculum, but it does not preclude a student's continuation toward such an objective.
- The curriculum should clearly be described in terms readily recognizable by students, school, staff, parents, employers, legislators, other educational institutions, and the public-at-large. As a curriculum, it should be described in terms of semester, trimester, or quarter hours. Credit awarded for lectures, laboratories, and shop periods should be equivalent to that generally accepted at the college level.
- The curricular description should specifically state the particular type of technician being educated; and that the program is designed to prepare the student for employment as a technician in a clearly defined cluster of present and reasonably predictable future employment opportunities.
- The curriculum will contain courses that are usually grouped under the following classifications: (1) basic science, (2) mathematics, (3) technical specialty, (4) communications, and (5) social studies.
- The curriculum will have a carefully coordinated grouping of courses that are arranged to blend smoothly from one into the next and not a loose collection of courses taken at random and independently of one another. In addition, specialized technical courses are to be introduced at the beginning term, and relatively large numbers of laboratory hours occur during the first year.
- The curriculum will allow a period of time for work experience that is carefully planned, closely supervised, and evaluated.
- The curriculum will be under continuous evaluation not only by the faculty and administration of the institution, but by an advisory committee composed of representative employers and others.
- The curriculum should be assisted in achieving its objectives by using a student organization that allows for leadership, attitudinal, and personal development.
- The curriculum should lead to a formal certification of accomplishment, such as the awarding of an associate degree, and the student's progress should be recorded and available as a formal transcript of college accomplishment.
- The curriculum should have competent and enthusiastic teaching staff, laboratories equipped with apparatus representative of those used by the most up-to-date employers, a good library, adequate classrooms, and an administrative direction sincerely dedicated to quality occupational education.

### Work Experience

Supervised work experience in the student's field of study can be a valuable part of the total learning experience. In the work phase of the training, students can see the practical application of their classroom training. Since most of the students come into technical programs directly out of high school, the supervised work experience helps them make a smooth transition to the world of work. This work experience should be supervised, should carry credits, and should be interspersed with classroom instruction.

Work experience in industry has other benefits. It will make the industry more aware of the program and thereby help in recruiting, graduate placement and in securing support for technical programs. Work with industry will also contribute to the professional growth of the teachers and coordinators.

### Degree Awarded

Traditionally, community colleges have granted an Associate in Arts degree to their graduates, a degree that ordinarily carries with it the connotation that the recipient is prepared to matriculate with junior standing at a four-year institution. The trend now appears to be toward offering a different kind of degree to students who complete two-year technical programs. Many of the older community colleges seem to feel that in order to earn an Associate in Arts degree, the student must have credit for most of the general education courses required in the first two years of a baccalaureate program.

Several community colleges across the nation are now awarding an Associate in Science degree or an Associate in Applied Science in technical areas. These students are graduated along with those who have earned an Associate in Arts degree, the only difference being that they are prepared to embark on a technical career. The technical schools generally offer the Associate of Science or Associate of Applied Science degree. It is a type of degree that appears desirable, and could also be offered by the four-year institution where appropriate.

## FACULTY

### Pre-Service Preparation

Teachers in two-year technical training programs should have the basic qualifications required in any other type of education program, augmented by work experience. This unique combination is difficult to obtain in requisite numbers today.

The most important characteristics of teachers in technical programs is that they be qualified in the subject matter they teach, which means at least an undergraduate major or equivalent – many institutions require a masters degree or equivalent. This latter would appear to be desirable, although not absolutely essential.

Leaders in agricultural education have long believed in training generalists, but the time to reverse this trend is long overdue. The cause of technical education will be furthered if the emphasis shifts to training specialists. As S. S. Sutherland put it: "There will be a complete disappearance of the undergraduate major in agricultural education. Teacher candidates will be selected from specialized majors in agriculture allowing on-the-job completion of the academic requirements for teaching."[10]

The work experience required of new faculty members may be waived in some areas of instruction, but should be mandatory for coordinators and teachers in the technical specialty courses. It should be recent and of sufficient duration to give the instructor an accurate picture of the requirements of a technician in the particular field of work, and it should be updated through sabbatical leaves.

The teacher in technical programs is most successful if he has a sincere desire to teach, a natural enthusiasm for his subject, and ability to work with and counsel students.

### Utilization

Since qualified teachers are in short supply, the tendency has been to assign one teacher to several courses – often in unrelated subjects. It is completely unrealistic to expect an individual to be competent in several subject matter areas.

Teachers in technical programs should be given sufficient support personnel – secretarial help, laboratory technicians, and

[9] Adapted (by Fred W. Manley) from "Criteria for Technician Education – A Suggested Guide", U.S. Department of Health, Education, and Welfare, November, 1968. EPC. Catalog FS 5.280:80056. Wash.: 1968.

[10] Sutherland, S.S., "Vocational Agriculture – 1975", American Vocational Journal, March 1967, p. 64.

teaching assistants – to relieve them of the routine work that can be performed as well or better by others. Not only does it save money to hire support personnel for the extraneous teaching details, but it helps attract and retain good teachers.

### In-Service Education

Institutions should provide opportunities for the professional improvement of its teachers and travel allowances to support their attendance at professional and trade meetings.

### Recruitment

There simply are not enough qualified teachers available to staff all of the technical education programs now in operation and little prospect that the situation will improve. Programs are being added at a faster rate than teachers can be trained.

While technically qualified people who would like to get into teaching are available in business and industry, many lack formal training in teaching methods. Perhaps some system of internship training could be provided to replace the normal teacher certification process.

Still more individuals in business would be willing to teach on a part-time basis, but, again they do not have the formal training in teaching methods. Some do not need it, but most would profit from in-service training in lesson planning and methods of instruction. This is not an insurmountable problem, but it will take effort and dollars to solve.

Another method of securing teachers is to raise the pay scale to a level where people will be attracted to this occupation. Business and industry have generally been able to outbid educational institutions for the top people.

## ADMINISTRATION AND FINANCING

### Number and Location of Programs

National need for technicians will not insure the success of a particular training program. The final test of an educational program at any level is the employability of its graduates and their ability to progress in the work for which they have been trained. Graduates of technical training programs must have a clear advantage over those who are not if the value of the program is to be demonstrated.

