# Journal of Southern Agricultural Education Research

**Volume 55, # 1**
**2005**

## Priority Research Areas

Extension Education
Agricultural Communication
Teaching and Learning in Undergraduate and Graduate Academic Programs
Understanding the Food and Fiber System
(Agricultural Literacy)
Agricultural Leadership
Teacher Education and School-Based Agricultural Education

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## Editor's Comments

In this, my third year as Editor of the Journal of Southern Agricultural Education Research (JSAER), I believe this publication is making progress toward the goal of becoming a regional journal recognized for high quality. The peer review process started last year was continued, and the Editorial Board adopted two new procedures we believe will improve the quality of the JSAER.

Following the procedures implemented with Volume 54, articles found acceptable for publication in the Proceedings of the 2005 Southern Region AAAE Research Conference (SR-AAAERC), whose authors had indicated that they be considered for publication in the JSAER, were submitted to a second peer review process. This year, the second review process was completed before the research conference, so that the articles were blind to the reviewers in this initial review. The Chair of the SR-AAAERC, Joe W. Kotrlik, served as the Co-Editor and worked very hard to meet the tightened deadlines. The five members of the Southern Region AAAE Research Committee served as the Editorial Board for 2005 JSAER. The members for 2005 were; Barry Boyd, Todd Brashears, James Dyer, Craig Edwards, and James Lindner. Their thoughtful and thorough reviews were greatly appreciated.

In all, 28 articles were submitted to be considered for publication in the 2005 JSAER. Of these, 12 were found unacceptable through the Southern Region Research Conference review. Sixteen articles were accepted for review by the JSAER Editorial Review Board. This year a new review procedure allowed JSAER reviewers to "Accept with Major Revision," and "Accept with Minor Revision" in addition to the "Accept" or Reject" options available to reviewers in the last two Volumes. Given these options, the following decisions were made. Five articles were Accepted, five were Accepted with Minor Revision, five were Accepted with Major Revision, and one was found to be unacceptable.

Following additional review, three articles were removed from consideration by their authors, leaving 12 articles to appear on these pages. The acceptance rate could be viewed as 12/28 or 42.9%. The Editorial Board established a policy that the Editor would publish the total number of articles accepted in the JSAER divided by the total number of unique submission to the Southern Region AAAE Research Conference. There were 54 articles submitted to the SR-AAAERC, 36 were published in the conference proceedings (66%), and 12 were published in the JSAER (22%).

As Editor, I am committed to the continuous improvement of the Journal of Southern Agricultural Education Research. I believe the JSAER Editorial Board has established a strong foundation for quality in the Journal and I look forward to implementing the policies and procedures that will help us attain our long term goal of establishing this journal as an important source of regional literature in the field.

# The Effects of Multimedia Cues on Student Cognition in an Electronically Delivered High School Unit of Instruction

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## Abstract

*The development of electronic curriculum materials holds great promise and rewards for both educators and learners alike, but little research has been conducted to determine the effectiveness of incorporating multimedia components within a electronically delivered unit of instruction. This research tested the theory of cue-summation (multiple cues across multiple channels) in a high school agricultural education setting and measured the effectiveness of the instruction.*

*Curriculum materials were created and placed on CD-ROM for asynchronous delivery capability. Materials comprised a week-long unit of instruction on milk processing and were developed in three Treatments (Tx). The first Tx consisted of text-only materials, the second consisted of text and an audio/video component and the third consisted of audio/video and still images. These three Txs represented single cue, redundancy and cue summation, respectively.*

*One hundred five high school agriculture science students participated in the study. Instrumentation used included a pretest/posttest for cognition as well as a researcher-developed demographic instrument. Data were collected in the fall of 2003 and analyzed using ANOVA techniques to determine significant differences among the Tx groups.*

*The researcher found that students scored significantly higher on the posttest when exposed to Txs containing an audio/video component. Recommendations include continued research as well as incorporating these findings into current curriculum development efforts for the betterment of the learners involved. Cue-summation produced student performance scores similar to redundancy.*

## Introduction

In the ever-changing world of education, trends and innovations seem to come and go as often as classes of students. Teachers have little time to adopt new instructional techniques and curriculum before they are outdated and replaced with the "next big thing." In this fluid environment, one innovation seems to have the potential to become not only a common educational instrument, but one that holds great promise for the future of education as we know it. Distance education is not a new concept. The origins of the methodology can be traced back to correspondence courses, the so-called "home-study," first formalized by the Chautauqua Institute in 1883 (Moore & Kearsley, 1996).

With the rise of the Internet, educational institutions now have the ability to not only transfer text-based materials, similar to the original correspondence courses, but to provide the student with hypertext, audio, video, interactive chat and many other methods of instructional delivery. The teacher has now become a facilitator with the responsibility of collecting and disseminating information to the students in the most effective manner. Selecting a mode of delivery has become as important as the content.

For many facilitators, it remains difficult to adequately learn and apply the knowledge needed to incorporate multimedia aspects into a distance-delivered course. Computer programs, hardware, video cameras, microphones and web-servers all play major roles in adding multimedia to a distance course. If facilitators are expected to invest a great deal of time and expense into producing a distance course, they should expect that their efforts will result in an increase in learning and retention by the student when compared to the traditional, text-only version.

A unit of instruction on dairy processing was created using material provided by Instructional Materials Service (IMS). Three versions of this unit were copied to CD-ROM and distributed to high school agriscience students. The three Tx levels reflected the characteristics of the theory of cue summation (Severin 1967a). The first Tx was a simple, text-only version of the curriculum. The second version included both text and an audio/video stream of the material. The third Tx level used the same audio/video stream but replaced the text with relevant pictures. Students were asked to view the unit and complete the posttest on the material. Scores for high, low, and total cognition were recorded.

*Research Hypotheses*

As a means of accomplishing the purpose of the study, three major hypotheses were tested:

1. Within the constructs of a multimedia course, total student cognition will significantly increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.
2. Within the constructs of a multimedia course, low-level student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

3. Within the constructs of a multimedia course, high-level student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

## Theoretical Framework

The research that was conducted in this study was based on two theories of cognitive psychology. The overall theory was the theory of information processing. This theory focuses on how the human memory system acquires, transforms, compacts, elaborates, encodes, retrieves and uses information. The model divides the memory system into three main storage structures: sensory memory, short-term memory and long-term memory. Each structure is synonymous with a type of processing (Burton, Moore, & Holmes, 1995).

In the first type of memory, sensory memory, input is accepted primarily through sight and sound and is processed within three to five seconds. The sensory registers briefly hold the information until the stimulus is recognized or forgotten. According to Klatzky (1980), this assigns meaning to stimulus. For example, the letter "A" is recognized as a letter rather than just a group of lines. From the sensory memory, information travels to the short-term memory.

Information that is recognized and transferred to short-term memory can remain active for 15-20 seconds without rehearsal (Klatzky, 1980) and must be rehearsed, elaborated, used for decision making, or stored in long-term memory before it is forgotten. For this reason, Klatzky termed short-term memory, "working memory." According to Miller (1956), the short-term memory has room for about seven chunks of information, plus or minus two, depending on the individual. Because of this limited cognition capacity, information must be coded and stored into long-term memory.

Long-term memory is an unlimited and permanent storehouse of information that is complex in structure and function. Long-term memory receives information from both sensory memory and short-term memory. Information in the sensory registers is compared to information in long-term memory for recognition, and long-term memory stores input from sensory memory and short-term memory.

The second theory that applies to this study is cue summation. This is an information processing theory that deals specifically with learning and retention in a multimedia environment. The cue summation theory states that learning is increased as the number of available stimuli are increased (Severin 1967a). Severin (1967b) goes on to state that: "Multiple-channel communications appear to be superior to single-channel communications when relevant cues are summated across channels, neither is superior when redundant between channels, and are inferior when irrelevant cues are combined (presumably because irrelevant cues cause interference between them)," (p. 397). In other words, the stimuli provided on different channels have to be relevant to each other or the distraction would cause a decrease rather than an increase in learning and retention.

Severin (1968) found that the combination of auditory signals with a visual presentation, providing a different but related cue to the stimulus object, was more

effective in producing recognition than a combination with a visual presentation of the same cue – a redundant condition.

Table 1 demonstrates the levels of the Tx where level 1 is a single cue using the visual channel in the digital mode (single cue). Tx level 2 combines text with the spoken word using both the audio and visual channels but within the same mode (redundancy). Tx level 3 used the audio channel and digital mode for the first cue and the visual channel and iconic mode for the second cue (cue-summation).

Table 1. *Tx Levels Based on Cues Combinations in Channels and Modes.*

| | | Channels | | |
|---|---|---|---|---|
| | | Audio | | Visual |
| | Digital | Spoken word "pasteurizer" [2,3] | | Printed word "pasteurizer" [1,2] |
| Modes | | | | |
| | Iconic | Sound of a pasteurizer in operation | | Picture of a pasteurizer [3] |
| | | | | |

[1]Single Cue - Visual Channel, Digital Mode
[2]Redundancy – Audio and Visual Channel, Digital Mode
[3]Cue Summation – Audio and Visual Channel, Digital and Iconic Mode

## Purpose and Objectives

The purpose of this study was to provide an asynchronous, electronically delivered unit of instruction to high school agricultural education students and compare performance based on the combination of channels used to provide the information. These channels (text, audio, video and images) were incorporated in an instructional unit on milk processing and delivered to the students on CD-ROM.

## Methods and Procedures

*Population and Sample*

The population for this quasi-experimental, non-equivalent control group design study included primary first-year agricultural education students. The unit of instruction was administered by student teachers at 6 student teaching centers. Within these six schools, the entry-level agriculture course was taught in 12 classes, making up the sample for this study. Each of the 12 classes was then randomly assigned to a Tx group.

This sampling plan yielded a sample size of 169 students, with 50 students in Tx group one, 64 students in Tx group two and 55 students in Tx group three. During the course of the research, several issues came to light that would reduce the number of students in each Tx group. Mortality based on student transfers, failure to complete consent forms, and absences reduced the number of observation in each Tx group. Two classes were also removed for failure to complete the unit according to the instructions. These reductions resulted in 105 students that participated in all aspects of the study.

According to Gall, Borg and Gall (2000), a group size of at least 15 observations is needed to accurately conduct experimental research, but in general, each group should be maximized as much as possible given researcher time and financial constraints. According to Kirk (1995), sample size can be calculated based on the number of levels of the independent variable being tested and the desired ά. In this case, the researcher was testing three levels of the independent variable and set the *a priori* alpha level at .05 for determining significance. In this case, group sizes of 21 subjects per Tx were required in order to meet these qualifications. The actual Tx groups of 26, 49, and 30 were more than required for this study.

*Instrumentation*

The original pretest/posttest consisted of 10 true/false, 10 multiple-choice and three short answer questions. The true/false and multiple-choice questions were derived from the two IMS curriculum unit tests provided in the teacher's guide. The true/false questions were used exactly as presented by IMS, but the multiple choice questions were created from short answer and fill-in-the-blank type questions. This was done in order to ensure accuracy and constancy of scoring the instrument. The first 20 questions were all lower-level cognition items. These questions were written to match the objectives of the unit as stated by IMS.

The last three questions were researcher-developed, open-ended questions that allowed for higher order thinking in the responses as defined by Newcomb and Trefz (1987). The information in these three questions was not taught directly in the course of the unit, but required students to evaluate the information they had learned and apply it to a new situation.

Content and face validity of the pretest/posttest was verified by a national panel (Gall, Borg and Gall, 2000) of food science, dairy science and dairy processing faculty members. Minor changes were made based on the panel's recommendations.

A sample of eighteen students was selected to pilot test the instrument for reliability. The students were instructed to carefully consider each question and make their best attempt to determine the correct answer. These scores were entered into Microsoft Excel® as 1 (correct answer) and 0 (incorrect answer). SPSS was used to determine the KR-20 coefficient alpha. The results of this analysis yielded an r = .52. This process also determined that three of the original 20 questions were negatively impacting the reliability of the instrument. Eliminating these questions resulted in an r = .83. The three items which negatively impacted the reliability of the instrument were permanently deleted from the pretest/posttest before it was administered to the Tx groups. This yielded 17 true/false, multiple-choice questions as well as three open-ended, short answer questions. The post-hoc reliability score decreased slightly to r = .77.

The second data collection instrument consisted of a demographic questionnaire. Face and content validity were verified using a team of three faculty members in the Department of Agricultural Education and Communications who possessed knowledge and experience in creating similar instruments. This instrument was completed by the students during researcher visits to the individual schools during Sept. 2-5.

*Data Collection*

Students in the selected schools were given an informed consent form to be read and signed by their legal guardians. The researcher traveled to each school during Sept. 2-5 to collect these forms as well as data on demographics.

During these visits, the researcher administered the pretest. Data from these two instruments were coded and entered into SPSS for analysis at a later time. The informed consent forms were collected from the students and coded 1 (allowed) and 0 (disallowed) into the same database. Only data collected from students who were allowed to participate were included in the final statistical analysis.

The student teachers involved in the data collection process participated in a training session during the four-week, on-campus "block" before their field work began in the fall of 2003. During the week of Oct. 6-10, 2003, the student teachers facilitated the unit of instruction, conducted the laboratory experiment, collected homework and administered the posttest. All materials were returned to the and tests were graded by the researcher.

*Analysis of Data*

Data were collected and imported to SPSS version 11.0 for Windows for analysis. In order to analyze the data on student cognition (low, high, total), several techniques were used. The student pretest was correlated to the posttest to determine the relationship between the two instruments. Trochim (2001) states that in order to use ANCOVA design, the pretest should be highly correlated to the posttest. If a high correlation exists ($r >= .7$), ANCOVA was used to hold previous student knowledge constant while determining the effect of the three Txs on student posttest performance. A moderate or low ( $r =< .7$) allowed the researcher to remove the pretest and conduct a one-way ANOVA to determine the effect of the Tx groups on the posttest score. Contrast coding was used to determine differences in groups when the ANOVA indicates a statistically significant difference between Tx group scores. Tx One was compared to Txs Two and Three, then Tx Two was compared to Tx Three.

Another purpose of using contrast coding was to check for the presence of trends in the data. The shape of the functions relating the Tx levels to the level of cognition were of interest to the researcher. SPSS for Windows 11.0 was used to determine effect size and was reported as eta squared ($\acute{\eta}^2$). In general, $\acute{\eta}^2$ is interpreted as the proportion of variance of the dependent variable that is related to the factor. Traditionally, $\acute{\eta}^2$ values of .01, .06, and .14 represent small, medium and large effect sizes, respectively (Green, Salkind, & Akey, 2000).

## Result/Findings

Research Hypothesis 1. Within the constructs of a multimedia course, total student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

A Pearson Product Moment Correlation was calculated to determine the relationship between the pretest total score and the posttest total score. The resulting

value for this calculation was determined to be r = .16. Because this value was less than r < .70 (Trochim, 2001), a one-way analysis of variance was conducted to evaluate the relationship between total cognition and the three Tx levels of the independent variable. The dependent variable for this research hypothesis was the student's total cognition for the unit of instruction as measured by the posttest total score for each individual student. Results of the one-way ANOVA are reported in Table 2.

Table 2. *Changes in Total Posttest Scores for Text-Only, Text + Audio/Video, and Images + Audio/Video.*

| Group | n | M[1] | SD | | | |
|---|---|---|---|---|---|---|
| Text-Only | 26 | 11.19 | 2.980 | | | |
| Text + A/V | 49 | 13.80 | 3.840 | | | |
| Images + A/V | 30 | 13.72 | 3.923 | | | |
| Total | 105 | 13.13 | 3.805 | | | |
| Source | SS | df | MS | F | p | $\acute{\eta}^2$ |
| Between | 129.675 | 2 | 64.837 | 4.805 | .010 | .086 |
| Within | 1376.339 | 102 | 13.494 | | | |
| Total | 1506.014 | 104 | | | | |

[1] 20-point scale

The ANOVA was statistically significant, F (2, 102) = 4.805, p = .010. The strength of the relationship between the three Txs and the posttest score, as assessed by SPSS, was medium with the three Tx levels accounting for 8.6% of the variance of the dependent variable. Levene's statistic was calculated to determine homogeneity of variances. The results of this test were not significant, F (2, 102) = 2.963, p = .056, therefore the researcher assumed that the variances of the three Tx groups were not significantly different from each other. Contrast coefficients were used to evaluate differences among the means. Two contrast groups were created. Contrast one compared Tx One (text-only) to Txs Two (text + A/V) and Three (images + A/V). Contrast two compared Txs Two and Three.

Table 3 indicates that there was a statistically significant difference t (102), = 3.06, p = .003, between the text-only Tx and the Txs containing A/V components and that there was no statistically significant difference t (102), = -.09, p = .926, between Txs Two and Three. The groups that received an audio/video component in the curriculum scored statistically significantly higher than the group that received the text-only Tx. There was no difference in the Second and Third Txs. A significantly linear trend was detected F (1, 102) = 6.578, p = .012 as can be seen in Figure 1. Participants who received audio/video components in the unit of instruction scored 8.68% higher on the posttest than students who received text without an audio/video component.

Table 3. *Comparison of Tx Effects on Total Posttest Scores.*

| Contrast | Tx 1 (text-only)[1] | Tx 2 (text + A/V)[1] | Tx 3 (images + A/V)[1] | Value of Contrast | Std. Error | t | df | p |
|---|---|---|---|---|---|---|---|---|
| 1 | -2 | 1 | 1 | 5.13 | 1.67 | 3.06 | 102 | .003 |
| 2 | 0 | -1 | 1 | -.08 | .90 | -.09 | 102 | .926 |

[1] Coding for contrasts.