Two principles appear self evident: (1) the need for technicians must be identified by geographic areas, and (2) the training offered must be of sufficient depth and intensity to insure that the graduates can fill the need.

The first stems from the fact that there is something less than perfect mobility of workers in the United States and there must be employment opportunities for graduates within a reasonable distance of the educational institution. In assessing need, one may be overly impressed, for example, by a report showing that a certain number of technicians are needed per year in a given occupation in a given area. But if investigation shows that the starting wage will be only about $1.50 per hour, it is quite clear why the industry in question will need the same number again next year – those trained this year will have moved into more lucrative jobs.

In many states there has been a serious lack of planning in regard to the needs for and location of technical education programs. It requires a minimum of five years and many thousands of dollars to start a program and graduate the first two classes. It should be recognized that there is a time lag in getting a program publicized and accepted, and that while poor quality programs cost nearly as much as good ones, they lead to disappointed employers, disillusioned students and unhappy parents.

It appears that a single state agency should be given the responsibility for overall planning, its responsibilities to: (1) Providing assistance in the determination of the need for technicians in the various occupational areas, (2) Making recommendations as to number and type of programs required to meet this need, and (3) Determining the geographic locations best suited to specific training programs.

### Type of Institution

Successful technical training programs are currently being offered in four-year colleges and universities, junior colleges, community colleges and technical institutes. The success or failure of technical programs depends upon factors other than the type of institution offering the program. As a group, each of the above types of educational institutions has certain inherent advantages and limitations. Some of the more obvious are noted below.

#### Four-Year Colleges of Agriculture and Natural Resources

Advantages and disadvantages:

- Technical programs can utilize the physical facilities already on campus – agricultural laboratory facilities, greenhouses, and herds of livestock – that are expensive to duplicate.
- There are more specialists available which means that one staff member need not try to handle a number of subjects.
- A wider variety of technical programs can be offered due to the availability of staff and facilities.
- If, however, a four-year institution is limited in terms of space or budget – as many are – technical programs can be added only in competition with other programs and tend to be neglected.
- Some faculty members may well feel that technical programs are a lower form of instruction and seek what to them are the more prestigious baccalaureate and graduate courses.
- Technical students may feel they are second-rate citizens if in a university environment.
- Research activity may encroach on teaching time and on student counseling effort.

#### Community or Junior Colleges and Other Two-Year Degree-Granting Instutions

Advantages and Disadvantages:

- Because a higher percentage of students are in two-year curriculums, there is less tendency to differentiate among students and programs.
- Because they are primarily teaching institutions, the faculty is committed to teaching as such, not diverted into research and extension.
- Students can often receive technical education within easy commuting distance of their homes.
- On the other hand, a given staff member may be asked to teach several courses, even though different competencies are required.
- Two-year institutions may also be limited as to the physical facilities necessary.
- Two-year institutions may have difficulty hiring qualified staff members.

#### Technical Institutes

Advantages and disadvantages:

- The entire faculty and student body are devoted to occupational education with a single educational objective.
- The commonness of purpose promotes good relations among students and faculty, but the institute may find it difficult to attract and hold qualified faculty.
- Too often institutions of this type tend to spread their faculty too thinly with the result that instruction is not of sufficient depth or intensity to prepare the students adequately for technical jobs.

### Initiating a New Program

Institutions should work with industry to verify that there is a genuine demand for the graduates of particular training programs before they are initiated. To project demand is not as difficult as seems at first glance. Interviewing a few – five to fifteen – of the recognized leaders in the industry being studied may yield more valid results than would a statistical sample of all prospective employers.[11] An advisory committee can be very useful in determining an industry's employment needs.

In theory, a genuine demand for graduates and a high quality curriculum built upon this demand should insure the success of technical programs. Unfortunately this is not always sufficient, for students must be attracted to the program in sufficient number to keep cost per student at a reasonable level. Enrollments are very difficult to forecast – it is fairly clear that in many occupational areas enrollments do not build up automatically when a new program is available. Data from other institutions with similar programs already in operation can be helpful in estimating enrollments and it is essential to budget funds for promotion activities when starting a new program.

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[11] "Policy and Administrative Decisions Needed when Introducing Vocational and Technical Education in Agriculture for Off-Farm Occupations", Center For Research and Leadership Development in Technical Education, Columbus, Ohio, August, 1965, p. 11.

It is difficult to set minimum projected enrollments that warrant starting a new training program, but it should be at least 125.[12] Adding a new occupational area to an already established technical training program can be safely undertaken with far smaller projected enrollments – as low as 20 to 25.

One method used by institutions to insure adequate patronage of a new program is to group several career specialties into one broad program – for example, agricultural business. The danger here is the possibility that the graduates will not have the technical skills and competencies required of them by their prospective employers.

### Administration

The tools that administrators have to work with and the atmosphere under which they operate are keys to the success or failure of a technical program.

The administrator of a technical division should have rank and salary equal to that of his colleagues in other phases of education. Too often overall administrators of colleges and universities look upon this type of training as a stepchild, an attitude that is reflected in budgets, promotions and in all decisions affecting the technical programs.

**Organization** The commonest arrangement is to place the administrative responsibilities for technical programs with a department head or dean. This can work well if all levels of administration are dedicated to the philosophy of technical education, but if anywhere in the higher echelon there are those who do not believe in technical education, any system will fail.

**Budgets** Technical education divisions or departments should have separate budgets and the administrative head should at least share in decisions on the allocation of funds, for he is in the best position to evaluate the relative importance of building, staff and equipment needs.

**Industry Cooperation** An industry advisory committee can be very helpful to an administrator of technical programs. It can contribute in a number of ways: (1) assist school officials assess the need for training in specific areas; (2) help develop curricula; (3) assist in identifying firms to be used in the work phase of cooperative programs; (4) assist in graduate placement; (5) help with recruitment; (6) help secure financial support for technical programs; (7) evaluate new ideas and techniques proposed by the instructional staff.

An advisory board should not make the decisions itself, but administrators can make wiser decisions if good advice is available from outside the institution itself.

Cooperation should benefit industry also. Administrators, coordinators, and teachers can be very helpful to industry. They can offer valuable assistance as ex officio members of trade association board of directors, members of industry educational committees, instructors in industry-sponsored training meetings and in adult education activities. Working with industry is an excellent way for coordinators and teachers to keep up-to-date. The value of working with industry should be recognized and a part of the coordinator's time allocated for this purpose.

### Financing

To provide quality programs an institution must have adequate facilities and equipment; a competent staff; and administrators who believe in technical education. Technical education programs are expensive, often more costly than the first two years of baccalaureate programs. The decision to start a new program should be made only after realistic estimates of costs and revenue have been made for at least five years into the future.

It is the joint responsibility of local school officials, state departments of public instruction, and agencies of the federal government to insure that the taxpayers' dollars are spent in such a manner as to insure a quality education for the maximum number of individuals at the least possible cost.

**Estimating Costs** Factors that should be considered in estimating the cost of a new program include:

- Building, equipment and staff.
- Existing courses, if any, that can be utilized.
- Administrative, clerical and overhead costs.
- Projected enrollments.

The Department of Health, Education and Welfare has sponsored the preparation of curriculum guides in a number of training areas that can be valuable to local school administrators in estimating costs. In most cases, the curriculum guides contain a rather detailed list of equipment, the type of facilities needed and recommended course outlines.

**Sources of Funds** The major sources of funds to support technical education programs are state and federal appropriations, student tuition and local governmental revenues. Private foundations have also given financial assistance in selected cases.

In a study of technical training programs in Washington State Neil Snepp reported that capital costs were usually provided by both state and local funds. Sixty percent of the institutions surveyed received over one-half of capital outlay from state appropriations, only ten percent used federal funds for capital expenditure. Operating expenses were met by a combination of state and local funds, plus student tuition. The commonest pattern of financing was one-third from each source, the next most common was one-half from tuition and local funds and one-half from state appropriations. Federal funds have been available under the Vocational Education Act of 1963 as amended and under other Federal Acts. In many cases these funds are available on a matching basis. State departments of Education are the best source of information on current funding for technical education.

Programs have also been funded by private foundations and by industries, in the latter case by supplying equipment, teaching aids and part-time service of employees. There is a time lag in most financing schemes, which must be taken into account.

### Accreditation

Institutional accreditation by a recognized regional accrediting organization is useful and should be sought by all post high school and collegiate institutions. Criteria used by the accrediting agency should be studied early in the development of a new program.

Specific accreditation of individual curricula in agriculture and natural resources is not advisable. However, non-enforceable guidelines and the assistance provided by appropriate organizations is helpful.

### Student Recruitment, Selection and Admission, Counseling and Career Placement

#### Recruitment

Enrollment in technical programs is growing rapidly; apparently some recruitment efforts have paid off. But enrollment in many curricula is small and those involved with technical programs should study recruitment methods that have been used successfully.

One of the principal problems in recruitment of students has been a lack of public information. Parents and counselors not only need to be more aware of the job opportunities but of the respectability of technical programs. The latter, particularly, is a major issue for the post-secondary advisory, for to some students and parents there is something less than ideal about a technical education – this despite the fact that this technical education has proven highly desirable, structurally sound and economically feasible. The student must be made aware of the importance of technical support to the scientist and professional, and of the worth of technical education.

The cooperation of public and private agencies and businesses in publishing and distributing career information should be sought. Schools offering technical programs should sponsor career days for counselors, parents and students in junior and senior high schools. Attractive brochures may be prepared and sent to high school counselors. Other media that may be utilized effectively are: News releases, films or slides, television or radio programs, and speakers from education or industry.

One of the better methods of recruiting is through word-of-

[12] Snepp, Neil, "Agricultural Programs in Community Colleges", Agricultural Education Magazine, March 1966, p. 197.

mouth by graduates of the program who are gainfully employed, but experience shows that it takes three to five years for effective communication of this type to take place.

In addition to directing students to the technical program as an appropriate alternative to the bachelor's program, recruiting should be aimed at those students who might otherwise terminate their education at the high school level.

Finally, the recruiting program should emphasize that many occupational areas in agriculture and national resources offer opportunity for young women as well as young men.

### Selection and Admission

The ultimate objective of the technical program is to produce high quality graduates. Therefore, it is important that there be a measure of student selection.

Selection and admission standards and policies should be tailored to students entering college parallel curricula and vocational programs.

Standardized achievement tests are available and may be used as part of the selection process. Raw scores, which can be converted to percentile ranks on national norms, generally give a pretty good indication of verbal and mathematical ability. Testing of potential technical students should however be designed to measure more than academic ability. It should include a measure of interest, mechanical ability and other special talents.

A high school transcript should be required of all students, and should be taken into account.

Students desiring to enter a technical program should have a high school diploma and have completed the equivalent of at least two years of mathematics, and one of science, or the equivalent. From among those meeting these requirements it may be desirable to further select students on such criteria as aptitude for technical training in general, aptitude and motivation for a particular curriculum, academic standing in high school and academic test scores, and seriousness of purpose.

For those students who have not completed the equivalent of the above-recommended courses, a pre-technical program, up to a year in length, is advisable. This program also helps to establish a reserve "pool" of qualified students for subsequent technical classes. In addition to science and mathematics, a pre-technical program should offer courses in communication skills, primarily to improve proficiency in reading and mechanics of English.

A personal interview can be a vital part of the selection program, to determine the prospective student's seriousness of purpose and motivation. If a prospective student has been away from high school and has been working full-time for a substantial period, it is wise also to obtain a letter from his employer that assesses his maturity, seriousness and work habits.

In any event, if unqualified students are admitted, the level of instruction is lowered, or the failure rate is high, which is an inefficient use of both student and instructor time. If quality of instruction is compromised, then graduates will fail to perform well later in technical positions, and students and employers will become disillusioned.

### Counseling

A need for counseling continues after students are admitted – in addition to a regular institutional counseling service, students should have access to their agricultural and natural resources instructors. In many cases, the students feel a closer relationship with the classroom teacher than with the professional counselor. The counseling program should give special attention to girls who enroll in technical programs, and whose employment poses special problems and who need help in setting realistic goals.

An orientation program, before or soon after school starts, is desirable to help new students adjust to the college environment. The program can include such things as campus tours and talks by administrators and student personnel staff regarding campus rules and policies. Library orientation to acquaint students with the facilities and their use is worthwhile.

### Placement

Schools offering technical programs should establish a placement service for students. Job placement may be of three types: Part-time school year, during the summer, or full-time upon completion of the program. The jobs should fit the occupational objective of the student.