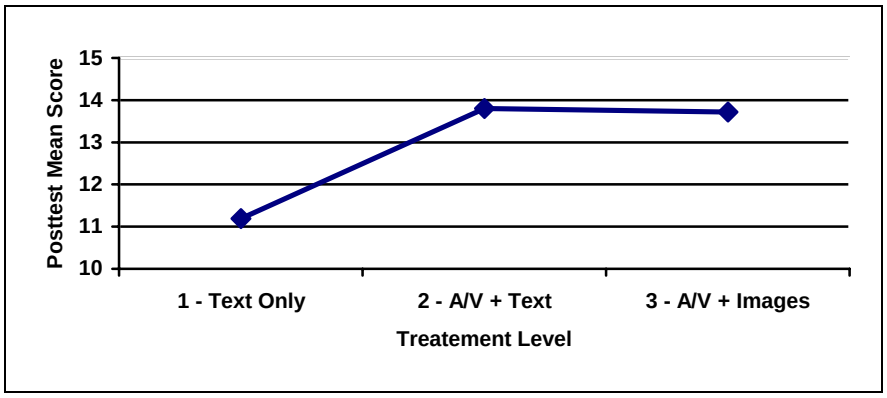


Figure 1. *Total Posttest Mean Score by Tx* ($F_{Linear}$ (1, 102) = 6.578, $p$ = .012).

Research Hypothesis 2. Within the constructs of a multimedia course, low-level student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

Low cognition items on the pre and posttest consisted of seven true/false and 10 multiple choice questions. These items were graded and entered into the database as right (1) or wrong (0). A Pearson Product Moment Correlation was calculated to determine the relationship between the pretest low cognition score and the posttest low cognition score. The resulting value for this calculation was determined to be r = .122. Because this value was less than .7 (Trochim, 2001), a one-way analysis of variance was conducted to evaluate the relationship between low cognition and the three Tx levels of the independent variable. The dependent variable for this research hypothesis was the student's performance on lower-level cognitive test items for the unit of instruction as measured by the posttest low score for each individual student. Results of the one-way ANOVA are reported in Table 4.

The ANOVA was statistically significant, $F$ (2, 102) = 3.413, $p$ = .037. The strength of the relationship between the three Txs and the posttest score as assessed by SPSS, was less than the effect size for total cognition but still medium with the three Tx levels accounting for 6.3% of the variance of the dependent variable.

Contrast coefficients were used to evaluate differences among the means. Levene's statistic was calculated to determine homogeneity of variances. The results of this test were not significant, $F$ (2, 102) = 2.963, $p$ = .056, therefore it was assumed that the variances of the three Tx groups were not statistically significantly different from each other. Contrast 1 compared Tx 1 (text-only) to Txs 2 (text + A/V) and 3 (images + A/V). Contrast 2 compared Txs 2 and 3.

Table 4. *Changes in Low Cognition Posttest Scores for Text-Only, Text + Audio/Video, and Images + Audio/Video.*

| Group | n | M[1] | SD | | | |
|---|---|---|---|---|---|---|
| Text-Only | 26 | 10.35 | 2.382 | | | |
| Text + A/V | 49 | 12.29 | 3.446 | | | |
| Images + A/V | 30 | 12.13 | 3.371 | | | |
| Total | 105 | 11.76 | 3.269 | | | |
| Source | SS | df | MS | F | p | $\acute{\eta}^2$ |
| Between | 69.696 | 2 | 34.848 | 3.413 | .037 | .063 |
| Within | 1041.351 | 102 | 10.209 | | | |
| Total | 1111.048 | 104 | | | | |

[1] 17-point scale

Table 5 indicates that while there was a statistically significant difference t (102), = 2.56, p = .012, between the text-only Tx and the Txs containing A/V components, there was no statistically significant difference t (102), = -.20, p = .837, between Txs 2 and 3.

Table 5. *Comparison of Tx Effects on Low Cognition Posttest Scores.*

| Contrast | Tx 1 (text-only) [1] | Tx 2 (text + A/V) [1] | Tx 3 (images + A/V) [1] | Value of Contrast | Std. Error | t | df | p |
|---|---|---|---|---|---|---|---|---|
| 1 | -2 | 1 | 1 | 3.73 | 1.456 | 2.56 | 102 | .012 |
| 2 | 0 | -1 | 1 | -.15 | .741 | -.20 | 102 | .837 |

[1] Coding for contrasts.

The groups that received an audio/video component in the curriculum scored significantly higher on the low cognition questions than the group that received text only. There was no difference in the second and third Txs based on audio/video with text and audio/video with images. A significantly linear trend was detected F (1, 102) = 4.358, p = .039 and is displayed in Figure 2.

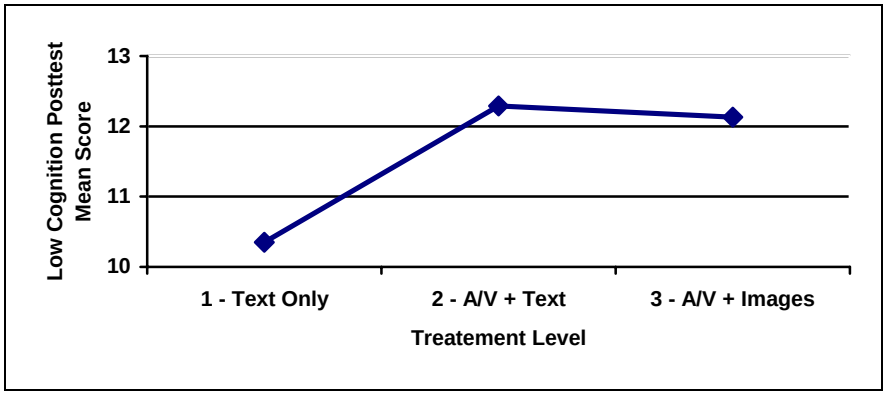


Figure 2. *Low Cognition Posttest Mean Score by Tx* ($F_{Linear}$ (1, 102) = 4.358, p = .039).

Research Hypothesis 3. Within the constructs of a multimedia course, high-level student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

High cognition items on the pre- and posttest consisted of three open-ended, short answer questions. These items were graded using a rubric and entered into the database as right (1) or wrong (0). Students who partially answered the question but failed to answer completely were given partial credit (.5) for that particular question. The Pearson Product Moment Correlation was determined to be r =.201. Because this value was less than r = .7 (Trochim, 2001), a one-way analysis of variance (Table 6) was conducted to evaluate the relationship between high cognition and the three Tx levels of the independent variable.

Table 6. *Changes in High Cognition Posttest Scores for Text-Only, Text + Audio/Video, and Images + Audio/Video.*

| Group | n | M[1] | SD | | | |
|---|---|---|---|---|---|---|
| Text-Only | 26 | .85 | .858 | | | |
| Text + A/V | 49 | 1.51 | .857 | | | |
| Images + A/V | 30 | 1.58 | .800 | | | |
| Total | 105 | 1.37 | .886 | | | |
| Source | SS | df | MS | F | p | $\acute{\eta}^2$ |
| Between | 9.462 | 2 | 4.731 | 6.686 | .002 | .116 |
| Within | 72.171 | 102 | .708 | | | |
| Total | 81.633 | 104 | | | | |

[1] 3-point scale

The ANOVA was statistically significant, F (2, 102) = 6.686, p = .002. The strength of the relationship between the three Txs and the posttest score as assessed by SPSS, was higher than the effect size for total and low cognition. The effect size was high with the three Tx levels accounting for 11.6% of the variance of the dependent variable.

Contrast coefficients were used to evaluate differences among the means. Levene's statistic was calculated to determine homogeneity of variances. The results of this test were not significant, F (2, 102) = .246, p = .782, therefore assume that the variances of the three Tx groups were not significantly different from each other. Contrast one compared Tx One (text-only) to Txs Two (text + A/V) and Three (images + A/V). Contrast 2 compared Txs Two and Three.

Table 7 indicates that while there was a statistically significant difference t (102), = 3.66, p = <.000, between the text-only Tx and the Txs containing A/V components, there was no statistically significant difference t (102), = .375, p = .708, between Txs Two and Three. The groups that received an audio/video component in the curriculum scored significantly higher on the higher cognition questions than the group that received text only. There was no difference in the second and third Txs based on audio/video with text and audio/video with images. A significantly linear trend was detected F (1, 102) = 7.569, p = .001 and is displayed in Figure 3.

Table 7. *Comparison of Tx Effects on Low Cognition Posttest Scores.*

| Contrast | Tx 1 (text-only) [1] | Tx 2 (text + A/V) [1] | Tx 3 (images + A/V) [1] | Value of Contrast | Std. Error | t | df | p |
|---|---|---|---|---|---|---|---|---|
| 1 | -2 | 1 | 1 | 1.40 | .383 | 3.66 | 102 | <.0 |
| 2 | 0 | -1 | 1 | .07 | .195 | .375 | 102 | .708 |

[1] Coding for contrasts.

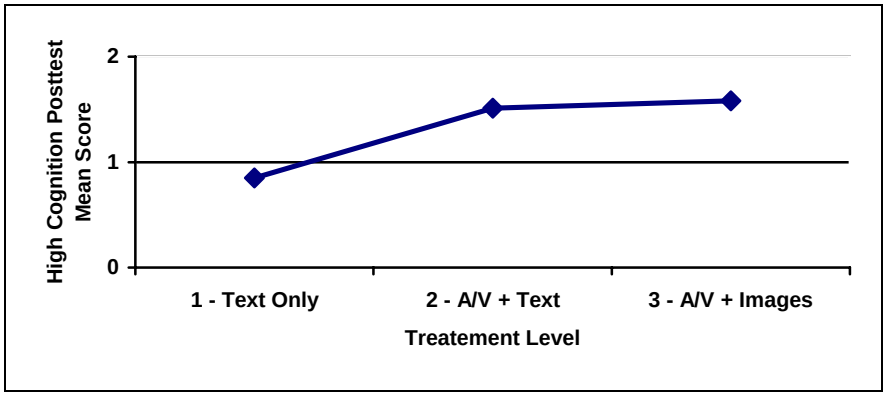


Figure 3. *High Cognition Posttest Mean Score by Tx* ($F_{Linear}$ (1, 102) = 7.569, $p$ = .001).

## Conclusions/Discussion

The results of this study indicate that a linear relationship exists between the number of differentiated channels and low, high and total student cognition gained from the electronic unit of instruction, but the three hypotheses were found to be untrue as student low, high, and total cognition increased significantly between Txs One and Two but not significantly between Txs Two and Three. Severin (1968) stated that true cue-summation would lead to significantly more learning than single channel or redundant cues within the same channel. This study failed to confirm that statement. The reason for this may be found in arguments made by Cushman (1973) who stated that a second channel had to add new information to the cues of the first channel or there could be no summation. If this is the case, then redundancy is taking place rather than cue-summation. The researcher's efforts to prevent this may have proven inadequate and produced two Txs of redundancy. Severin (1967b), Cushman (1973), Nugent (1982) and Yang (1993) determined that multiple cues (either redundancy or cue-summation) were superior to single channel cues. This research confirmed those findings in that students who were administered Txs containing multiple cues performed significantly higher than students who received only a single cue. This would indicate that providing multiple cues for students would be beneficial in the learning process, however, attempting to create cue-summation may be more difficult than is practically feasible for most teachers.

## Recommendations

*Recommendations for Improvement of Practice*

The research presented here indicates that in the electronic format commonly used for distance education delivery, both redundancy and cue-summation are superior to a single cue. Researchers, teachers, and instructional designers should make concerted efforts to incorporate the use of multimedia content into future efforts.

*Recommendations for Further Research*

The United States Department of Education (USDE) (2003) makes several recommendations for research practices to ensure the quality and quantity of empirical evidence meets standards acceptable for use in general education settings. This research followed those guidelines in regards to the planning, collection and analysis of data, but several improvements could be made to improve future research. The USDE states, "A general guideline is that the study should lose track of fewer than 25 percent of the individuals originally randomized – the fewer lost the better. This is sometimes referred to as the requirement for 'low attrition'." (p. 7)

This study lost roughly 38% of the originally randomized participants through course transfers or administrative removal. This limitation should be addressed by future researchers and measures should be taken in order to reduce or eliminate student attrition during the course of the study.

A second area of concern based on the USDE recommendations has to do with long-term outcomes. The guideline from the USDE reads, "The study should preferably obtain data on long-term outcomes of the intervention so that you can judge whether the intervention's effects were sustained over time." (p. 7-8)

The final area of concern deals with sample size for finding a statistically significantly result. The USDE recommends 50-60 classrooms or 300 individuals. This is contrary to Kirk (1995) whose calculations were used to arrive at the minimum for this study of 21 individuals per Tx group. It is safe, however, to recommend that the observations be maximized to the fullest extent of the researcher's abilities and funding.

Given these guidelines, the researcher suggests the following:

1. Replication on populations outside the limited geographical scope of this project.
2. Increase population size to the point that classrooms could be the unit of observation rather than individual students.
3. Conduct testing to determine the effects of block versus traditional scheduling on student performance.
4. Additional creation and testing of multimedia curriculum in an effort to determine the internal effects and nuances of cue-summation with a variety of images in an effort to select the most effective.

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# Relationships between Student Achievement and Levels of Technology Integration by Texas AgriScience Teachers

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## Abstract

*The purpose of this study was to determine if agriscience teacher integration of instructional technology was related to student achievement. A survey instrument was developed to collect information on the level at which teachers integrate technology into their instruction. Teachers' demographics, teachers' technology integration skill levels, teachers' administrative use of technology skill levels, and teachers' technology integration levels were collected from a random sample of 150 agriscience teachers in Texas. Student data were collected on 10$^{th}$ grade students in classes taught by the 150 teachers selected to participate in the study. The Texas Education Agency provided all TAAS data. The primary student variables used in the study to quantify math, reading, and writing achievement were the total number of multiple choice items correct for each of these three subject areas. A low positive correlation was found between student achievement in math and teacher instructional technology integration level (.14). Negligible positive correlations ($r < .10$) were found between teacher instructional technology integration level and student achievement on the writing portions and reading portions of the TAAS.*

## Introduction

Nationally, in 2001, there were 4.2 students for every instructional school computer, and the number of students per Internet-connected computer in schools dropped from 7.9 in 2000 to 6.8 in 2001 (Skinner, 2002). In 2001, the National Assessment of Educational Progress reported that Texas was above the national average with 3.7 students for every instructional school computer (Zehr, 2003). With this increase in instructional technology has been an increased concern for how this technology is being used and the impact that it has on student learning.

Richard Clark (1994) argued that the literature clearly demonstrates that use of instructional media, technologies used to deliver instruction, does not determine learning. Clark stated his argument most clearly as follows:

> "The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in nutrition. . . Only the content of the vehicle can influence achievement" (Clark, 1983, p. 445).

Clark's arguments were not popular among instructional technology researchers, but there is some empirical support for his ideas. In spite of theses findings there has been an increased emphasis on the integration of computers in the curriculum, especially in the ninth through twelfth grades. Educators have placed an emphasis on the need to prepare technologically literate students. Most states have adopted state technology standards and have charged schools with meeting those standards. Texas established the Texas Essential Knowledge and Skills (TEKS). These standards describe what students should know and what skills they should possess when using technology in each grade level.

## Theoretical Base

With a focus on measurable outcomes, behaviorist theory helped to drive the integration of technology into the education system. "Because behaviorists seek to produce observable and measurable outcomes in students, they had a tremendous influence on the development of instructional technology" (Thompson et al., 1996, p. 10).

Researchers have debated for years the role that media has on student learning. Early on, as new technologies were developed and introduced to the education system, researchers typically began investigating the new technologies with media comparison studies. Most of these studies found no significant difference in achievement between instructional opportunities delivered through different mediums. Levie and Dickie (1973) stated that people can learn from a variety of media. Much of the research on different instructional technologies produced similar findings; people can learn when instruction is delivered through computers (Salomon & Gardner, 1986; Schlosser & Anderson, 1994).

Researchers in agricultural education have concluded that this holds true for agriscience classes as well. Students can learn through computer-mediated technologies (Murphy, 1999; Zidon & Luft, 1987). Salomon and Gardner (1986) and Schlosser and Anderson (1994) determined that content and instructional variables as well as media play large roles in student learning.

This research prompted many researchers to move from media comparison studies toward studies designed to assess how to most effectively use the technology. As the direction of instructional technology research changed, so did the theories that influenced it.

Clark and Salomon (1986) found that research on learning in education was moving from a behaviorist to a cognitive or constructivist theoretical base. When evaluating student learning from the cognitive learning perspective, learning was viewed as "the degree to which previously learned knowledge and skills can be transferred to new contexts and problems" (Clark & Surgure, 1988, p. 20). Cognitive theory defines learning as a process in which the learner is actively engaged in integrating new knowledge with old knowledge. This view of learning has altered the direction of instructional technology research because student ability, prior knowledge, motivation, and instructional methods are considered to be factors that influence whether or not learning will occur (Clark & Surgrue, 1988). In agricultural education at the collegiate level, Johnson, Ferguson, and Lester (1999, 2000) conclude that students' knowledge of and experience with computing, as well as their self-efficacy in dealing with computing problems, are important in their success in technology-mediated environments.

This study correlated teacher technology integration levels with student achievement. For this reason, this study was grounded in the behaviorist and cognitive learning theories.

## Purpose

The purpose of this study was to determine if agriscience teacher use of instructional technology is related to student achievement in math, reading, and writing. To accomplish this purpose, the following objectives were proposed:

1. Determine the technology skill level of Texas agriscience teachers.
2. Determine the current level of instructional technology integration by Texas agriscience teachers.
3. Identify the Texas Assessment of Academic Skills (TAAS) test scores of students who were enrolled in agriscience courses of those teachers surveyed.
4. Determine if relationships exist between instructional technology integration by agriscience teachers and agriscience student achievement.

## Methods

*Population and Sample*

The target population for this study consisted of single teacher agriscience programs, teachers, and their students in public secondary schools in the state of Texas. The accessible population was defined as single teacher agriscience programs in the sate of Texas during the 2002-2003 school year, both the teachers and their tenth grade students. Single teacher programs were selected in order to ensure that student data could be paired to the correct agriscience teacher within a particular school.

The sample frame of teachers was identified using the *Agriscience Teachers Directory System* (AST) housed at Texas A&M University. A sample was drawn by applying random sample techniques as described by Gall, Borg, and Gall (1996). The population was not sorted prior to sampling in order to ensure a truly random sample of all Texas single teacher agriscience programs. Desired sample size was determined to be 85 by using Cohen's table for determining sample size of a nondirectional study with an alpha of .05 (Cohen, 1988). Over sampling was employed to ensure a large enough final sample size could be obtained. The AST mailing list contained 1,876 names and addresses which served as the population. From the population, a sample of 213 names was randomly selected. After the initial random selection was made, names of 63 teachers were removed from the selection for not meeting the criteria of teaching in a single teacher department. The final sample consisted of 150 agriscience teachers.

The student data used in this study came from tenth grade students of the agriscience teachers in the sample. Tenth graders were selected as the participants because they are required by Texas state law to be tested using the TAAS test near the end of their tenth grade year. Student data was collected on tenth grade students from all high schools where there were more than five students in each category of data collection. The requirement of a minimum of five students was instituted by The Texas Department of Education in order to assure student anonymity. The Internal Review Board (IRB) at Texas A& M University approved collection of student data without the use of a student consent form provided the Texas DOE data collection requirements were adhered to.

*Instrumentation*

Teachers were asked to complete a three-part survey instrument. The first section included demographic information such as gender, teaching experience, age, availability of technology to the teacher, availability of technology to the students at the school, type of Internet connection available at the school, and where the teachers learned their technology skills. The second section included questions that were designed to determine the teachers' competence level concerning specific computers skills such as e-mail, word processing, spreadsheets, presentation software, internet, web pages, file management, presentation equipment, and using computers to complete administrative tasks. The third section included questions designed to determine the level at which teachers were comfortable with integrating technology into their teaching. The third section was

modeled after the Intel Teach to the Future Scoring Guide for Integration of Technology by Teachers (Intel Teach to the Future, 2002). This third section used behavioral anchored response scales to assess the teachers' technology integration levels.

Reliability was not calculated on section one of the instrument as responses to demographic data by teachers were expected to be reliable and valid. Section two of the instrument had a reliability measure of .95 for the 42 questions measuring teacher technology skill level. Section three of the instrument had a reliability of .93 for the nine items that were used to measure teacher integration of technology.

The instrument used to measure student achievement was the TAAS test as administered by the Texas Education Agency in Spring of 2003.

*Collection of Data*

For the purpose of collecting data, Dillman's procedures for collecting survey data were used (Dillman, 2000). The initial contact for the final sample of 150 agriscience teachers was made via a packet that was mailed September 12, 2002. Three more mailings and one round of phone calls brought the total number of responses to 97 of the 150 randomly selected or a response rate of 65%. All data collection from teachers was completed by December 31, 2002.

Student data were collected by contacting the Texas Education Agency (TEA) and requesting a data file containing all TAAS data for students whose agriscience teachers participated in the study. The TEA produced data files containing the TAAS test scores for students who met the qualifications of completing the TAAS test in the Spring of 2003 and also who had been enrolled in agriscience class for either or both 2001-2002 and/or 2002-2003 school years. Of the 97 teachers who participated in the mail survey portion of this study, ten were removed from the study, as corresponding student data could not be collected for their students.

*Analysis of Data*

The data were analyzed using SPSS 11.5 (SPSS, Inc., 2003). The results generated were descriptive, comparative, and correlational. The first portion of the analysis process was descriptive. The survey described the current demographics of Texas agriscience teachers. SPSS 11.5 (SPSS, Inc., 2003) procedure *Frequencies* and *Descriptives* was used to calculate central tendencies, frequencies, and variability. The descriptive analysis was conducted on the demographic portions of the teacher data using SPSS 11.5. SPSS 11.5 procedure *Reliability Analysis* (SPSS, Inc., 2003) was used to determine the internal consistency of each measurement scale. Correlations were calculated using the procedure *Bivariate Correlation* (SPSS, Inc., 2003) to determine significant correlations between teacher data and student data.

Behavioral anchored response scales that range from "1" to "5" were used to make comparisons between technology competence levels of the teachers and technology integration levels of teachers and all data was recoded to a scale of 0 to 1.

## Findings

*Demographic Characteristics of Teachers*

Only three of the teachers were female; 83 were male, one failed to respond to the gender question. The mean age of the 87 teachers was 41.9 years. The mode age range for the agriscience teachers was 31 - 40 years of age, and the median age was 40.7. The teachers possessed an average of approximately 15.0 years of teaching experience with a standard deviation of 10.2 years. Data in Table 1 provide a profile of the 87 participating agriscience teachers in this study.

Table 1. *Selected Frequencies of Demographic Characteristics for Texas Agriscience Teachers (N=87)*

| Demographic Characteristics | f | % "yes" |
|---|---|---|
| Gender | | |
| Male | 83 | 95.4 |
| Female | 3 | 3.4 |
| Age | | |
| 21-30 years old | 16 | 18.4 |
| 31-40 years old | 28 | 32.2 |
| 41-50 years old | 19 | 21.8 |
| 51-60 years old | 24 | 27.6 |
| Teaching Experience | | |
| 1-5 years | 21 | 24.1 |
| 6-10 years | 14 | 16.1 |
| 11-15 years | 13 | 14.9 |
| 16-20 years | 11 | 12.6 |
| 21-25 years | 13 | 14.9 |
| 26-30 years | 3 | 3.4 |
| 31-35 years | 9 | 10.3 |

*Skill Level of Texas Agriscience Teachers*

To accomplish the first objective of determining the technology skill level of Texas agriscience teachers, section two of the instrument measured the teachers' technology skill level.

Teachers were asked questions measuring their competency on nine technology skill sets: 1) e-mail; 2) word processing; 3) spreadsheets; 4) presentation software; 5) Internet use; 6) creating web pages; 7) file management; 8) presentation hardware; 9) administrative use of technology. The questions asked of participants measured specific technology skills. Participants were asked to respond by circling "Y" for yes, they do possess that skill, or "N" for no, they do not possess that skill. Their responses were coded as "N" = 0 and "Y" = 1; so that if subjects responded "Y" to the five questions

regarding word processing then they would have scored a 1.0 on their level of word processing proficiency.

A review of the literature and subsequent reliability analysis suggested that the technology skill portion of the teacher data could be condensed from nine "subscales" to only two measurement scales: 1) Teacher administrative use of technology skills; and 2) Teacher use of technology in instruction skills. Table 2 reports the mean and standard deviation of the two technology skill scales.

Table 2. *Descriptive Statistics for Scales Assessing Administrative and Instructional Level of Skills in Technology of Texas Agriscience Teachers (N=87)*

| Technology Scale | M | SD |
|---|---|---|
| Administrative use of technology skill level | .61 | .36 |
| Instructional use of technology skill level | .63 | .26 |

Overall, teachers believed that their skill level in administrative use of technology (mean = .61) to be essentially the same as their skill level in use of technology in instruction (mean = .63).

*Current Level of Instructional Technology Integration by Texas Agriscience Teachers*

To accomplish the second objective of determining the instructional technology integration level of Texas agriscience teachers, section three of the instrument measured the teachers' level of technology integration. Teachers were asked to rate their own competency on nine technology integration items, with these items being listed in table three.

The questions asked the teachers concerning their level of technology integration used behavioral anchored response scales on a scale of 1 to 5, with 1 being the lowest level of technology integration and 5 being the highest level of technology integration. These responses were then recoded on a scale of 0 to 1 so that comparisons could be made more easily between teacher technology skill levels and teacher technology integration levels. The resulting means listed in table three are on a 0 to 1 scale with 1 being the highest level of technology integration. The N, mean, and standard deviation are reported on each of the nine items and of the scale in Table 3.

Table 3. *N, Mean, and Standard Deviation for Level of Technology Integration by Texas Agriscience Teachers*

| Technology Integration Item | N | M | S.D. |
|---|---|---|---|
| 1. technology enhances student learning | 87 | .42 | .22 |
| 2. technology is important to the lessons | 84 | .44 | .20 |
| 3. relationships between technology and learning | 86 | .42 | .22 |
| 4. technology is used in the lessons | 86 | .46 | .22 |
| 5. lessons require higher order thinking skills | 84 | .44 | .20 |
| 6. learning objectives are targeted | 84 | .40 | .20 |
| 7. student's work utilizes technology | 85 | .40 | .20 |
| 8. objectives align with the TEKS | 83 | .76 | .20 |
| 9. obj. align with Tx Standards for Tech. Literacy | 85 | .36 | .24 |
| Technology Integration Scale (alpha = .91) | 87 | .46 | .16 |

The scale score of .46 for the level of technology integration by teachers is lower than both their skill level of administrative use and of integration. In other words, the level at which they have been able to integrate technology into their instruction is less than their level of skills.

*Texas Assessment of Academic Skills Test Scores for Students*

The Texas Education Agency was contacted to allow accomplishment of the third objective of determining the academic achievement of the students as measured by their TAAS test scores. The TEA produced data files containing the TAAS test scores for students who met the qualifications of completing the TAAS test in the spring of 2003 and also being enrolled in agriscience classes for fall 2001, spring 2002, fall 2002, or spring 2003. Also, the student test scores collected were test scores of students who were enrolled in agriscience classes of the teachers who participated in the study.

Demographic information regarding the students who participated in this study is illustrated in Table 4.

Table 4. *Selected Frequency Demographic Characteristics of All Students in Sample (N=3009)*

| Demographic Characteristics | f | % |
|---|---|---|
| Gender | | |
| Male | 2040 | 67.8 |
| Female | 969 | 32.2 |
| Ethnicity | | |
| White, not of Hispanic origin | 2128 | 70.7 |
| Hispanic | 653 | 21.7 |
| African American | 200 | 6.6 |
| American Indian or Alaskan Native | 13 | 0.4 |
| Asian or Pacific Islander | 15 | 0.5 |
| Participated in Free or Reduced Meals | | |
| Not identified as economically disadvantage | 2021 | 67.2 |
| Eligible for Free Meals | 798 | 26.5 |
| Eligible for Reduced-Price Meals | 174 | 5.8 |
| Other Economic Disadvantage | 16 | 0.5 |
| English Proficiency | | |
| Student Identified as LEP | 87 | 2.9 |
| Student Not Identified as LEP | 2922 | 97.1 |
| Special Education | | |
| Student Participating in Special Ed | 610 | 20.3 |
| Student Not Participating in Special Ed | 2399 | 79.7 |
| Gifted and Talented | | |
| Student Participating in Gifted/Talented | 228 | 7.6 |
| Student Not Participating in Gifted/Talented | 2780 | 92.4 |

*Correlations between Instructional Technology Uses by Agriscience Teachers and Agriscience Student Achievement*

The individual student names and identification numbers were not provided, but their campus identification numbers were provided. The student and teacher data were paired using the campus identification number. The student variable that was used in statistical analysis for correlations that involved math, reading, and writing was the total number of multiple choice items correct for each of the three subject areas. Table 5 illustrates the teacher technology administrative skills, teacher technology integration skills, and teacher technology integration level correlated with student achievement scores on the TAAS math, writing, and reading scores.

Table 5. *Teacher Technology Administrative Skill Level, Teacher Technology Integration Skill Level, and Teacher Technology Integration Level Correlated with Student Achievement Scores on TAAS Math, Writing and Reading, (N=87)*

| TAAS Sections | Admin. Skill | Integration Skill | Integration Level |
|---|---|---|---|
| Math Total Number Correct | .13 | .10 | .14 |
| Writing Total Number Correct | .17 | .12 | .04 |
| Reading Total Number correct | -.01 | -.07 | -.06 |

Data are presented on the teachers' level of skill in administrative use of technology and on the teachers' level of skill in integrating technology, but the teacher variable that most directly influences student achievement is the teachers' level of technology integration. While no statistically significant correlations were found at the inferential level for these variables, there were some 'descriptively significant" correlations in this sample (Davis, 1971). Low associations existed between the teachers' ability to use technology for administrative purposes and student math and writing scores on the TAAS. More importantly to the purpose of this study, Table 5 also illustrates a low positive association between how much the teacher actually integrated technology and the students' TAAS math scores. Also of note is that correlations were near 0 between teacher levels of integration of technology and students' reading and writing TAAS test scores.

## Conclusions

Measuring teacher technology skills revealed that they were most proficient on Internet use with a mean response of .85, a mean of .81 for e-mail, .79 for word processing, .75 for integration of technology, .69 for file management, .56 for presentation hardware, .52 for presentation software, and a mean score of only .19 for creating web pages. The teachers scored a .61 for administrative use of technology skills and a .63 for instructional use of technology skills.

For student data the three key test categories that were analyzed by the researcher were math, writing, and reading achievement. The student variable that was used was the total number of multiple choice questions that the student answered correctly for each portion of the test. Total number of multiple choice items correct was used for this correlation because it generated the most accurate measurement of the students' actual performance on each portion of the test.

The primary purpose of this study was to determine if relationships existed between agriscience teacher integration of instructional technology and student achievement. The findings of this research show that there was, descriptively, a positive low correlation between student achievement on the math portion of the TAAS and teacher instructional technology integration level (r = .14). While Davis (1971) identified correlations of .10 to .29 as low associations, the researcher does recognize the "ambivalence" of low r values with regard to descriptive versus inferential conclusions.

Negligible correlations were found between teacher instructional technology integration level and student achievement on the writing portion and the reading portions of the TAAS.

While there are no cause and effect relationships addressed in this study, the findings of this study do offer support that a positive relationship exists between the level of agriscience teacher technology integration and student achievement in basic academic subjects. This information may help teacher educators better prepare in-service trainings for current agriscience teachers and may also help teacher educators have a better idea of what to teach to their current students.

## Recommendations

This study found an r value of .14 for the correlation between student achievement on the math portion of the TAAS and teacher instructional technology level. These findings are correlational and do not attempt to show a cause and effect relationship, however these findings do contribute to the growing body of research that supports the role technology plays in improving student achievement in basic academic areas.

More research is needed to further explore this relationship. With this correlation in consideration, the following questions are recommended for further research:

1. Could there be a level of diminishing returns when it comes to the amount of technology that agriscience teachers integrate into their curriculum? With the existing curriculum standards that are in place for agriscience courses, it is evident that agriscience teachers already have obligations to what they are responsible for teaching in their classrooms. To what level should agriscience teachers integrate technology in order to maximize the benefit to their students?

2. Teachers scored .61 on administrative use of technology skills and .63 on technology integration skills level. However, they scored only .46 on actually integrating the technology into their curriculum. Therefore, to increase the level of technology integration, should teacher educators shift their focus (if one exists) from teaching new and current agriscience teachers' specific technology skills to a focus on training that involves actual integration of technology in instruction?

3. What is the disconnect that inhibits teachers from integrating instructional technology into the curriculum? Teachers integrate technology at a level far below their technology skill level. If this disconnect can be identified and addressed, then teachers and teacher educators may be able to eliminate it.

4. What is the cost effectiveness of integrating instructional technology into agriscience courses? Are there other variables positively correlated to student achievement that are less expensive per unit of student achievement? Could it be more beneficial to students if educators reallocate yearly technology budgets to

pay for more agriscience teaching assistants, supervised agricultural experience projects, or increased agriscience teacher salaries?

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# A Comparison of Commonwealth Accountability Standardized Test Scores Between High School Agricultural Education/Career and Technical Education Students and the Kentucky State Standards

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## Abstract

*Throughout the history of education, assessment has been a crucial part of the teaching process. Various forms of assessment can "affect decisions about grades, advancement, placement, instructional needs, and curriculum"* (Dietel, 1991). *In Kentucky, the Board of Education designed the Commonwealth Accountability Testing System, or CATS, to assess its school programs. Each school has its own performance goal for every two-year period, ending in 2014. By 2014, the Board of Education hopes every school will receive a score of at least 100 out of 140.*

*While scores can be evaluated by grade, they can also be evaluated by a number of other divisions, such as academic program. Scores in various areas can vary greatly depending on the student's curriculum choice. For example, students enrolled in an agriculture program may fare differently than those enrolled in communication classes in the areas of science, reading or mathematics. A study of these varying scores will not only improve student interest in certain educational programs, but also spotlight other programs that may need assistance in reformatting curriculum or teaching styles.*

*Through a look at the CATS scores of Kentucky's high schools in 2003, the overall scores of agriculture students compared to those of non-agriculture students can determine the influence agricultural education has on the CATS test. By evaluating these scores by educational program, the CATS tests can be used to evaluate not just the curriculum of the subjects being tested over, but also the programs that contribute to learning these subjects. Through this evaluation, Kentucky's standardized tests can be used to their fullest potential by assessing curriculum and teaching styles, and in turn aiding in the advancement of education.*

## Introduction

In today's growing world, education is changing at an ever-quickening rate due to constant advancements in technology and science, as well as other academic fields (Newman, 1998). Officials realize that in order for our students to remain on the cutting-edge of learning, schools must be able to adapt curriculum to the changing times. In order for schools, states, and the entire nation to determine whether students are effectively learning the most up-to-date material, a form of assessment must be used to evaluate what each child has learned.