Placement may be through school placement offices or by the department of agriculture and natural resources. Prospective employers should be encouraged to call the school when they need help.

Faculty should also be prepared to make recommendations as to placement at appropriate meetings of advisory committees or technical societies. The initial placement of graduates on jobs is important and will determine whether that employer will later seek additional graduates from the school. A good placement record helps motivate current students and attract new ones.

The final phase of the counseling and placement service should consist of periodic follow-up of graduates. Follow-up may be by formal questionnaire or by informal visits with employers and graduates. An effort should be made to see how former students have progressed on the job and to discover any problems they may have encountered. Follow-up studies help locate weaknesses in the program and are a valuable tool for curriculum evaluation and improvement or change. Information gained from follow-up studies is also valuable for counseling and job orientation of entering students.

### Responsibilities of Four-Year Colleges and Universities

Prejudices in higher education against technical education must be overcome. Administrators and faculties of institutions of higher learning must evaluate their own educational policies in terms of providing two-year technical education. The institution must define its role – if it includes technical education, then there must be administrative and faculty support for the notion that two-year education is a worthy endeavor from the standpoint of the individual and of service to the industries of the state. Without this philosophy behind it, two-year educational programs will not have the financial support and teacher dedication that they need. The situation is apt to be gravest at those institutions that offer both four-year and less-than-four-year programs, because interaction among students, among faculty members, and between student and faculty may encourage, however unjustifiably, the concept of an educational hierarchy.

## Preparing Effective Demonstrations for the Classroom and Laboratory

When was the last time you delivered an effective demonstration to your students? What if you find you have difficulty presenting demonstrations that effectively communicate, or show the "how-to-do" to your students? Let's take a look at the components of effective demonstrations that can provide the results you are looking for.

### *State the Importance of the Skill*

Your students need to know why this skill is important or useful to them. It may be for future employment, or for a job they can perform in their home. If you hear questions such as, "Why am I learning this? or "Where am I ever going to use this skill?", you need to ask yourself why are you teaching this skill. Be sure to let the students know as you prepare to begin your demonstration the importance of the skill.

### *Obtain Interest of Students*

Show an example of what the students will be creating or completing. Provide them with a visual clue. You want to "hook the student". Ever watch a demonstration of a food item being prepared on a television news program? There usually is a finished product for the audience to see before the demonstration begins. Let students see what they are attempting to complete or attain when they complete the skill.

### *All Necessary Materials Ready*

Be sure all of your tools and supplies are set up at your demonstration area. There is nothing as frustrating than having to interrupt a demonstration to locate a tool or piece of material that is not at your demonstration area. Make a list of everything you need for a complete demonstration. Check to make sure you have your items in place or in easy reach before you begin.

### *Use Questions to Draw Upon Informational Lesson*

One method to determine if your students are ready or prepared for the demonstration is to ask questions as you begin, and during the steps of your demonstration. You are checking for understanding, and how this activity relates back to lessons you presented in the classroom. If your students are unsure as to why you are performing specific steps, you may need to pause, and take time to refresh the student's memory.

### *Knowledgeable of Subject*

Providing your students with incorrect information can affect your credibility as an instructor. Be sure to do your homework before you begin your demonstration. If a student asks a question that you are uncertain of the answer, let them know that is a good question. Help them locate the answer after the demonstration.

### *Stress the Key Points*

Be sure to include key points during your demonstration. Reinforce proper safety practices. Make sure students remember to disconnect power tools and machinery from electrical sources prior to making adjustments. If the demonstration requires students to handle cutting tools, be sure students have had adequate safety instruction prior to use. See safety below.

### *Performed Skillfully*

Practice, practice, and practice. If you fail to perform the skill to the desired level or degree, how can you expect your students to perform the skill? Determine if the skill is appropriate for the experience-level of your students. Get assistance if you need help with perfecting your skill.

### *Setting/Location*

Can all students watch you perform the task? Do you need to arrange stools around a table or bench for students to sit while a row of stands behind to view? Be sure to select the best setting. Make sure your voice can be heard. If you must compete with background noise and cannot move the class to another location, consider using a cordless microphone and portable speaker.

### *3-Step Demonstration Technique*

This is the heart of effective demonstrations for student achievement of a task or skill.

(1) Instructor does and tells. The first step is the instructor performs the skill while verbalizing the steps and key points.

(2) Student does and tells/or Student does and Instructor tells/or Teacher does and student tells. During the second step, call a student volunteer forward to repeat the skill. Ask the student to verbalize the steps as he/she performs the skill. If the student is uncomfortable with talking, ask if they would prefer to have you talk while they perform the steps. If the student is uncomfortable with performing the task, ask them to repeat the steps while you perform the task.

(3) All students do (practice) under teacher supervision. During the third step, allow students to work on the task while you closely monitor their progress. This provides you with opportunity to see if students can replicate the process of performing the task.

### *Emphasize Safety*

Always take into account personal safety. If the demonstration requires students to wear personal safety protection such as safety glasses, splash goggles, or lab coats, make sure you model it first. Never place you or your students in harm's way. Remind students about safety practices covered during lecture. If a student may come to harm from not following directions, make sure each student has had proper safety instruction, and that a signed and dated safety exam is kept on file before the student attempts the skill.

### *Time Required*

The attention span of a high school student (and a college student) is limited. A rule of thumb for demonstrations is to keep it to less than 15 minutes in length. Any longer, and you may be interjecting too much informational material (best presented in lecture before the demonstration). Or cut back on the number of steps and prepare two separate demonstrations. If the skill is too complicated (too many steps to follow or remember) the student may become frustrated if they are not successful.

### *Job Operation Sheets (JOS)*

Create an instruction sheet to serve as a reference for students to complete the skill. The JOS should include the objective, a list of tools and materials, steps to perform the task, key points (including safety), and illustrations or graphics. The JOS serves to refresh the student's memory and provides a step-by-step procedure to complete the task. Teachers should have a JOS at their side when performing the demonstration to serve as a reminder or reference. JOS should be distributed to students at the end of the demonstration as the class practices the task.