While there are several forms of assessment, norm-referenced assessment, such as standardized testing, allows student knowledge to be compared at the individual, grade, school, state, and national levels. Today, the United States government allows each state to create its own form of norm-referenced assessment to compare students and curriculum. In Kentucky, the Commonwealth Accountability Testing System, or CATS, is a form of norm-referenced assessment that has been in place since 1992 (White, 1998). It provides reliable scores that can be compared between schools so Kentucky can accurately and effectively evaluate not only individual student progress, but also the efficiency of teaching practices and relevance of curriculum in various subjects (Kentucky Department of Education, 2002). Today, Kentucky high schools provide many career and technical education programs for students, including agricultural education.

Historically, agricultural education has been a popular and well-rounded curriculum that teaches the basics of various other subjects through agriculture rules, procedures, and concepts (Shinn et al., 2003). T. Bailey, in *Integral Vocational and Academic Education* states,

> Agriculturally based activities, such as 4-H and FFA, have for many years used the farm setting and students' interests in farming to teach a variety of skills. It only takes a little imagination to think of how to use the social, economic, and scientific bases of agriculture to motivate and illustrate skills and knowledge from all of the academic disciplines (as cited in Shinn et al., 2003).

The effects of agricultural education's teaching methods and curriculum on high school students is difficult to determine because much of the performed assessment in the program is authentic, allowing students to be graded on portfolios, projects, and other performance-based assessment. Additionally, little research has been gathered on how agricultural education students fare on norm-referenced tests, such as standardized tests. However, by comparing the CATS scores of high school agriculture students to those of non-agriculture students and to the Kentucky state averages, one can determine how high school agriculture students fare on the standardized test overall compared to these other groups of students.

First, a review of literature regarding the advantages and disadvantages of standardized tests and the particulars of the CATS test is necessary in order to fully

understand how the CATS test is a valid measurement in the evaluation of high school students. Additionally, a brief history of agricultural education is included to display how this subject area differs from other high school subject areas, and why the teaching practices and curriculum of agricultural education may affect CATS scores.

## Theoretical Framework

Assessment in today's school system holds many purposes for various groups of individuals (Dietel, Herman & Knuth, 1991). Policymakers use assessment to set standards and monitor education quality. School administrators use assessment to plan and improve programs, while teachers utilize it to observe student progress. Additionally, parents and students use assessment to determine student strengths and weaknesses. While no one form of assessment can accurately measure a student's ability, the standardized test is a popular method of evaluating students, and proves useful for each of the latter groups (Postman, 2001).

While standardized testing is widely used for evaluating students and curriculum, it is a very controversial form of assessment. In an article entitled *Issues in High Stakes Testing Programs*, Finbarr Sloane (2003) identifies several negative effects of standardized testing on students. First, he claims that these lengthy tests frustrate students and discourage them from trying. Additionally, the fact that norm-referenced tests compare students also makes these students more competitive. Critics claim that because these tests focus on recall, they have led to a narrowing of curriculum and an emphasis on simple memorization with limited opportunity to practice higher-order thinking skills (Dietel et al., 1991). Standardized tests are timed and contain only one answer for each question, which lead teachers to ask questions requiring exceptionally short responses and encourage students to select the best answer rather than developing their own questions and answers, again discouraging higher-level thinking. Essentially, critics are worried that teachers will "teach the test" rather than teaching a broad range of topics, some of which may show up on the test (wikipedia, 2004).

With all of these harsh criticisms, one may wonder if standardized tests are actually appropriate measures for evaluating student knowledge. Fortunately, there are many advantages associated with standardized tests, making the tests very beneficial. While standardized tests may frustrate students by confronting them with difficult questions, they also provide these students with information about their individual knowledge and skills (Sloane, 2003). These tests also send clear signals about what to study. In addition, competitive students are motivated by these tests to work harder in school. When compared with teacher-created tests, standardized tests are more reliable and valid (wikipedia, 2004). Contrary to popular belief, it may be very difficult for teachers to teach tests because many standardized tests have several forms, making it impossible for a teacher to know the test's content. Finally, cost proves to be the biggest benefit accredited to standardized testing.

Caroline Hoxby, a professor of economics at Harvard University, created an example in her essay, *Conversion of a Standardized Test Skeptic*, to illustrate how cheap

standardized testing is. She claims that with the money that is spent per student on standardized testing annually, teacher salaries could be raised by one quarter of a percent, classes could be reduced by two one-thousandths of a student, or the school year could be lengthened by one-tenth of one day. Each of these options is incredibly inefficient for improving student learning when compared with the benefits of standardized testing. Standardized tests may not be problem-free, but they are one of the cheapest and most reliable ways to evaluate students on the state level.

In Kentucky, the CATS test has been the required form of standardized testing for the past five years, being introduced to students in the spring of 1999 (Kentucky Department of Education, 2002). The CATS test is a very useful form of assessment, in that it is designed for both state and national comparison. This test was created through a broad, collaborative process that includes ideas from a group of 8,000 teachers, principals, superintendents, parents, guardians, community and business leaders, legislators, and other citizens. This group of professionals determined that high school students should be tested in the subjects of science, mathematics, writing on demand, writing portfolios, reading, social studies, arts and humanities, and practical living and vocational studies. Today, a formal advisory council, a panel of testing experts, and a designated legislative committee continue to advise the state board. After completion of the ten-day CATS testing period each spring, students' work in every tested subject is labeled as novice, apprentice, proficient, or distinguished, which is the highest score. To ensure fair and accurate scoring, Kentucky teachers completed descriptions for these scores in every subject and grade level. In addition to a conglomeration of student academic scores, schools also receive scores regarding non-academic issues including student retention rate, dropout rate, and the percentage of graduates that continue their education in college. By combining nonacademic and academic scores, each school receives a single score between zero and 140 points.

The Kentucky Department of Education requires that every school have its own individualized goal every two years until the year 2014. By the end of the goal outlines, Kentucky expects every school to reach a score of at least 100, which is considered proficient. Depending on whether a school scores higher or lower than its goal, the school will either receive assistance or financial rewards.

Because the job market is constantly expanding and adapting to new technology, Kentucky schools have added several career and technical education majors to their high school programs. Among those is agricultural education. The mission of this unique program is to "[prepare] students for the successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems" (Gill, 2003). By combining classroom instruction, involvement in the FFA (formerly known as the Future Farmers of America), and supervised agricultural experiences, enrolling in agricultural education can be the highlight of one's high school career. Additionally, students can learn the basics of other academic programs through applications in agriculture classes. According to G.C. Shinn et al. (2003), authors of *Improving Student Achievement in Mathematics: An Important Role for Secondary Agricultural Education in the 21st Century*, "secondary agricultural education, through the sue of relevant

curriculum delivered from a student-centered perspective by skillful teachers, has high potential for engaging students in active, hands-on/minds-on learning environments rich with opportunities for learning mathematics" (2003).

While agricultural education proves to have very different teaching techniques from many other academic programs, theory and performance-based assessment do little to confirm that these differences have an affect on student learning. By comparing the scores of high school agriculture students on the CATS test in 2003 to those of other career and technical education majors and to the Kentucky state averages, the influence of the agricultural education curriculum and teaching styles on CATS scores may be evaluated.

## Purposes and Objectives

In order to determine if a difference exists in performance level on the CATS tests between agricultural education majors and all career and technical education majors, as well as agricultural education majors compared to Kentucky's state standard, this study contains two purposes:

1. To compare the performance of high school career and technical education majors on the CATS test in 2003.
2. To compare the performance of agricultural education majors to Kentucky state standards on the CATS test in 2003.

In an effort to complete these two purposes, the following three objectives were established:

1. To compare the performance of all career and technical education majors in reading, science, on demand writing, a writing portfolio, math, social studies, arts and humanities, and vocational studies.
2. To compare the performance of agricultural education majors to the other career and technical education majors in each previously mentioned assessment subject.
3. To compare the performance of agricultural education majors to the Kentucky state academic index for all Kentucky high school CATS takers in 2003.

## Procedures

To complete this study, the 2003 scores of CATS tests from 2275 Kentucky high school agricultural education students were compared to Kentucky's 2003 state averages, compiled from Kentucky's 45,676 high school students. Additionally, a copy of Kentucky's CATS scores of high school career and technical education students for 2003 was obtained from the Kentucky State Department of Education. The scores were broken down by career and technical education major and score categories in a Microsoft Excel file. In addition, Kentucky state high school overall averages for the CATS test in 2003 were verified from the Kentucky Department of Education website.

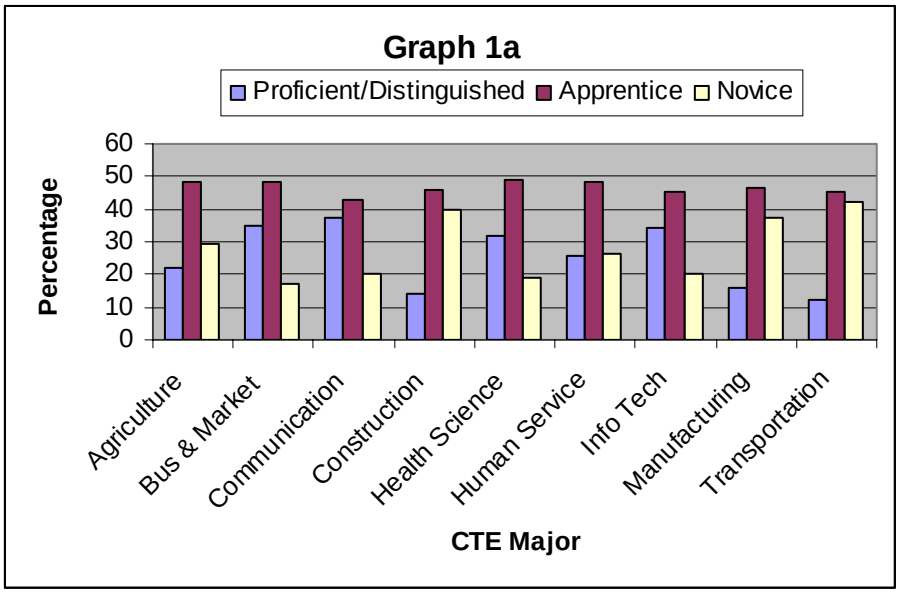
By comparing the percentages of scores in the score categories of Distinguished, Proficient, Apprentice, and Novice between agricultural education majors and other career and technical education majors, it can be determined how agricultural education

majors performed on the CATS test compared to the other career and technical education majors in 2003. With the overall state scores, the difference between state standards and agricultural education scores can be determined.

## Findings

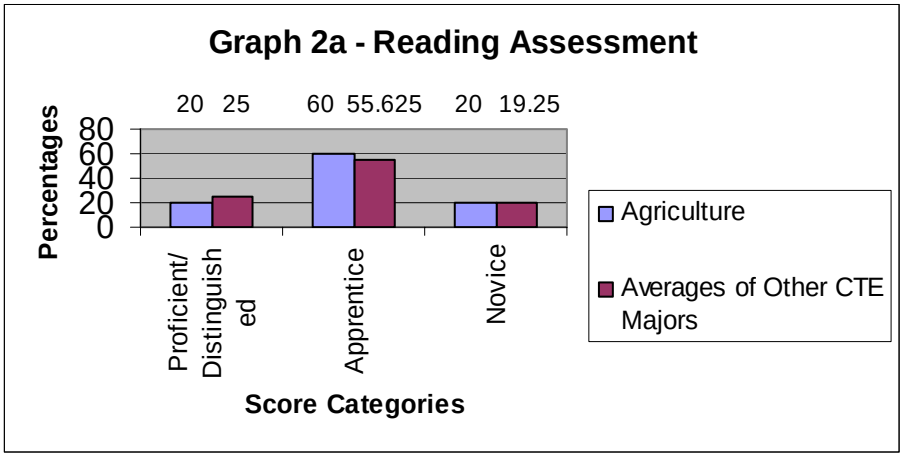
In order to complete each of the three objectives defined above, the graphs below are split into three categories to coincide with the objective they satisfy. Graph Set 1 compares the performance of all career and technical education majors on the CATS test.

Graph 1a compares the overall performance of each career and technical education major on the CATS test in 2003. Communication has the highest percentage of students scoring in the categories of proficient or distinguished, while transportation has the fewest number of students scoring similarly. Additionally, transportation has the highest number of students scoring in the novice category. Because by 2014, the Kentucky Department of Education expects all students to score in the categories of proficient or distinguished, this graph concludes that communication is the subject most likely to reach this goal. Further, the graph shows that the areas of transportation, construction, and manufacturing all need to make great improvements in their students' scores in order to meet the 2014 goal. The remaining subjects appear to fall somewhere between communication and transportation, implying that while scores need to be improved, they are not yet producing scores that should cause great alarm to analysts of the CATS test.

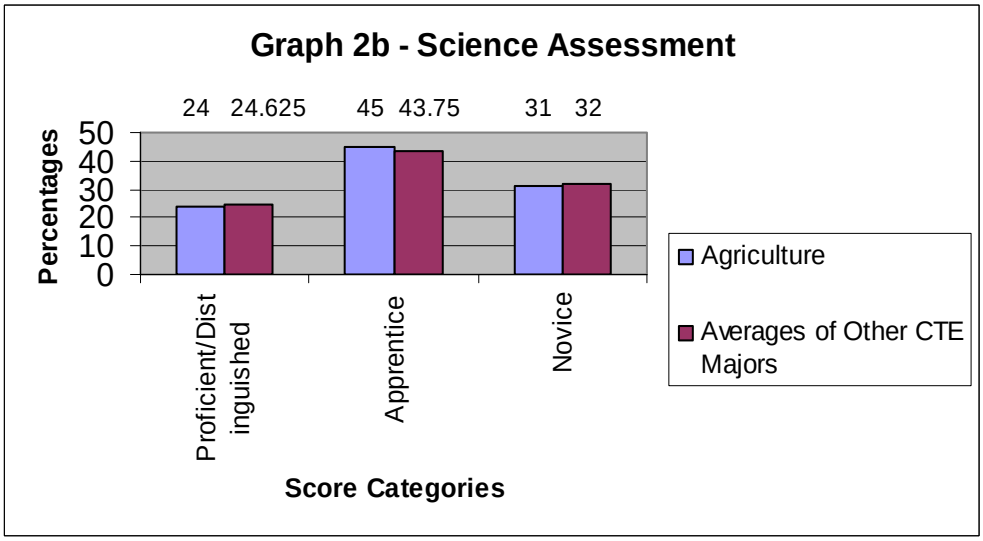



Graph Set 2 compares agriculture students to students in all other career and technical education majors in each assessment area. In the following graphs, agriculture scores are compared to the average scores of all other career and technical education majors in each score category. With regard to scores in each assessment, high school agriculture majors are considered slightly below average. This major does not display

proficient and distinguished scores that are severely below those of the other career and technical education majors, but the scores are nevertheless below satisfactory.

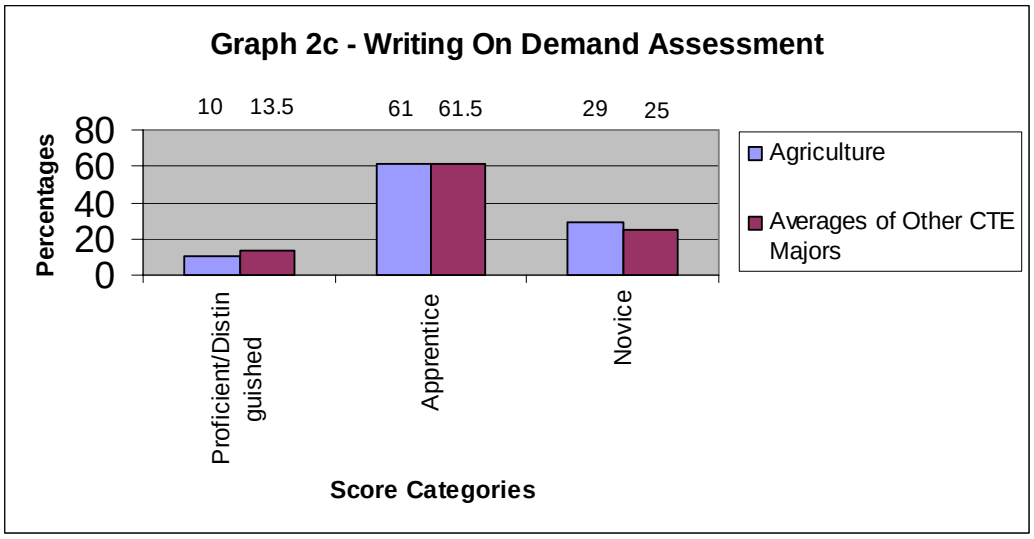



Graph 2a shows the difference in scores between agriculture and other career and technical education majors in Reading. The graph displays that the average of the other career and technical education majors is higher in proficient/distinguished that agriculture. The novice scores of the two groups are close in value, showing that agriculture is not very far below the average of the other career and technical education majors in Reading, but needs some improvement in scores to become above average.

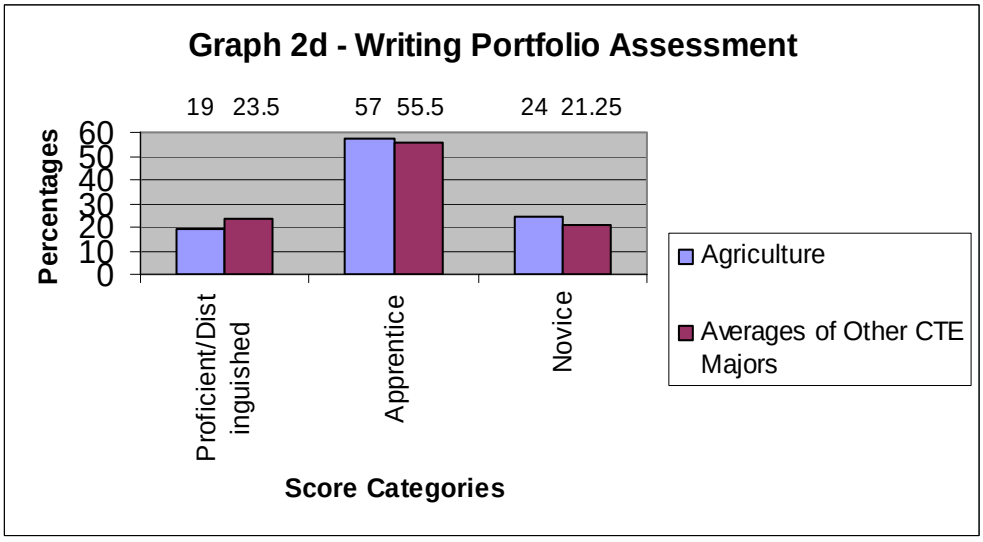



Graph 2b displays the scores of agriculture compared to those of other career and technical education majors in the assessment area of Science. According to the graph, agriculture students are very slightly under average in their number of proficient and distinguished scorers when compared to the other career and technical education majors. Additionally, the novice average of the other majors is just higher than that of the agriculture students. This indicates that agriculture students are virtually average on their

assessment in Science, and some improvement would definitely put agriculture students above the average.

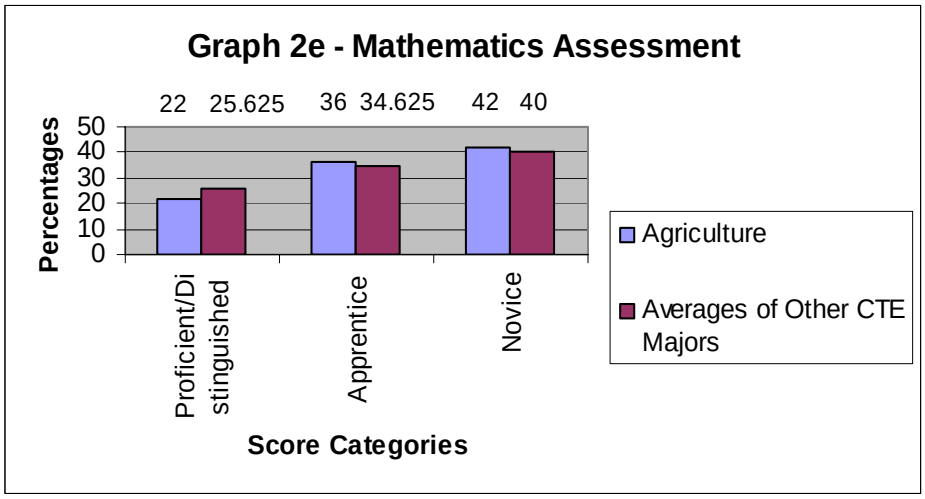



Writing on Demand scores are evaluated in Graph 2c. While fewer students from both agriculture and other career and technical education majors scored proficient or distinguished than on previous assessment subjects, agriculture students still have a lower proficient and distinguished score percentage than the average of all the other career and technical education majors. While apprentice score percentages are very close, agriculture has more students that score novice, concluding that the scores of agriculture students are slightly below the averages of the other career and technical education majors.

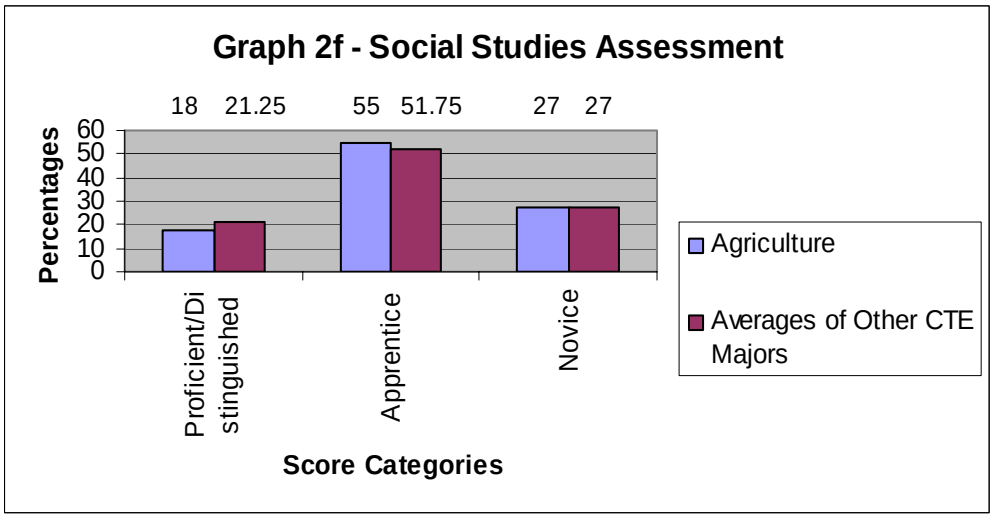



Graph 2d compares the score percentages between agriculture and other career and technical education majors on the Writing Portfolio. Once again, the average of the proficient and distinguished scores from all the other career and technical education

majors is higher than agriculture's percentage. This, along with agriculture's higher novice percentage, implies that agriculture is below average compared to other career and technical education majors in the Writing Portfolio assessment.

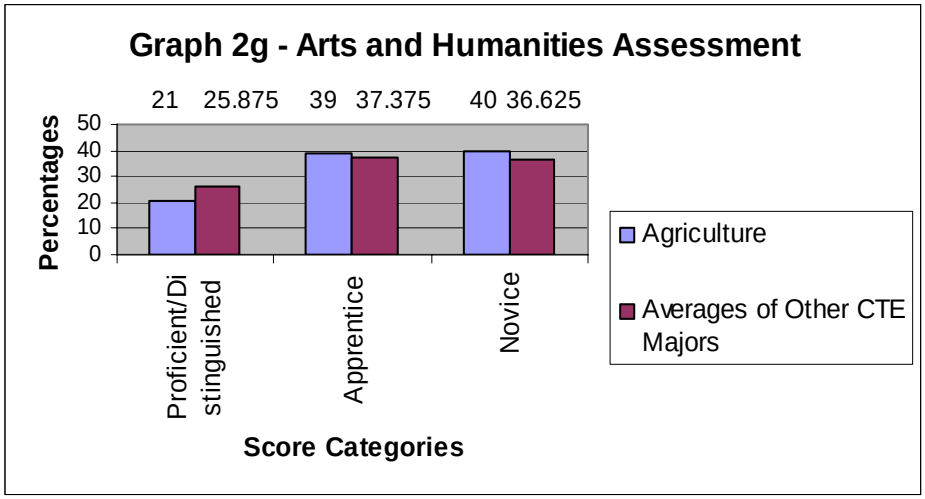



Graph 2e displays score percentages of agriculture and other career and technical education students in Mathematics. While the overall high novice percentages from both parties indicates that Math is an area all career and technical education majors need improvement in, agriculture is still below the career and technical education average. This is proven by agriculture's lower proficient and distinguished score and higher novice score.

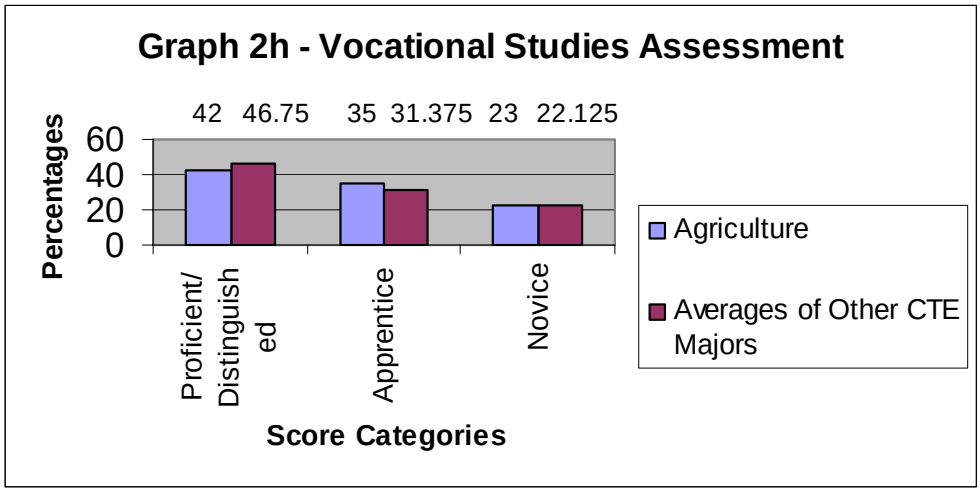



Unlike the Mathematics assessment in Graph 2e, Graph 2f displays the bell curve that is expected in assessment. This graph looks at scores between agriculture and other career and technical education majors in Social Studies. Similar to other assessment subjects, agriculture scores are lower in proficient and distinguished. They are, however, equal to the average in the novice category. This shows that while there is not a very

large gap, agriculture is still slightly behind the average of the career and technical education majors in Social Studies.

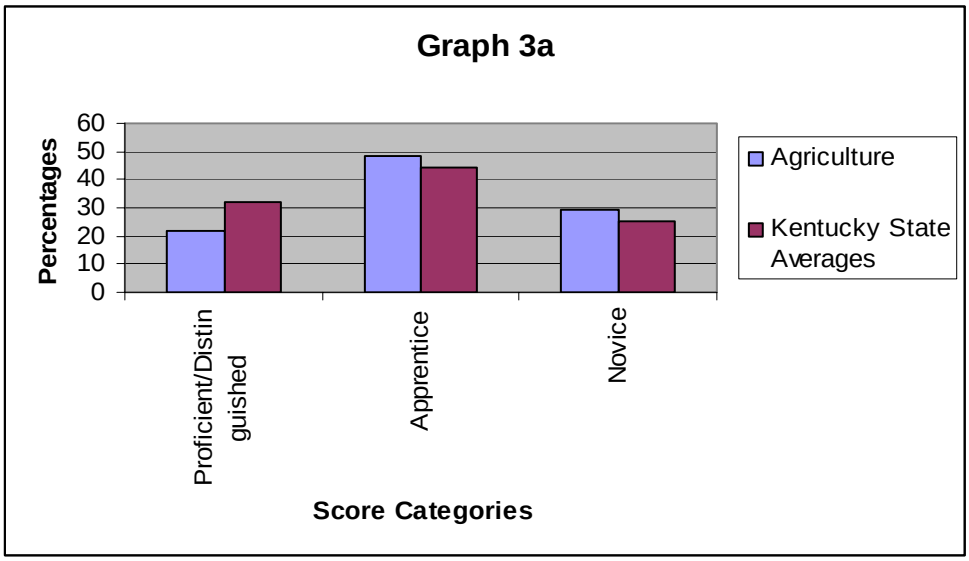



An assessment of Arts and Humanities is looked at in Graph 2g. While the graph displays that all career and technical education majors need improvement in this subject, agriculture has higher novice scores and lower proficient and distinguished scores than the averages of the other career and technical education majors. These differences in scores show that scores of agriculture students in Arts and Humanities are below average compared to other career and technical education majors.




Graph 2h looks at the assessment of Practical Living and Vocational Studies. While the percent of proficient and distinguished scores is higher in all career and technical education majors compared to other assessment subjects, agriculture is still behind the averages of the other majors because of agriculture's lower proficient and distinguished score percentage.

Graph 3a compares score percentages of agriculture students to Kentucky's state averages on the 2003 CATS test. As the graph displays, Kentucky averages in proficient and distinguished are higher than those of agricultural education majors. These, in addition to Kentucky's lower novice averages, conclude that the scores of high school agricultural education majors are below the state standards.




## Conclusions

After evaluating the differences in various CATS score averages, several conclusions can be gathered with regard to the previously mentioned objectives of this study. After comparing the performance of high school career and technical education majors on the CATS test in 2003, certain majors stand out as opposite ends of the assessment spectrum.

By evaluating Graph 1a, the major that displays the highest ability on the CATS test is easy to determine. Communication students display the greatest score averages overall, having both the highest proficient and distinguished score percentage and a low novice score percentage. The CATS test has proven that communication programs need little reform. The three majors most in need raising CATS test scores are transportation, construction, and manufacturing. These majors fall short of the other six career and technical education majors both in their proficient and distinguished score average and their novice score average.

While this study looks at all career and technical education majors, it focuses primarily on agricultural education. Graph Set 2 shows that, with regard to CATS test scores, high school agriculture majors fall short of the score averages of other career and technical education majors. Unfortunately, comparing agricultural education scores with Kentucky state averages in Graph 3a paints a similar picture. Kentucky's proficient and distinguished score average is higher than that of agriculture, showing that many non-agriculture students score higher than agriculture students on the CATS test.

## Recommendations

After looking at the results of this study, it seems as though the unique teaching methods applied in agricultural education may not be enough to meet CATS test goals. However, before any conclusions can be drawn on whether or not some assistance should be offered, a few questions need to be answered. First, are there other factors that may lead to these lower scores, other than the curriculum and teaching methods? What are the IQs and GPAs of the students entering agricultural education? Perhaps these scores are an improvement from those of previous years. If so, the educators and students in agricultural education should be commended for their efforts. Additionally, score percentages may be skewed if certain majors are not offered in many schools, if students incorrectly state their major, or if students are placed in a certain major because of their IQ. A further look into these career and technical education majors may prove that agricultural education scores are not as poor as this study implies.

## Discussions and Implications

Obviously, this study is merely a starting point in what could be a more definitive idea of how career and technical education majors, and more specifically agricultural education, affects the learning of high school students. Through additional research into the IQs and study habits of agricultural education students, agricultural education curriculum, and common teaching methods, educators can discover more about how students learn and retain knowledge. Additionally, a continuation of this research may help to reveal which specific teaching practices can help students learn and retain more information. After agriculture students' 2003 CATS test scores, agriculture educators should make it a priority to raise the standards and expectations they hold their students to. Improvement can begin with agriculture teachers in the form of varied teaching styles, greater commitment to teaching all students, and higher expectations of these students. While improving educational quality on the classroom level is not the only answer to raising Kentucky's agriculture students' CATS test scores, it is a reasonable and realistic place to begin. Perhaps in future years, additional investigations will be able to determine how valuable career and technical education programs are in today's schools, and continue to expand the educational horizons of America's students.

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# Teacher Preparation and In-Service Needs Associated With Management of the Total Program of Agricultural Education in Georgia

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## Abstract

*The purpose of this descriptive census study was to survey agriculture teachers (N = 348) in Georgia to determine perceived level of importance, competence, and pre-service/in-service training needs for a set of non-instructional, agriculture teacher competencies, specifically associated with duties related to managing the "total program" of agricultural education. Sixty one percent of the teachers (n = 212) completed a modified version of Joerger's (2002) Minnesota Beginning Agricultural Education Teacher In-service Programming Needs Assessment instrument, which was based on Borich's (1980) Needs Assessment Model. Mean and Standard Deviation were calculated to indicate teachers' perceived level of importance and competence for each professional competency, while Mean Weighted Discrepancy Scores were calculated to represent in-service and pre-service needs. Teachers considered all of the non-instructional competencies needed for managing the total program of agricultural education important. They also considered themselves at least somewhat competent in each of the competencies. According to the Georgia agriculture teachers in this study, the most important training need for either pre-service teacher education or professional development was advising students about post-secondary education in agriculture. Other highly rated pre-service/in-service training needs included preparing FFA proficiency award applications and FFA degree applications, developing an effective public relations program, and developing Supervised Agricultural Experience (SAE) opportunities for students.*

## Introduction

Improving university agricultural teacher education curricula and statewide continuing education programs calls for a thorough needs assessment of current practitioners of the "agriculture teaching" trade. As students, teachers, schools, curricula, legislation, and times change, providers of teacher education training must also re-evaluate the content they distribute to pre-service and in-service agriculture teachers. In fact, the Committee on Agricultural Education in Secondary Schools Board on Agriculture of the National Research Council (1988) stated, "Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers, … in and about agriculture" (p. 7). Determining what and how to revise and expand for teacher preparation and in-service education is the challenge. Fortunately, some researchers (Dormody & Torres, 2000; Layfield & Dobbins, 2002; Garton & Chung, 1996, 1997) have been successful at determining teacher preparation and in-service needs in their respective states. These researchers recommended that other states replicate the pre-service and in-service needs studies to determine the specific needs of agriculture teachers.