### *Assessment*

Develop a scoring rubric to measure student achievement or mastery of the skill. The rubric should present a breakdown of the point value for the project or task. The student is able to see where the most value is assigned to the activity (i.e. appearance, within measurable tolerances, workmanship, use of time, etc.). A column on the scoring rubric should allow the student to assess their own ability and provide their own score of their skill. A column for the instructor will allow the student to see how he/she compares to their instructor.

Taking the time to properly prepare will help you achieve effective results.

**Source:** McCormick, Floyd (1994) *The Power of Positive Teaching*. Krieger Publishing Company

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## Analyzing Quantitative Data: Doing the Right Thing and Doing it Right

Analyzing quantitative data are both challenging and a time consuming effort. Problems associated with use of statistical tools to analyze quantitative data are well documented in literature and in critiques of articles, paper presentations, theses/dissertation defenses, etc (Yoder, 2008). A review of discussant comments in conference papers presented and a review of comments from manuscript reviewers revealed several concerns regarding the use of statistical tools (Radhakrishna, 2009). Examples of concerns include: 1) using inferential statistics such as t-tests, ANOVA when the sample reported is not random, 2) computing t-tests on single items to detect statistical significance, 3) not using the same subjects when using dependent t-tests or repeated measures, that is unequal "n" in each wave of data collection, 4) not dummy coding nominal scale variables when using regression, 5) using correlation to report differences, 6) using Chi-square for reporting differences as opposed to associations, and 7) reporting means when variables are nominal.

The focus of this article is to present a general quantitative data analysis matrix that help address concerns stated above. In addition, discuss specific data analysis matrices for types of research—descriptive, correlational and experimental. Appropriate use of statistical tools is critical to accomplishing the objectives of the study, testing the hypotheses or to predict outcomes of a research study. Appropriate analysis of data begins with the purpose—general description, determine relationships or predict variables, determine differences between groups or cause and effect. In addition, researchers should pay attention to data analysis when designing and constructing the questionnaire or instrument (Radhakrishna, 2007). The following key questions should be considered before selecting appropriate statistical tools to analyze data. 1) what is the end sought from the study—describe, explain-predict, control outcomes; 2) what is the scale of measurement—nominal, ordinal, interval/ratio-- for key variables examined in the study, 3) the number of levels of key independent and dependent variables, and how many independent or dependent variables are used in the analysis—univariate, bivariate, multivariate, 4) how were subjects selected, that is, probability (random sample) vs. non-probability (purposive sample) or the entire population (census), and 5) statistical assumptions to be met—parametric vs. nonparametric tests. Answers to these questions are not only important but are to be emphasized at

the research proposal level and should be reported in chapter 3 of thesis/dissertation. Figure 1 summarizes key elements of appropriate statistical tools for data analysis.

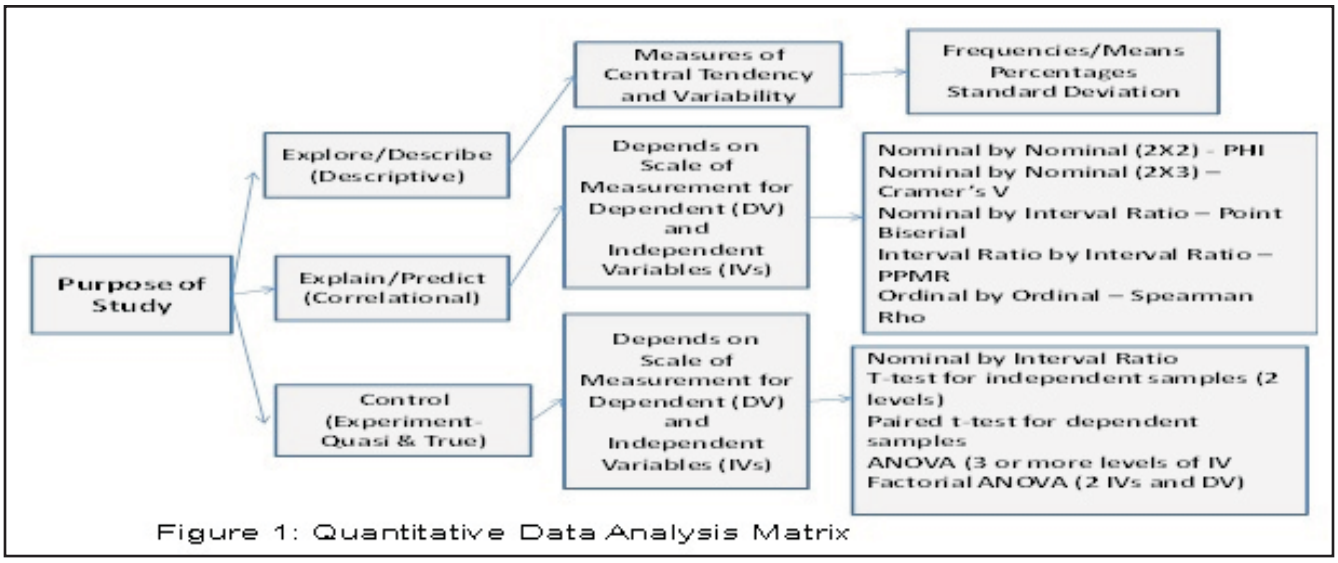

Figure 1: Quantitative Data Analysis Matrix

As shown in Figure 1, use of statistical tools to analyze data varies depending on the purpose of the study and type of data or scale of measurement. Faculty and graduate students can develop their own matrix for data analysis specific to their studies using the information in figure 1. Further, it is also useful to provide details of data analyses as depicted in Table 1. It is recommended that details of data analyses be reported in chapter three (methods and/or procedures) of a thesis or dissertation.

**Table 1: Variables, Scales of Measurement, Data Sources, and Analysis by Research Questions**

| Research Questions/ Objectives/Hypothesis | Source of Information (Survey) | Scale of Measurement Ind. Variable and Levels | Scale of Measurement Dep. Variable and Levels | Statistical Analysis/ Tools |
|---|---|---|---|---|
| What are the demographic characteristics of rice extension material users? | Section 6 | Nominal Ordinal Interval/ratio | - | Descriptive Statistics, Measures of variability |
| What factors influence the usefulness of knowledge products as a mass media approach in disseminating rice information? | Sections 1, 2, and 5 | Gratification and Non-gratification Variables (Nominal) | Usefulness of Knowledge Products (Interval/ratio) | PPMr, point bi-serial correlation, Mean, SD |

Appropriate use of statistical tools to analyze quantitative data is critical to answering the purpose and methodological rigor questions. Graduate students, faculty teaching research methods and data analysis courses will find the information reported in this piece useful. In addition, appropriate use of statistical tools will not only help reduce errors but also help able to stand up to the critical review and scrutiny of reviewers, committee members, and faculty. Further, using appropriate statistical tools to answer research questions/hypotheses/objectives will provide a confident basis for action and withstand criticism aimed at discrediting results (Rossi, Lipsey & Freeman, 2004 and Braverman & Arnold, 2008).

Here are key CHECK points for data analysis:

- Consider the purpose of the study. The purpose of the study drives the use of appropriate statistical tools to analyze data.
- Always keep in mind the purpose and data analysis as you start developing your instrument. This is very critical to not only using certain type of statistical tools, but also in asking the type of questions (scaled vs. open-ended questions).
- Consider early on developing a data analysis matrix or table to link the purpose of the study to research questions to identification of independent/dependent variables to scales of measurement to statistical tools.
- Report appropriate "test of significance" levels to determine if the results are due to chance.
- Use appropriate symbols to match and support use of specific statistical tools.
- Make sure that the statistical assumptions for using specific statistical tools have been met.

• When reporting mean differences, calculate and report effect sizes.

• When all said and done, make sure that you checked all the points so that your results will withstand the test of scrutiny.

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## Pastures of Plenty: the Future of Food, Agriculture, and Environmental Conservation in New England

***By John E. Carroll. 2008. New Hampshire Agricultural Experiment Station Publication #2340. University of. New Hampshire, Durham, NH, 143 pages***

*Pastures of Plenty* is an articulate and convincing testimony to the power of grass and grazing. Rich in the history of New England agriculture, this book extols the past importance of a region not currently known for food production, a place where people at one time were nearly self-sufficient in what they needed. Because of its rugged terrain and non-suitability for large-scale, high-technology farming, much of the northeast has been virtually ignored in the agricultural advances of the past half century.

Prof. John Carroll describes well the current situation of food production in the region and provides a vision of the potential for New England in a future based primarily on grass and animal production. Maps of four New England states – Maine, Vermont, New Hampshire, Massachusetts – show the areas with most potential for grazing based on soils, topography, and rainfall. The map of Vermont is particularly of interest because nearly 90% of the state appears to be suitable for this appropriate practice. Later the author provides a state-by-state look at programs currently being implemented by the land grant universities, often in cooperation with land owner clients. His road map is one well worth pursuing for a look at an alternative future for the region.

As a foundation for the proposed widespread use of grazing, the author cites an impressive list of emerging conditions that will lead to the recommended conversion of the rural landscape. Among these are 1) increasing fossil fuel costs that will make conventional commodity crop production less profitable; 2) growing awareness of food security, impossible to achieve with the current system based on expensive and distant transport of most foods; 3) recognition of the problems with large-scale livestock confinement operations including antibiotic resistance; 4) growing awareness by consumers of where and how food is grown and interest in locally-grown, fresh foods; 5) an appreciation of the potential of New England states to grow more of their own food, especially by grazing livestock, 6) low energy and capital costs and high resource use efficiency of grazing systems; and 7) awareness of the connections between extensive grazing and rural culture and communities. These factors combine to illustrate a tremendous potential for *Pastures of Plenty* that would signal a new agricultural and food paradigm for this agroecoregion.

Subsequent chapters explore the biological, soil, and climatic resources of the region and how these are especially well suited for grazing livestock. The author delves into historical strategies that have been used successfully in other places, such as that described from France by Andre Voison in his seminal book *Grassland Productivity* (1959) that chronicled the long history of sustainable grazing patterns used in Europe, systems that were subverted by introduction of too many animals per unit of land and subsequent destructive overgrazing. As an environmental conservationist and highly published historian, Dr. Carroll delves into unique sources such as John Ikerd's writings that relate human spiritual and mental health to the health of their surrounding ecosystems. He also cites a Lewis Lockwood book, *Beethoven: the Music and the Life,* which refers to the sixth symphony, the *Pastorale*, in these terms: "(This) symphony evokes the quiet exaltation we feel amid the fields, streams, trees, and birds; it is impregnated with a sense of communion with all that is natural and God-given in the outdoors … (He) seized on the great tradition of the musical "pastoral", with its complex connections to the pastoral tradition in literature …." These are connections rarely explored in conventional academia, relating agriculture and food to deep spiritual feelings and personal ethics, rich and potential connections that may relate in unique ways for some students and farmer clients.

*Pastures of Plenty* illustrates the renaissance talents of the author in combining poetry, farmer quotes, classical music, science of grass development, and GIS mapping to describe potentials of grassland-based farming. He weaves the stories of well-known contemporary farmers, philosophers, and ecologists – Wendell Berry, Joel Salatin, Bill Mollison, E.F. Schumacher, Wes Jackson – into the discussion about how grasslands fit into New England. Who else but John Carroll would entitle a chapter about soils, "The Tablecloth under the Banquet of Civilization"? He continues with the potentials of dairying, with the importance of biodiversity as preserved in heritage cattle breeds and crop cultivars, and the untapped opportunities in direct marketing.

In concluding chapters the author explores the recent history of land grant universities in working toward a more sustainable agriculture, and how they have collaborated with key grassroots farmer organizations to realize this goal. It is difficult in a short review to capture the essence of rich writing

and combination of unique resources that support a coherent set of arguments for converting this region into a veritable green and growing rural economy. Coming from a land grant university Extension system, without an apparent ISBN designation, it is likely that this book has escaped the attention of many in academia. This is a serious omission from our lexicon of academic publications related to grazing, and Prof. Carroll's book gives both life and a new dimension to understanding potential systems for the future.

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## Restraint and Handling for Veterinary Technicians and Assistants

***By Bonnie Ballard and Jody Rockett, Delmar Cengage Learning, 2009, soft cover, 159 pages, cost: approximately $50, ISBN - 13:978-1-4354-5358-6, ISBN – 10: 1-4354-5358-1***

*Restraint and Handling for Veterinary Technicians and Assistants* is a brief (159 pages), soft-backed volume that provides an interesting approach to teaching basic, important information to individuals who wish to handle a variety of species of domestic animals using effective and safe methods.