Researchers have investigated a cadre of constructs related to pre-service and in-service needs of agriculture teachers. Dobbins and Camp (2000) indicated a needed understanding in curriculum development, learning styles, technical areas, teaching methods, teaching techniques, and academic integration methods. Edwards and Briers (1999) evaluated the competencies of facilitating student learning in classroom and laboratory settings, facilitating student learning in leadership and personal growth, facilitating student learning in student agricultural experiences, and facilitating teacher competencies related to student services, program management, personal roles and relationships, and planning and managing educational tools. Joerger's (2002) categories of professional teaching competencies needed for success and survival were classroom management, leadership and SAE development, technical agriculture, and program design and maintenance. Roberts and Dyer (2002) conducted a Delphi study of agricultural education experts to determine the characteristics of an effective agriculture teacher. The Roberts and Dyer study categorized effective teaching characteristics into instruction, FFA, SAE, community relations, marketing, professionalism/professional growth, program planning/management, and personal qualities. To date, most studies have attempted to describe all of the necessary teaching competencies for teachers of agriculture. This study evaluated pre-service and in-service needs of teachers associated with the non-instructional planning and management of the total program of agricultural education.

## Conceptual Framework

There is more to teaching agriculture than content and pedagogical process. According to espoused theories of other agricultural education researchers (Edwards & Briers, 1999; Garton & Chung, 1996; Greiman, Walker, & Birkenholz, 2002; Joerger, 2002; Layfield & Dobbins, 2002; Mundt & Connors, 1999; Peiter, Terry, & Cartmell, 2003; Roberts & Dyer, 2002) interested in pre-service and in-service needs of secondary

agriculture teachers, teaching competency need areas may include (a) planning and managing the FFA program, (b) preparing students for participation in leadership and career development events (CDEs), (c) preparing FFA degree applications, (d) preparing proficiency awards, (e) completing other reports, (f) developing an effective public relations program, (g) managing an advisory committee, (h) managing an adult program, (i) developing and updating curricula, (j) organizing fundraising activities, (k) managing students' SAEs, (l) and building support for the agricultural education program. The framework for this study specifically draws on the work of Borich (1980), Garton and Chung (1996, 1997), and Joerger (2002).

This study surveyed agriculture teachers in the state of Georgia to determine perceived level of importance, competence, and pre-service/in-service training needs for a set of agriculture teacher competencies, specifically associated with the above duties related to managing the "total program" of agricultural education. Ensuing paragraphs detail the findings of other researchers seeking to provide more effective pre-service and in-service training for agriculture teachers.

Teachers receive little program management assistance in many areas related to agricultural education from their respective school districts (Greiman et al., 2002). According to a Delphi study of outstanding teachers, managing the overall activities of the local FFA chapter was the top training need, and thus should be addressed (Mundt & Connors, 1999). Edwards and Briers (1999), Joerger (2002), and Peiter et al. (2003) found that planning and managing the work of an FFA program is a major in-service need.

Preparing students for participation in Career Development Events (CDEs) is another area for which teachers perceive they need more training. From organizing and planning for FFA officer elections to training for the next floriculture event, researchers have (Edwards & Briers, 1999; Peiter et al., 2003) reported that preparing students for participation in CDEs was a major in-service need. The effective teacher Delphi of Roberts and Dyer (2002) concurred; they believed that the ability to prepare students to be successful in CDEs was crucial.

Preparing FFA degree applications has been reported to be a highly rated in-service need of beginning teachers (Garton & Chung, 1996; Layfield & Dobbins, 2002; Peiter et al., 2003). Additionally, preparing FFA proficiency awards was reported as a need area and major concern for beginning teachers in Missouri (Garton & Chung, 1996), Minnesota (Joerger, 2002), South Carolina (Layfield & Dobbins, 2002), and Oklahoma (Peiter et al., 2003). However, when teachers of all experience levels were evaluated, the findings varied (Washburn, King, Garton, & Harbstreit, 2001). Washburn, et al. found that preparing degree applications and proficiency awards was ranked 1$^{st}$ in Kansas, but 22$^{nd}$ in Missouri as a training need.

FFA degree applications and proficiency awards are not the only forms of paperwork for agriculture teachers. Teachers are inundated with reports in the name of local, state, and federal accountability. Completing reports was the highest rated in-

service need of beginning teachers in Missouri (Garton & Chung, 1996). Garton and Chung (1997) determined completing reports for local and state administrators was the most pressing issue in their study. Layfield and Dobbins (2004) agreed that training related to completing reports for local, state, and federal accountability was needed.

Agriculture teachers also have to promote their total program of agricultural education. Developing an effective public relations program was a highly rated in-service need of both beginning and experienced teachers, according to Garton and Chung (1996) and Layfield and Dobbins (2002). Additionally, state agricultural education staff believed that training to help teachers develop an effective public relations program was an important need (Garton & Chung).

Advisory committees help agriculture teachers plan their program, but teachers rarely receive training in managing those committees. Unlike teachers, state agricultural education staff in Missouri believed training, which taught prospective and future teachers how to utilize a local advisory committee, was also one of the top in-service needs of agricultural education teachers (Garton & Chung, 1996). Still, teachers in other states identified in-service training in advisory committee management as an important need (Joerger, 2002; Layfield & Dobbins, 2002).

In some states, adult education is still an important part of the total program of agricultural education. According to the literature, adult education was another area in which teachers need more training (Findlay & Drake, 1989; Garton & Chung, 1996; Layfield & Dobbins, 2002). State joint staff in Missouri listed management of the adult program as an important in-service need for that state; however, beginning agriculture teachers in Missouri did not rate this as important as the state staff (Garton & Chung, 1996). Researchers (Findlay & Drake, 1989; Layfield & Dobbins, 2002) have reported that agriculture teachers in Alabama, Florida, Georgia, and South Carolina indicated a competency deficiency in managing the adult program.

In their undergraduate teacher preparation program, agriculture teachers received one course, maybe two which addressed developing agricultural education curricula in their undergraduate/graduate program. However, developing and updating curricula continues to be a training need for teachers. Edwards' and Briers' (1999) study found that implementing new curricula is a major in-service need. Peiter et al. (2003) determined that new teachers needed to know how to offer a variety of courses to attract students, and how to modify curricula to meet changes in technology. Washburn et al. (2001) found that teachers of agriculture believe that modifying the curricula to meet changes in technology and to attract and retain quality students were of utmost importance.

Agricultural education faculty and state directors continue to tout the importance of agriculture teachers maintaining a SAE program for all students, but teachers persist in their struggle with this competency. Layfield and Dobbins (2002) determined that beginning teachers perceived that they needed help becoming acquainted with strategies for developing SAE opportunities for students. South Carolina teachers (Layfield & Dobbins, 2002) also felt

they needed in-service assistance with learning how to supervise SAE programs. Peiter et al. (2003) listed selection of SAE projects, supervision of projects, and livestock show procedures as areas where new teachers could use help.

Studies have also indicated that teachers need help developing personal and monetary support for their agricultural education program. Mundt and Connors (1999) and Joerger (2002) indicated that building support from faculty, counselors, and administrators in the school, as well as parents, organizations, and other adult groups in the community, was a major concern needing to be addressed by in-service. According to Peiter et al. (2003), the support-building skill of improving the image of the program was another area where teachers could use help. Additionally, Layfield and Dobbins (2002) and Peiter et al. (2003) discovered that teachers needed help with organizing fundraising activities for the local FFA Chapter.

## Purpose and Objectives

The purpose of this descriptive study was to survey agriculture teachers in the state of Georgia to determine perceived level of importance, competence, and pre-service/in-service training needs for a set of non-instructional, agriculture teacher competencies, specifically those associated with duties related to managing the "total program" of agricultural education. Specific objectives of this study were the following:

1. Describe the demographic characteristics of Georgia agriculture teachers.
2. Describe the perceived level of importance Georgia agriculture teachers placed on competencies associated with managing the total program of agricultural education.
3. Describe the perceived level of competence Georgia agriculture teachers had for competencies associated with managing the total program of agricultural education.
4. Describe the perceived pre-service and in-service needs of Georgia agriculture teachers.

## Procedures

The population of this descriptive study included the 348 middle school and/or high school agriculture teachers employed during the 2004-2005 school year in the state of Georgia. Surveys were distributed and collected at the Georgia Vocational Agriculture Teachers Conference, regional agriculture teacher meetings, and via an online version of the instrument.

A modified version of the *Minnesota Beginning Agricultural Education Teacher In-service Programming Needs Assessment* (Joerger, 2002) was used to survey the teachers. This instrument was modeled after the 1996/1997 Garton and Chung instrument, which was based on the Borich Needs Assessment Model (Borich, 1980). This study combined the FFA/leadership development/SAE category with the program management category of Joerger (2002) to create a set of items which depicted the non-

instructional competencies of agriculture teachers associated with managing the total program of agricultural education. A panel of experts consisting of four University of Georgia faculty, two graduate students, three regional coordinators of agricultural education, and four agriculture teachers were used to determine the face and content validity of the instrument. Cronbach's alpha was calculated to determine the reliability of importance ($\alpha = 0.94$) and competence ($\alpha = 0.94$) scales. The 27 items of the instrument were constructed with two Likert-type scales ranging from one to five that measured teachers' perceptions of the importance of the competencies as well as their level of competence in each of the competencies.

The data collected were entered into SPSS 12.0™. Mean and standard deviation were calculated to determine the competencies that teachers perceived to be important. Additionally, mean and standard deviation scores were calculated to determine the competencies in which teachers perceived themselves to be competent. In order to determine the in-service and pre-service needs of Georgia agriculture teachers, a mean weighted discrepancy score (MWDS) was calculated. The MWDS score was calculated by subtracting the competency score from the importance score and by multiplying that number times the mean importance rating for each competency (Borich, 1980; Joerger, 2002). MWDS was calculated because it provides a more valid picture of needs than directly asking teachers or future teachers for a ranking (Edwards & Briers, 1999).

There were 212 respondents out of 348 middle school and/or high school agriculture teachers in the population, yielding a response rate of 61%. To address non-response early respondents ($n = 121$) were compared to late respondents ($n = 91$) using an independent samples t-test. Lindner, Murphy, and Briers (2001) and Miller and Smith (1983) reported that responses of late respondents are often similar to non-respondents, and reasoned that if there is not a difference between early respondents and late respondents, then there is little need to pursue additional efforts to increase responses from non-respondents. With the exception of one item on the competence scale, no other significant differences were found between early and late respondents. The one item within the competence scale, "Utilizes alumni and/or young farmer affiliate" was significantly different when early ($M = 3.27$, $SD = 1.16$) respondents were compared to late ($M = 3.61$, $SD = 0.984$) respondents, $t\ (206) = -2.21$, $p < 0.05$, $d = 0.35$.

## Findings

Georgia agriculture teachers are mostly male (74.5%), and were represented by each age category (Table 1). Fifty-two percent of the agriculture teachers had 11 years teaching experience or less, and thirty-five percent of agriculture teachers had five or less than five years of teaching experience. All of the respondents had at least a Bachelor's degree and over half (57.6%) held at least one graduate degree.

Table 1. *Selected Teacher Demographics*

| Characteristics | | f | % |
|---|---|---|---|
| Gender | Male | 158 | 74.5 |
| | Female | 54 | 25.5 |
| Age | Less than 25 | 29 | 13.7 |
| | 25 to 34 | 60 | 28.3 |
| | 35 to 44 | 51 | 24.1 |
| | 45 to 54 | 58 | 27.4 |
| | 55 to 64 | 16 | 7.5 |
| | More than 65 | 2 | 0.9 |
| Teaching Experience | Less than 5 years | 74 | 34.9 |
| | 6 to 10 years | 36 | 17.0 |
| | 11 to 15 years | 26 | 12.3 |
| | 16 to 20 years | 20 | 9.4 |
| | 21 to 35 years | 26 | 12.3 |
| | 26 to 30 years | 25 | 11.8 |
| | More than 30 years | 5 | 2.4 |
| Highest Degree Earned | Bachelors | 90 | 42.5 |
| | Masters | 78 | 36.8 |
| | Specialist | 32 | 15.1 |
| | Doctorate | 12 | 5.7 |

Teachers considered all of the competencies needed for managing the agricultural education program to be important. According to these teachers, the most important competency was conducting local FFA chapter activities ($M = 4.70$, $SD = 0.49$), followed by developing an effective public relations program ($M = 4.63$, $SD = 0.59$) and developing relationships with fellow teachers and administrators ($M = 4.60$, $SD = 0.58$). According to Table 2, organizing fundraising activities for the local FFA chapter ($M = 4.59$, $SD = 0.55$) and supervising students' SAE programs ($M = 4.58$, $SD = 0.58$) complete the top five list of most important competencies. Table 2 lists teachers' perceived level of importance for each competency.

Table 2. *Agriculture Teachers' Perceived Level of Importance for Selected Competencies (N = 212)*

| Professional Competency | *M* | *SD* |
|---|---|---|
| Conducting local FFA chapter activities | 4.70 | 0.49 |
| Developing an effective public relations program | 4.63 | 0.59 |
| Developing relationships with fellow teachers and administrators | 4.60 | 0.58 |
| Organizing fundraising activities for the local FFA chapter | 4.59 | 0.55 |
| Supervising students' SAE programs | 4.58 | 0.58 |
| Developing SAE opportunities for students | 4.55 | 0.60 |
| Preparing FFA CDE teams | 4.54 | 0.59 |
| Integrating life skills into curriculum | 4.53 | 0.67 |
| Evaluating the local agriculture program | 4.46 | 0.63 |
| Planning banquets | 4.43 | 0.63 |
| Ability to use the local advisory committee to acquire resources to sustain the local program and FFA chapter | 4.42 | 0.64 |
| Teaching record keeping skills | 4.42 | 0.66 |
| Establishing a program advisory committee | 4.42 | 0.70 |
| Providing guidance to students interested in post-secondary education in the food, fiber and natural resource industries | 4.41 | 0.65 |
| Determining the content that should be taught in specific courses | 4.40 | 0.62 |
| Completing reports for local and state administrators | 4.39 | 0.68 |
| Teaching about public issues related to agriculture | 4.37 | 0.65 |
| Preparing FFA degree applications | 4.35 | 0.66 |
| Embedding graduation standards in the agriculture curriculum | 4.32 | 0.73 |
| Coordinating activities with local agricultural organizations/agencies | 4.31 | 0.76 |
| Preparing FFA proficiency award applications | 4.29 | 0.69 |
| Locating and selecting student references and materials | 4.26 | 0.64 |
| Providing career exploration activities in agriculture | 4.22 | 0.72 |
| Utilizing a local alumni or young farmer affiliate | 4.20 | 0.89 |
| Conducting assessments to determine the courses that should be taught | 4.10 | 0.77 |
| Developing a variety of curriculum-based School-to-Work activities | 3.98 | 0.84 |
| Establishing and organizing an agricultural co-op/internship | 3.94 | 0.91 |

*Note*. 1 = "Not important"… 5 = "Very important."

Teachers considered themselves at least somewhat competent in each of the non-instructional competencies related to managing a total program of agricultural education. They believed that they were most competent at developing relationships with fellow teachers and administrators ($M = 4.20$, $SD = 0.77$). Teachers also considered themselves competent conductors of local FFA chapter activities ($M = 4.14$, $SD = 0.73$); competent planners of FFA banquets ($M = 4.05$, $SD = 0.82$); competent report completers ($M = 3.97$, $SD = 0.82$); as well as competent fundraisers for the local FFA chapter ($M = 3.96$, $SD = 0.82$). Teachers expressed that they were least competent at establishing and organizing an agricultural co-op/internship ($M = 3.05$, $SD = 1.05$), developing a variety of curriculum-based School-to-Work activities ($M = 3.12$, $SD = 0.99$), and preparing FFA proficiency awards ($M = 3.28$, $SD = 1.02$) and degree applications ($M = 3.36$, $SD = 0.97$).

Table 3. *Agriculture Teachers' Perceived Level of Competence for Total Agricultural Education Program Competencies (N = 212)*

| Professional Competency | *M* | *SD* |
|---|---|---|
| Developing relationships with fellow teachers and administrators | 4.20 | 0.77 |
| Conducting local FFA chapter activities | 4.14 | 0.73 |
| Planning banquets | 4.05 | 0.82 |
| Completing reports for local and state administrators | 3.97 | 0.82 |
| Organizing fundraising activities for the local FFA chapter | 3.96 | 0.82 |
| Supervising students' SAE programs | 3.95 | 0.76 |
| Integrating life skills into curriculum | 3.95 | 0.78 |
| Preparing FFA CDE teams | 3.85 | 0.77 |
| Determining the content that should be taught in specific courses | 3.82 | 0.76 |
| Establishing a program advisory committee | 3.82 | 0.95 |
| Evaluating the local agriculture program | 3.80 | 0.85 |
| Developing SAE opportunities for students | 3.78 | 0.79 |
| Developing an effective public relations program | 3.73 | 0.83 |
| Locating and selecting student references and materials | 3.70 | 0.79 |
| Teaching about public issues related to agriculture | 3.67 | 0.83 |
| Coordinating activities with local agricultural organizations/agencies | 3.64 | 0.83 |
| Teaching record keeping skills | 3.64 | 0.81 |
| Providing guidance to students interested in post-secondary education in the food, fiber and natural resource industries | 3.61 | 0.84 |
| Ability to use the local advisory committee to acquire resources to sustain the local program and FFA chapter | 3.58 | 0.96 |
| Embedding graduation standards in the agriculture curriculum | 3.49 | 0.91 |
| Conducting assessments to determine the courses that should be taught | 3.47 | 0.92 |
| Providing career exploration activities in agriculture | 3.44 | 0.88 |
| Utilizing a local alumni or young farmer affiliate | 3.41 | 1.10 |
| Preparing FFA degree applications | 3.36 | 0.97 |
| Preparing FFA proficiency award applications | 3.28 | 1.02 |
| Developing a variety of curriculum-based School-to-Work activities | 3.12 | 0.99 |
| Establishing and organizing an agricultural co-op/internship | 3.06 | 1.05 |

*Note*. 1 = "Not competent"…5 = "Very competent."