My first impression of this volume was that the book was exceptionally elementary in content and that there was wasted space throughout the book. As I read through the information and studied the photographs, however, I became convinced that this volume should be required reading for veterinary students as well as new employees in veterinary clinics (technicians, assistants, etc.). My conviction has always been that, if a handler can restrain an animal in a comfortable and secure way, he/she has achieved about 80% of the challenge of successfully accomplishing a treatment procedure. This manual will help individuals accomplish that goal.

As our society has shifted from the circumstances where everyone handled animals routinely on family farms to the current situation where a very small proportion of individuals are involved with animal farming and ranching early in life, the need for a manual such as this is significant. Even for folks who have had considerable experience with a few species, this book provides information on a variety of species that may not be familiar to them.

The book is divided into two units, 'Small Animal Restraint' and 'Large Animal Restraint', respectively. In Unit 1, Chapter 1 sets the tone for the book, outlining both principles and complications of restraint. Chapter 2 describes tools designed for restraint. The next three chapters provide specific information on restraint as well as behavioral considerations for dogs, cats and exotic pets, respectively. Unit 2 provides one chapter on tying a variety of knots useful for restraining large animals. Subsequent chapters provide specific information concerning restraint and behavior for horses, cattle, goats, pigs and llamas.

Each chapter begins with a list of learning objectives and key terms and ends with a list of review questions, a bibliography and occasionally a supplemental reading list. Throughout the book, sidebars entitled “Safety Alerts” are highlighted in yellow and placed in the margins of the text, providing the reader with warnings pertaining to the procedures described. This emphasis on safety of handlers as well as animals is well conceived and an important part of the book. Sections describing various handling techniques, labeled 'Procedures', are emphasized by color coding in the text and are described in numbered, easily followed steps so that there is no doubt about how to accomplish each one. The glossary and index provided at the end of the book are both presented in sufficient detail to be quite useful.

Perhaps the most important and useful feature of this manual is the set of numerous color pictures; most of them are excellent and quite effective at demonstrating particular situations.

Were I to change anything about this volume, I would include more information on procedures for goats, pigs and llamas as these chapters are quite brief and I would include a picture of a pig board (which is described but not pictured). In some photographs depicting tying knots, there should be arrows indicating the direction of pull. These arrows are missing from Figures 6-3c, 6-4c and 6-5a. Figure 7-1 'Common cues to horse behavior' is not very useful. The sketches do not demonstrate various emotions of a horse effectively. Photographs would have been a more useful tool than the sketches for this figure.

Apart from these mild criticisms, *Restraint and Handling for Veterinary Technicians and Assistants* is a practical and instructive volume that should be of use to folks who are interested in the technical aspects of handling domestic animals safely and effectively. This book should be available to novice employees of veterinary clinics and will also provide useful information to those who have more experience.

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## Ornamental Horticulture: Science, Operations, and Management, Fourth Edition

***By Jack E. Ingels, Delmar, Cengage Learning, hard cover, 687 pages, approximate cost: $ 76.49, ISBN: ISBN-13:978-1-4354-9816-7 ISBN-10:1-4354-9816-X***

This book covers 24 chapters grouped in four sections, starting from the science of ornamental horticulture, passing through the craft and the profession in ornamental horticulture, and going on the production and techniques in ornamental horticulture. Each chapter of the book provides an expert view of a specific topic in a particular field. It presents the latest advances in the role of ornamental horticulture in everyday life.

The book opens with the presentation on Plant Science, Soil Science, Plant Growth Regulators, Plant Reproduction, Plant Injuries and How to Control Plant Injuries. It begins with a chapter that discusses the value of plants in our lives, plant classification and the plant Kingdom and Nomenclature, parts of a plant, the structure of plant parts, juvenility and maturity in plants, major plant processes, and what plants need to growth (Chapter 1). In addition, the author explains how to describe and identify plants and addresses soil properties, such as soil texture, soil nutrients, soil structure and organic material, soil acidity and alkalinity, cation exchange capacity and fertilizers (Chapters 2 and 3). Types of growth regulators and plant reproduction are described in chapters 4 and 5, respectively. Chapter 6 illustrates plant injuries, the symptoms of injured plants and their causes and some strategies to control pests and diseases. This section exclusively concentrates on all aspects regarding to the science of ornamental horticulture.

Art is an important aspect in horticulture, but the readers are sometimes having hard time to follow the instructions from the book. However, this book provides an elegant way to overcome this diversity through well explained presentation on different crafts in ornamental horticulture. Various topics addressed in this section are floral design (chapter 7), the interior use of plants (Chapter 8), landscape design (chapter 9), installing landscape plants (chapter 10), maintaining landscape plants (chapter 11), special training techniques for plants (chapter 12), turf (chapter 13), and techniques in plant propagation (chapter 14). The detail explanation on this section helps the readers to better understanding of the floral design, landscape, turf, and plant propagation and its application. It also opens a good perspective for the learner..

Different professions in ornamental horticulture are illustrated in a simple manner through good examples for floriculture, nursery, and landscape industries, as well as other careers in ornamental horticulture (Section 3: Chapters 15, 16, 17, and 18). These chapters take into account not only the science of ornamental horticulture, but also the relevant industries in ornamental horticulture. The explanation of each chapter makes it easy and simple for the learner to follow.

Providing appropriate production techniques, promoting business, personnel management and business communication is a common goal in horticultural business. Section 4 (chapters 19 to 24) deals with several production techniques such as greenhouse and nursery production techniques, business principles and application and how to do business communication in horticulture. This section shows that horticultural science alone cannot provide the complete solutions for developing business in horticulture.

The author provides a very good insight into important topics in horticultural science and relevant application in ornamental horticulture. In each chapter, the author provides detailed list of objectives and key terms, as well as comprehensive review questions which are useful for students to monitor their learning process. This will also help the learner to better focus on the most important issues or topics described on each chapter. The essay, multiple choice and short answer questions are an excellent blend of assignment for students.

Overall, the book is a valuable resource because it has balanced coverage of various aspects of the science of ornamental horticulture, the production techniques, craftsmanship, and business management skills. The content of the book is very appealing and offers well-written information of recent issues in ornamental horticulture. In conclusion, this book will be an excellent text in agricultural colleges for years to come.

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# NACTA Yesterday

## *NACTA-50 Years of Teaching Excellence*[1]

The National Association of College Teachers of Agriculture (NACTA) was officially born March 12, 1955, at Central Missouri State College in Warrensburg, Missouri. The first president of NACTA was Edwart B. Knight from the Tennessee Polytechnic Institute. He stated:

"It is our responsibility as educators to prepare our students for the kind of life they will enter upon graduation-big, rough, demanding and fast moving." Sound familiar?

The 1957 conference was held at Stephen F. Austin College in Nacogdoches, Texas, and at that conference G. Carl Schowengerdt presented a small gavel to conduct business. It was felt that a small gavel in Texas was totally out of place and downright embarrassing. So a Texas gavel was constructed with a mallet 12 inches long, 7 inches in diameter, with a handle 3 feet long. That gavel was resurrected to conduct business at the 50th celebration for NACTA. A perspective on the financial requirements for membership in NACTA is gained from the 1959 Executive Committee, which set NACTA dues at S3. This included a subscription to the *NACTA Journal*, a peer reviewed journal dedicated to teaching improvement. The annual conference registration fee for that year was S5, but this fee was waived for the host school staff members.

A constitution and bylaws were put in place, and the early years set the foundation for the organization in many ways. The first meetings of representatives from non-land-grant colleges involved discussions to define the purpose and function of NACTA, as well as how NACTA should relate to the land-grant institutions. After many lengthy and heated discussions over the early years of NACTA, the constitution was modified in 1967 to allow total integration of junior colleges, colleges, and universities into NACTA.

The name of the organization was changed in 1963 to The National Association of Colleges and Teachers of Agriculture. As the organization grew in scope and included representatives from Canada, it was decided to once again change the name. History records a third name change in 2002, to North American Colleges and Teachers of Agriculture. From the start, the acronym has been and remains NACTA.

The first 25 years of the history of NACTA was summarized by G.Carl Schowengerdt, professor of agriculture emeritus, Southeast Missouri State University. Dr. Schowengerdt was a charter member of NACTA and served as its president and in many other roles, including historian. He was one of several individuals that gave unselfishly of their time to an organization that has been and continues to be dedicated to the improvement of college teaching of agriculture. The detailed history in the publication entitled, *1955 to 1979 History of the National Association of Colleges and Teachers of Agriculture (NACTA): 25 Years Dedicated to the Improvement of College Teaching of Agriculture*, will not be repeated here but provides an interesting review of where we have come from.

Murray A. Brown, NACTA secretary-treasurer compiled a publication entitled, *Forty Years in NACTA*, in 1994 to celebrate the 40th anniversary of NACTA. A key role in keeping the NACTA organization viable financially and respected professionally has been not only leadership from outstanding presidents but also the dedication and leadership of the offices of secretary, treasurer, and editors.

While adequate credit can never be expressed to all that have filled the offices of NACTA, there are thoselike Murray Brown, who served as secretary-treasurer from 1972 to 1999, and Jack Everly, who was editor from 1975 to 1996, who deserve a "medal of honor." Rick Parker (editor) and his wife Marilyn (secretary-treasurer) are moving NACTA forward in very positive ways at the present time.

This organization now welcomes membership from all aspects of the food, fiber, and natural resources areas. It is dedicated solely to the improvement of teaching. Annual meetings rotate between two-year and

four-year institutions. Many, many individuals continue to give of their time, talents, and resources to make NACTA viable.

The NACTA foundation was formed in 1985 to establish an endowment to fund NACTA awards. The foundation continues to grow and serves an important base for supporting awards to recognize outstanding educators.

As we celebrate our 56th year, it is important to review the benefits of NACTA. They include the *NACTA Journal*, where peer-reviewed articles on improving and promoting excellence in college teaching of agriculture and related disciplines are published. Articles cover topics that treat all aspects of teaching, such as methods, problems, philosophy, materials, evaluations, assessments, and rewards at the college level. Also included are reviews of textbooks, videos, and other instructional media. The

[1]Source: NACTA -- 50 Years of Teaching Excellence, available online at http://nacta.fp.expressacademic.net/article.php?autoID=1732&issueID=262. This publication details each of the presidents of NACTA, lists the conference sites, themes and awards through 2004.

Annual NACTA Conference in mid-June provides and encourages colleagues to strive for excellence in the classroom. This conference includes presentations and discussions on topics of vital interest to college teachers. Outstanding teachers receive national recognition at the awards banquet. NACTA also fosters undergraduate student excellence through its liaison with the Honor Society of Delta Tau Alpha and with the NACTA Judging Conference.

# Join NACTA

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## *Join NACTA today!*

***(North American Colleges and Teachers of Agriculture)***
***— a professional organization dedicated to advancing the scholarship of teaching and learning in agricultural, environmental, natural, and life sciences.***

- Members receive the quarterly *NACTA Journal,* a professional, peer reviewed journal emphasizing the scholarship of teaching. The Journal also includes book reviews, teaching tips, and abstracts.
- Members attend the annual conference held at different colleges and universities in the U.S. and Canada, and where members present papers on innovative teaching concepts.
- Each year NACTA recognizes outstanding teachers with a variety of awards including: Teaching Awards of Merit, Teacher Fellows, Regional Outstanding Teacher Awards, NACTA-John Deere Award, Teaching Award of Excellence, Distinguished Educator, and Graduate Student Teacher Awards.

**Membership Categories (circle one):**

- **Institutional Active Dues are $75/year (if your University/college is a member)**
- **Active Dues are $100/year**
- **Graduate Student $25/year - Emeritus $25/year**
- **Lifetime - $750 -one payment (or $800 if made in four payments of $200)**
- **Institutions ($150 - 4 year schools and $100 - 2-year schools)**

***To join complete the following form.***

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Send a check payable to NACTA for the correct amount or you can pay using a credit card (VISA and MasterCard only); phone calls also accepted 1-208-436-0692:

**Name on Card** _____

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**Three digits on the back of your card to the right of the signature block:** _____

***Send your completed form to -***

**Marilyn B. Parker**
**NACTA Secretary/Treasurer**
**151 West 100 South**
**Rupert, ID 83350**

***For more information visit the NACTA website:***
***www.nactateachers.org***
***or email nactasec@pmt.org***

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**** If you are interested in serving on one of the committees contact the Chair.***

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