Pre-service/in-service need is represented by the MWDS. The MWDS score was calculated by subtracting the competency score from the importance score and by multiplying that number by the mean importance rating for each competency (Borich, 1980; Joerger, 2002). The highest rated pre-service/in-service training need was that of providing guidance to students interested in post-secondary education in the field of agriculture. Teachers also indicated a need for pre-service/in-service training in preparing FFA proficiency awards (2nd highest need) and degree applications (3rd highest need). Rounding out the five most important needs were training in developing an effective public relations program and developing SAE opportunities for students. Table 4 lists competencies in descending order from most needed to least needed per MWDS.

Table 4. *Pre-service and In-service Training Needs of Agriculture Teachers (N = 212)*

| | MWDS[1] |
|---|---|
| Providing guidance to students interested in post-secondary education in the food, fiber and natural resource industries | 4.40 |
| Preparing FFA proficiency award applications | 4.21 |
| Preparing FFA degree applications | 4.21 |
| Developing an effective public relations program | 4.13 |
| Developing SAE opportunities for students | 4.10 |
| Ability to use the local advisory committee to acquire resources to sustain the local program and FFA chapter | 3.67 |
| Embedding graduation standards in the agriculture curriculum | 3.49 |
| Utilizing a local alumni or young farmer affiliate | 3.41 |
| Establishing and organizing an agricultural co-op/internship | 3.39 |
| Teaching record keeping skills | 3.36 |
| Developing a variety of curriculum-based School-to-Work activities | 3.34 |
| Providing career exploration activities in agriculture | 3.20 |
| Teaching about public issues related to agriculture | 2.97 |
| Preparing FFA CDE teams | 2.89 |
| Evaluating the local agriculture program | 2.88 |
| Supervising students' SAE programs | 2.85 |
| Coordinating activities with local agricultural organizations/agencies | 2.84 |
| Organizing fundraising activities for the local FFA chapter | 2.75 |
| Conducting assessments to determine the courses that should be taught | 2.55 |
| Integrating life skills into curriculum | 2.55 |
| Establishing a program advisory committee | 2.52 |
| Conducting local FFA chapter activities | 2.48 |
| Determining the content that should be taught in specific courses | 2.41 |
| Locating and selecting student references and materials | 2.35 |
| Developing relationships with fellow teachers and administrators | 1.80 |
| Completing reports for local and state administrators | 1.72 |
| Planning banquets | 1.57 |

*Note.* [1]Mean Weighted Discrepancy Score

## Conclusions

Georgia agriculture teachers are mostly male and well educated, and a large majority of participants had no more than 11 years of experience. Teachers considered all of the non-instructional competencies needed for managing the total program of agricultural education to be important. Most important to teachers was conducting local FFA chapter activities. Teachers considered themselves at least somewhat competent in each of the competencies related to managing a total program of agricultural education. Teachers reported highest levels of competence for developing relationships with fellow teachers and administrators, conducting local FFA chapter activities, planning banquets, completing reports, and organizing fundraising activities. They perceived themselves to be least competent at preparing FFA degree and proficiency award applications,

developing curriculum-based school-to-work activities, and establishing and organizing an agricultural co-op/internship.

According to the Georgia agriculture teachers in this study, the most important training need for either pre-service teacher education or professional development was advising students about post-secondary education in agriculture. The researchers of this study found no other studies indicating such a high need for training to help teachers aid students in making decisions about studying agriculture at the post-secondary level. Teachers' responses indicate that more pre-service and in-service training opportunities are needed to help them aid students in preparing FFA proficiency award applications and FFA degree applications. Garton and Chung (1996), Layfield and Dobbins (2002), Joerger (2002), and Peiter et al. (2003) determined that teachers in their respective states needed training related to preparing FFA proficiency awards and degree applications as well. Similar to this study, other agricultural education researchers have also found that developing an effective public relations program (Garton & Chung, 1996; Layfield & Dobbins, 2002) and developing SAE opportunities for students (Layfield & Dobbins; Peiter, et al., 2003) were important training needs.

## Implications and Recommendations

With the number of middle school and high school agricultural education positions on the rise, the large number of teachers who have no more than 11 years experience directly indicates a need for re-evaluating the pre-service agricultural education program and the professional development opportunities offered by the Georgia Department of Agricultural Education. Recommendations are specific to and appropriate for agricultural education in Georgia, but other states may also benefit from the recommendations that follow.

According to this study, the most important pre-service/in-service need is training that provides guidance to students interested in post-secondary education in the food, fiber and natural resource industries. This competency should be addressed in university teacher preparation curricula in Georgia. Faculty should invite post-secondary recruiters from all state institutions offering majors related to agriculture to end-of-student teaching seminars and/or other agricultural education courses. Pre-service teachers should be challenged to develop a complete understanding of agricultural opportunities in higher education prior to leaving their respective post-secondary institutions. Additionally, professional development programs should be regularly offered to current teachers, programs which detail the post-secondary agricultural opportunities. Future research should identify items that should be shared with students, especially those which concern education opportunities at the post-secondary level.

Given the findings of this study and those of other researchers (Garton &Chung, 1996; Layfield & Dobbins, 2002; Joerger, 2002; Peiter et al., 2003) Georgia agricultural education faculty need to modify curricula to more effectively educate students on how to complete the FFA proficiency awards and degree applications. Additionally, "State departments, university faculty, and National FFA Organization officials should conduct

workshops or other in-service activities" to assist current teachers with completing FFA proficiency awards and degree applications (Clark & Scanlon, 1996, p. 15). Upon completion of additional and appropriate training, future, longitudinal research should be used to monitor teachers' and students' competencies associated with completing FFA proficiency awards and degree applications.

In addition to this study, similar findings (Garton & Chung, 1996; Layfield & Dobbins, 2002) help make the case that perhaps universities with access to agricultural communications faculty, students, and resources may be capable of helping pre-service and in-service agriculture teachers more fully develop their ability to develop a strong public relations program. Pre-service courses of study could include an agricultural communications course that addresses public relations skills and abilities. Conceivably, agricultural communications faculty could assist agricultural education faculty and state staff with professional development opportunities which address this need.

Again, developing SAE opportunities for students (Layfield & Dobbins; Peiter, et al., 2003) is found to be an important need. Teacher education faculty in Georgia ought to infuse agricultural education courses with specific strategies and examples of SAE opportunities for students. Distributing specific techniques and examples of SAE opportunities for current teachers would also assist with this in-service need. Workshops at the summer teachers' conference, disseminated ideas over the state agricultural education listserv, or possibly even a Website that shares SAE opportunities with teachers may all be viable options for providing teachers additional help in developing SAE opportunities for students.

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# A Profile of Cooperating Teachers and Centers in Oklahoma: Implications for the Student Teaching Experience in Agricultural Education

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## Abstract

*This inquiry is the first systematic study of cooperating teachers' perceptions of the agricultural education student teaching experience in Oklahoma in more than three decades. The sampling frame (N = 64) included cooperating teachers representing 55 student teaching centers. A questionnaire was sent to cooperators via postal mail. The instrument included 13 items identifying selected characteristics of cooperating teachers and centers. In addition, teachers rated 34 elements of the student teaching experience using a Likert-type scale ("5" = "High Importance . . ."1" = "No Importance"); final return rate was 77%. Cronbach's coefficient alpha reliability estimates for five core areas of the student teaching experience ranged from .47 to .87; the overall importance scale yielded an estimate of .93. Respondents rated 33 of 34 elements as having "much importance" or greater (M > 4.00). The highest rated element was "a well rounded program emphasizing instruction, SAEs, and youth leadership activities" (M = 4.92; SD = .34). The core area "Cooperating Teacher-Student Teacher Relationships" accounted for seven of the ten highest rated elements. Recommendations and implications point to the need for greater diversity in cooperating teachers and centers, for instrument re-design as related to the construct of instruction, and for the provision of targeted professional development opportunities for cooperating teachers.*

## Introduction and Conceptual Framework

Is there a more important component of the preservice professional development of aspiring agriculture teachers than the student teaching experience? Earlier researchers (Barnes & Camp, 2002; Covington & Dobbins, 2004; Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Deeds, Flowers, & Arrington, 1991; Dobbins & Camp 2000; Edwards & Briers, 2001; Harlin, Edwards, & Briers, 2002; Larke, Norris, & Briers, 1992; Roberts & Dyer, 2004) have described important dimensions of the student teaching experience in agricultural education. Deeds collected data from 82 institutions, nationally, that were charged with agricultural teacher education. Larke et al. conducted a national study that queried three groups—teacher educators, supervising teachers, and student teachers. Covington and Dobbins (2004) carried out a nationwide modified Delphi panel consisting of teacher educators and secondary agricultural education teachers to determine a task list for the student teaching experience. Barnes and Camp, Deeds et al. (1991), Dobbins and Camp, Edwards and Briers, Harlin et al., and Roberts and Dyer reported the perceptions of cooperating teachers and/or student teachers representing different states: Florida, Mississippi, North Carolina, South Carolina, Texas, and Virginia.

However, the last systematic study of Oklahoma cooperating teachers regarding their views about important elements of the student teaching experience in agricultural education was conducted more than 30 years ago (Holley, 1972). Arguably, many changes have occurred in secondary agricultural education, in education generally, in the agricultural, food, fiber, and natural resources system, and in American society during the last three decades.

*Importance of the Student Teaching Experience*

Norris, Larke, and Briers (1990) asserted, "The student teaching center and the supervising (cooperating) teacher are the most important ingredients in the student teaching experience" (p. 58). Moreover, Korthagen and Kessels (1999) argued that a cooperating student teaching center "must be able to offer a sound balance between safety and challenge and a balance between the goal of serving student teachers' learning and the interests of the school" (p. 14). Further, "Priority should be given to selecting cooperating teachers who model the desired teaching behaviors expected of student teachers" (Garton & Cano, 1994, p. 213).

Researchers (Byler & Byler, 1984; Deeds & Barrick, 1986) have identified positive relationships between cooperating teachers' attitudes and morale toward teaching secondary agricultural education and perceptions held by preservice students following their field experiences. DeMoulin (1993) maintained that, "students should exhibit positive changes in attitude toward teaching and come away from the student-teaching experience with a positive attitude toward their chosen profession" (p. 160).

Martin and Yoder (1985) framed a successful student teaching experience as one in which a "team approach" (p. 19) exemplified the cooperating teacher-student teacher relationship, including a supervisory "climate" devoted to using a clinical teaching analysis model. The researchers contended that "success of the individual student teacher

depends, to a very great extent, upon the general supervisory climate in the department and on the educational leadership abilities of the cooperating teacher" (p. 21). Martin and Yoder concluded that, "Supervision of student teachers represents an important responsibility" (p. 21). Many teacher educators opine that it is a responsibility demanding diligent and sustained inquiry.

Conceptually, this study is supported by Ajzen's (1991) work describing the role of beliefs in human behavior. In particular, the construct of *belief salience*, i.e., "a relation between a person's *salient* beliefs about the behavior and his or her attitude toward that behavior" (p. 192) exists and therefore informs one's perceptions. Accordingly, it was posited that cooperating teachers' perceptions are valid reflections of their attitudes regarding importance of selected elements of the student teaching experience. But what are Oklahoma cooperating teachers' perceptions of important elements of the student teaching experience in agricultural education?

## Purpose and Research Questions

The two-fold purpose of this study was to describe what cooperating teachers perceived to be important elements of the student teaching experience, and to identify selected characteristics of cooperating teachers and centers. The following research questions guided this study: 1) What do cooperating teachers' perceive to be important elements of the student teaching experience in agricultural education? 2) What are selected personal, professional, and school setting characteristics of cooperating teachers?

## Methods and Procedures

This descriptive study sought to describe cooperating teachers' perceptions of important elements of the student teaching experience, and to identify selected characteristics of cooperating teachers and centers. The study's sampling frame (N = 64) included teachers and schools who had either served as cooperating student teaching centers previously or who were future placement sites for student teachers from Oklahoma State University; thus it was a purposive sample. Potential cooperating teachers and centers were derived from a list based on established selection criteria as well as input received annually from potential cooperators—teachers and their principals,—selected state staff members, and teacher education faculty.

The data collection instrument was developed by Edwards and Briers (2001) for use with agricultural education cooperating teachers in Texas. These researchers used cooperating teacher focus groups to identify 34 elements of the student teaching experience per five "core" areas derived from a review of literature (Briers & Edwards, 1998; Edwards & Briers, 1999; Larke et al., 1992; Martin & Yoder, 1985). Items were validated further via a postal mail questionnaire follow-up procedure (Edwards & Briers, 2001).

Part one of the instrument was divided into five "core" areas of the student teaching experience and included 34 "important elements": classroom and laboratory

instruction (5 items; α = .47), supervised agricultural experience programs (SAEPs) (4 items; α = .61), student leadership development (FFA) (7 items; α = .85), school and community relationships (9 items; α = .83), and cooperating teacher-student teacher relationships (9 items; α = .87). Teachers were asked to indicate their perceived "level of importance" for the elements using a Likert-type rating scale: "5" = "High Importance," "4" = "Much Importance," "3" = "Some Importance," "2" = "Low Importance," and "1" = "No Importance." Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .47 to .87; the overall importance scale yielded an estimate of .93. Part two of the instrument included 13 items identifying selected characteristics of cooperating teachers and centers. The instrument was modified slightly to reflect Oklahoma school setting characteristics and teachers.

Cooperating teachers were postal mailed a research packet during the spring of 2004 that included a cover letter explaining the study, a questionnaire, a pre-coded scan sheet, and a return envelope coded to determine non-respondents. Following a two-week waiting period, non-respondents were contacted and encouraged to return their questionnaires. Teachers who requested another research packet were mailed one. After a similar waiting period, a third mailing of research packets containing a slightly altered cover letter was mailed to remaining non-respondents (Dillman, 1978; Tuckman, 1999).

The final rate of return—deemed to be acceptable (Tuckman)—was 77% (49 of 64) for the cooperating teachers representing 55 cooperating student teaching centers. To address the possibility of nonresponse bias, teachers who responded more than one week after receipt of the first return were operationalized as "late respondents" (23) per recommendation of Lindner, Murphy, and Briers (2001). This procedure permitted a near 50-50 split of early and late responders thus improving the power of statistical comparison (Lindner et al.). Accordingly, independent samples *t*-tests were used to compare the two groups; no significant differences ($p < .05$) were detected for the variables of interest. However, caution is urged when attempting to generalize the study's findings beyond the responding sample. The *Statistical Package for the Social Sciences v. 11.0.* was used for data analysis. Research questions were analyzed descriptively with frequencies, percentages, means, and standard deviations; a ranking of the important elements was determined as well.

## Findings

As shown in Table 1, cooperating teachers who participated in this study were mostly male; only three of the respondents were female. About two-thirds (33) of the teachers held only a Bachelor's degree; the remainder had earned a Master's degree. One-fourth (12) of the cooperating teachers held teaching certification(s) in other areas. Six-in-ten respondents (30) had 16 or more years of experience as an agricultural education teacher.

Regarding selected characteristics of cooperating student teaching centers, 44 of the centers reported campus enrollments of 618 or fewer students; the remainder were larger schools (Table 2). A slight majority of centers (26) had two or more classrooms in

their agricultural education departments. The most common laboratory facility was for teaching agricultural mechanics (46). Slightly more than one-half (27) of the cooperating centers had a greenhouse or some other facility for teaching horticulture. A similar number of schools (26) had a project center/feeding facility to support students' livestock SAEs. About one-in-four centers (14) had a land laboratory but very few (2) had an aquaculture facility (Table 2).

Table 1. *Selected Characteristics of Cooperating Teachers (N = 47[a])*

| Characteristics | Frequency | Percentage |
|---|---|---|
| Gender | | |
| Male | 44 | 90 |
| Female | 3 | 6 |
| Highest Degree Held | | |
| Bachelor's | 33 | 67 |
| Master's | 14 | 29 |
| Teaching Certificate(s) Held in Other Areas[b] | | |
| No other teacher certification | 29 | 59 |
| Yes, in general science | 7 | 14 |
| Yes, in life-earth science | 1 | 2 |
| Yes, in fields other than those above | 4 | 8 |
| Interested in a Graduate Degree | | |
| Definitely not | 9 | 18 |
| Probably not | 16 | 33 |
| Unsure | 5 | 10 |
| Probably yes | 14 | 29 |
| Definitely yes | 3 | 6 |
| Years Taught Agricultural Education | | |
| 3 - 5 years | 3 | 6 |
| 6 - 10 years | 8 | 16 |
| 11 - 15 years | 6 | 12 |
| 16 or more years | 30 | 61 |

*Note.* [a]Two respondents did not provide demographic data about themselves. [b]Six respondents did not answer this question.

Table 2. *Selected Characteristics of Cooperating Student Teaching Centers (N = 47[a])*

| Characteristics | Frequency | Percentage |
|---|---|---|
| Size of School | | |
| < 132 students | 10 | 20 |
| 132 - 363 students | 20 | 41 |
| 365 - 618 students | 14 | 29 |
| 659 - 1229 students | 1 | 2 |
| 1275 - 4279 students | 2 | 4 |
| Number of Agricultural Education Classrooms | | |
| 1 | 20 | 41 |
| 2 | 18 | 37 |
| 3 | 8 | 16 |
| Ag Mech Laboratory (Yes) | 46 | 94 |
| Greenhouse (Yes) | 21 | 43 |
| Other Hort. Facility (Yes) | 6 | 12 |
| Aquaculture Facility (Yes) | 2 | 4 |
| Land Laboratory (Yes) | 14 | 29 |
| Project Center/Feeding Facility (Yes) | 26 | 53 |

*Note*. [a]Three respondents did not provide data about their schools.

Cooperating teachers' mean ratings of 34 "important elements" of the student teaching experience are shown in Table 3. Teachers rated elements (items) of the student teaching experience on level of importance ("5" = "High Importance" . . . "1" = "No Importance") via a mail questionnaire; all but one of the 34 items were perceived to have either "much" or "high importance" ($M > 4.00$) (Table 3). The overall mean was 4.49 or midway between "much" and "high importance."

The highest rated element was "a well rounded program emphasizing instruction, SAEs, and youth leadership activities" ($M = 4.92$; $SD = .34$). "A cooperating teacher who has a positive attitude" was the second highest rated element ($M = 4.90$; $SD = .31$), while the element "a cooperating teacher who is a 'good' role model" was rated third ($M = 4.88$; $SD = .39$). Three elements belonging to the core area "Cooperating Teacher-Student Teacher Relationships" were rated fourth, fifth, and sixth in importance; the items were separated by .01, respectively ($M = 4.86$; 4.85; 4.84) (Table 3). "Recognized integrity of the cooperating teacher and program" ($M = 4.73$; $SD = .57$) was rated the seventh most important element. In eighth place was the element "a discipline management plan is used in a structured environment" ($M = 4.69$; $SD = .55$). And, the element "discipline policies that are in place and enforced" ($M = 4.67$; $SD = .52$) tied for ninth with "a cooperating teacher who provides frequent evaluations and feedback to the student teacher" ($M = 4.67$; $SD = .56$). Of the remaining elements, 17 had mean importance ratings ranging from 4.63 to 4.27, while seven items had mean rating scores approaching "much importance" ($M < 4.25$). Only one of these elements was rated below "much importance": "all students meeting state SAE requirements, with accurate record books" ($M = 3.90$; $SD = .71$).

The 34 elements were grouped conceptually into five "core" areas, and a "composite" mean was computed for each area (Table 3). The core area "Cooperating Teacher-Student Teacher Relationships" (9 elements) accounted for seven of the ten highest rated elements. Accordingly, this core area had the highest composite mean (4.71). "Classroom and Laboratory Instruction" (5 elements) was second highest ($M$ = 4.55), and the core area "School and Community Relationships" (9 elements) had the next highest composite mean ($M$ = 4.39). The core areas "Supervised Agricultural Experience Programs" (4 elements) and "Student Leadership Development (FFA Activities)" (7 elements) had the second lowest and lowest composite means (4.35; 4.32), respectively.

Table 3. *Cooperating Teachers' Perceptions of the Important Elements of the Student Teaching Experience (N = 49)*

| Elements[a] | M[b] | SD | Ranking | |
|---|---|---|---|---|
| Classroom and Laboratory Instruction | | | | |
| Daily (systematic) classroom and/or laboratory Instruction | 4.63 | .61 | 11 | |
| A discipline management plan is used in a structured environment | 4.69 | .55 | 8 | |
| Current technology used in instruction | 4.27 | .73 | 25 | |
| Creative teaching methods as a basis for daily instruction, e.g., use of multimedia and varied teaching techniques | 4.22 | .69 | 27 | |
| A well-rounded program emphasizing instruction, SAEs, and youth leadership activities | 4.92 | .34 | 1 | |
| Composite Mean[c] | | | | 4.55 |
| Supervised Agricultural Experience Programs | | | | |
| All students meeting state SAE requirements, with accurate record books | 3.90 | .71 | 34 | |
| Diversity within the students' SAEs | 4.00 | .74 | 33 | |
| Project supervision and an explanation of this commitment to the student teacher | 4.55 | .58 | 14 | |
| Student participation in advanced awards and degrees on district, state, and national levels | 4.37 | .73 | 20 | |
| Composite Mean[c] | | | | 4.35 |
| Student Leadership Development (FFA Activities) | | | | |
| Strong classroom instruction in student leadership development | 4.49 | .55 | 15 | |
| These activities as essential for a balanced program | 4.49 | .65 | 16 | |
| A history of successful participation | 4.06 | .80 | 32 | |
| Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs) | 4.33 | .69 | 22 | |

*(table continues)*

| Elements[a] | M[b] | SD | Ranking | |
|---|---|---|---|---|
| Cooperating teachers who delegate the training of at least one team to the student teacher | 4.27 | .73 | 26 | |
| Resources available to train a competitive team | 4.41 | .73 | 19 | |
| Opportunities for the student teacher to judge or monitor a district or state CDE | 4.22 | .77 | 28 | |
| Composite Mean[c] | | | | 4.32 |
| School and Community Relationships | | | | |
| Recognized integrity of the cooperating teacher | 4.73 | .57 | 7 | |
| Departmental support organization(s) (e.g. , advisory committees, booster clubs, and Alumni) | 4.33 | .66 | 21 | |
| A cooperating teacher who supports other school activities (e.g., athletic events) | 4.12 | .75 | 31 | |
| A cooperating teacher who supports activities in the community (e.g., service organizations) | 4.57 | .58 | 12 | |
| A spirit of professional cooperation among fellow teachers | 4.57 | .61 | 13 | |
| Use of local media | 4.27 | .61 | 24 | |
| School administrators who are involved in program activities | 4.18 | .70 | 29 | |
| Community service projects | 4.33 | .69 | 23 | |
| Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm) | 4.41 | .67 | 18 | |
| Composite Mean[c] | | | | 4.39 |
| Cooperating Teacher-Student Teacher Relationships | | | | |
| A cooperating teacher who is willing to be a mentor | 4.85 | .41 | 5 | |
| A student teacher who is willing to be mentored by the cooperating teacher | 4.86 | .41 | 4 | |
| A cooperating teacher who has a positive attitude | 4.90 | .31 | 2 | |
| A cooperating teacher who is a "good" role model | 4.88 | .39 | 3 | |
| A cooperating teacher who communicates clear expectations to the student teacher (e.g., role in classroom and calendar of events) | 4.84 | .43 | 6 | |
| A cooperating teacher who provides frequent evaluations and feedback to the student teacher | 4.67 | .56 | 10 | |
| Discipline policies that are in place and enforced | 4.67 | .52 | 9 | |
| "Reinforcement" techniques in teaching (e.g., pace, reteaching, retesting, and accommodation of various learning styles) | 4.49 | .65 | 17 | |
| Assistance in job placement | 4.17 | .75 | 30 | |
| Composite Mean[c] | | | | 4.71 |
| Overall Mean | | | | 4.49 |

*Note.* [a]Important elements were derived from an earlier study (Edwards & Briers, 2001). Items were modified slightly to reflect Oklahoma secondary agricultural education.
[b]5 = High Importance . . . 1 = No Importance. [c]Composite mean of elements for that core area.

## Conclusions, Recommendations, and Implications/Discussion

Instructors selected by Oklahoma State University to serve as cooperating teachers in agricultural education were primarily males who were experienced teachers. Less than one-third of the respondents held a master's degree. Most cooperating teachers were employed in schools with moderate to small enrollments. Centers included classrooms dedicated to agricultural education and, in most cases, laboratories for teaching agricultural mechanics. Facilities to support other parts of the agricultural education curriculum were less common.

Respondents rated 33 of 34 elements of the student teaching experience as having "much importance" or greater ($M > 4.00$). As a core area, respondents held greatest importance for elements of "cooperating teacher-student relationships," even more so than "classroom and laboratory instruction," which was rated second. The element "a well-rounded program emphasizing instruction, SAEs, and youth leadership activities" received the highest rating overall. Teachers' perceptions about selected aspects of students' SAEs ranked lowest (Table 3).

Cooperating teachers' recognition of importance of the cooperating teacher-student relationship supported the position of Martin and Yoder (1985). Further, because teachers stressed selected elements of this core area, i.e., "positive attitude" and being a "'good' role model" were the second and third highest ranked items, earlier work by Byler and Byler (1984) and Deeds and Barrick (1986) was also supported. However, contrary to Edwards and Briers (2001), who found that Texas cooperating teachers held the core areas "classroom and laboratory instruction" and "cooperating teacher-student relationship" to be equal in importance, Oklahoma teachers perceived the latter to be the most important core area of the student teaching experience.

*Recommendations for Future Practice*

1) Albeit the current pool of potential female cooperators in Oklahoma is small, teacher educators should strive to identify and develop more centers staffed by female agricultural education teachers for the purpose of future student teacher placements.

2) Teacher educators should identify and use cooperating centers for student teacher placement that offer facilities supporting the teaching of a diverse agricultural education curriculum, including horticulture, aquaculture, animal science, and environmental science. Cooperating centers that offer only one or two laboratory experiences should be encouraged to diversify.

3) Teacher educators should continue to encourage current and future cooperating teachers to pursue graduate education (e.g., a master's degree) supporting their role as a cooperating teacher and as an agricultural education teacher. Teacher education faculty in agricultural education should continue to offer graduate course work in residence and at a distance to support the professional growth of this audience.

*Recommendations for Future Research*

1) Student teachers should be queried about their perceptions of important elements of the student teaching experience (Edwards & Briers, 2001; Harlin et al., 2002; Roberts & Dyer, 2004). Then, findings compared to cooperating teachers' perceptions in an attempt to better understand different as well as similar perceptions held by these two key stakeholder groups. Other significant groups could be included as well, e.g., members of the Oklahoma state staff for agricultural education and selected teacher educators. Areas of disagreement may generate additional research questions about important elements of the student teaching experience.

2) More research should be conducted to determine why cooperating teachers perceived that the cooperating teacher-student teacher relationship was the most important core area even more so than classroom and laboratory instruction. A deeper understanding of cooperating teachers' rationale for this perception may better inform teacher educators who are charged with preparing preservice students for the student teaching experience. Qualitative methodologies, e.g., focus groups and semi-structured interviews, may be effective tools for that purpose.

3) The finding that the two lowest rated important elements were drawn from the same core area—"Supervised Agricultural Experience Programs"—warrants further study, especially as it relates to how cooperating teachers assist students in meeting state SAE requirements, importance of accurate record books in that process, and their views about diversification of students' SAE opportunities (Baggett-Harlin & Weeks, 2000).

*Implications/Discussion*

This inquiry is the first systematic study of cooperating teachers' perceptions of the agricultural education student teaching experience in Oklahoma in more than three decades (Holley, 1972). It shed valuable light on cooperating teachers' perceptions of important elements of the student teaching experience (Table 3). The finding that teachers rated a comprehensive program of agricultural education, i.e., one "emphasizing instruction, SAEs, and youth leadership activities" as the most important element of the student teaching experience was encouraging.

However, further analysis of data revealed significant variability among cooperating teachers' perceptions about the role of instruction, especially as it related to the use of instructional technology and creative teaching methods; these elements were ranked 25 and 27, respectively. What is more, because the reliability estimate for the core area in which these items were nested was low ($\alpha = .47$) leads one to question how respondents operationalized them in the context of classroom and laboratory instruction. (Findings by Edwards and Briers in 2001 with Texas cooperators using the same instrument revealed a similar lack of internal consistency for this construct.) Accordingly, cooperating teachers should be probed further about the role of these

behaviors and their related ability to provide effective mentoring. Moreover, it appears that a reconfiguring of the study's instrument is in order to more accurately surface cooperating teachers' perceptions of classroom and laboratory instruction as well as to describe the importance of instructional technology and creative teaching behaviors.

Baggett-Harlin and Weeks (2000) reported inconsistencies among Oklahoma agricultural education programs regarding level of student SAE participation as well as completion of SAE record books. Other researchers (Dyer & Osborne, 1995) have noted serious challenges and deficits related to implementing SAEs and some have called for substantial reconfiguring of how SAEs are operationalized (Baggett-Harlin & Weeks; Camp, Fallon, & Clarke, 1999; Retallick, 2003) in agricultural education. Although viewed as important, this inquiry found that cooperating teachers perceived selected aspects of students' SAEs were the least important elements of the student teaching experience. This may be additional evidence that the "profession's" view of SAE and its role in today's agricultural education model (Retallick) is in a "state of flux," conceptually and, perhaps, philosophically. Accordingly, teacher educators should provide professional development opportunities to assist cooperating teachers in reconfiguring and expanding their views regarding SAEs per recommendations of Camp et al., Dyer and Osborne, Retallick, and others.

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# Coverage and Outcomes of the Space Agriculture in the Classroom Curriculum

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## Abstract

*The Space Agriculture in the Classroom curriculum entitled "Growing Space" was piloted in four states for the 2003-2004 school year in 6th grade classrooms. A follow-up study was conducted to assess whether the project's goals are being met. These include creating an interest in space agriculture careers among minority and urban students and exposing students of all races and backgrounds to the topics involving space and agriculture. A questionnaire was sent to all 395 teachers who received curriculum packets, with 184 teachers (47%) responding. Of the responding teachers, 154 (84%) used the curriculum. Based on teacher reports, 38% of the students in participating classrooms were of a minority group. Teachers also responded positively to questions regarding the interest of minority students in space and agriculture topics. The Space Agriculture curriculum also reached many students in cities and suburbs. Overall, this study provides evidence that the Space Agriculture in the Classroom curriculum is, in part, meeting its goals.*

## Introduction

The Space Agriculture in the Classroom (SAITC) program is a joint initiative of the Agriculture in the Classroom (AITC) program of the Cooperative State Research Extension and Education Service (CSREES), United States Department of Agriculture (USDA), and the Office of Biological and Physical Research, National Aeronautics and Space Administration (NASA). The Space Agriculture in the Classroom program was created in 2001 to address concerns from USDA and NASA about sustaining an adequate supply of agricultural scientists, engineers, technicians, and producers in the next three decades.

Since the early 1980s, NASA has been providing educational materials and programs through their Farming in Space Program to a relatively small, nationwide group of classroom educators. Through this partnership, USDA has recognized that NASA's vision of controlled environment farming on long duration space missions could capture the interest of technologically-oriented students and teachers. Moreover, this approach was seen by USDA as an opportunity to increase agricultural literacy for a larger number of America's youth - a problem that the National Research Council (1988) has decried for some time. Because agriculture plays a critical role in space activities through plants that provide food, regenerate oxygen, remove carbon dioxide and purify water for long duration space missions, both organizations saw the partnership as highly symbiotic.

The primary academic partner of the Space Agriculture in the Classroom program is the Department of Agricultural Education and Communication at the University of Florida. The University of Florida's role in the Space Agriculture program is to provide educators with instructional materials created by the Space Agriculture in the Classroom project team in the Department of Agricultural Education and Communication and NASA's Office of Biological and Physical Research. The content of the space agriculture curriculum included current NASA research in space agriculture, and connected this research to benefits for local and national agriculture production and related areas such as food safety and nutrition.

In essence, the project was designed to enhance student awareness of agricultural practices and the terrestrial application of space-based technologies. Specifically, the near-term goals of the Space Agriculture in the Classroom program were to:

1. Increase awareness of and interest in agricultural and space sciences among middle school students.
2. Increase understanding of agricultural activities in space and on Earth.
3. Stimulate interest in careers in agriculture and engineering.
4. Secure the participation of teachers and students in urban schools.
5. Secure the participation of large numbers of minority students.

With an interest in serving a wide range of students at a stage of early opinion formation, sixth grade science students and teachers were identified as the target audience for the initial year of the project. The Space Agriculture in the Classroom curriculum was developed during the 2003-2004 school year. This curriculum included a high-gloss

magazine entitled "Growing Space" with pictures and graphics written on a sixth grade reading level and formatted to be interesting to those students. Lesson plans and science experiments written for use alongside the magazine also were provided, including a laboratory activity to compare the growth of "space" and "earth" wheat. PowerPoint presentations and supplemental resources were provided via the Space Agriculture in the Classroom Web site (www.spaceag.org) to be accessible to teachers at all times. The Growing Space magazine and wheat seeds were assembled into classroom sets for participating teachers. Because the program was designed to reach large numbers of students, the materials were prepared for use "as is" and no teacher workshops were provided.

When the curriculum materials were completed, a letter and sample copy of "Growing Space" magazine was sent to over 3,700 middle school science teachers in Alabama, Florida, New Mexico, and Utah to alert them about the program and provide information on procedures for participating. The list for Alabama contained 322 teachers, Florida 2,462, New Mexico 187, and Utah 771. All of the Alabama and New Mexico teachers were National Science Teachers Association (NSTA) members. For Utah, 359 teachers were NSTA members and the remainder Applied Technology teachers. The Florida teachers were identified from Florida Department of Education's list of middle school science or self-contained 6$^{th}$ grade teachers who presumably taught science.

A total of 395 teachers requested a classroom set of materials during Fall, 2003 and Spring, 2004. Statewide coverage of the program was sought, but emphasis was placed on recruiting teachers in urban schools, which would also secure the participation of large minority student populations.

In order to determine if the project's goals were being met, an evaluation of the Growing Space curriculum was designed and implemented by members of the Space Agriculture in the Classroom project team at the University of Florida. This paper reports the results of the study and presents recommendations for strengthening the program.

## Conceptual Framework

This study drew on Rossi, Freeman, and Lipsey's (1999) work regarding systematic evaluation. Their work involves a comprehensive approach that employs both formative and summative methods during the lifecycle of the project. The formative elements of the evaluation include assessing the coverage and delivery of the program. Program coverage is high when the target population is engaged in the program, at least to the extent allowed by the available resources. In addition, there should be no significant bias in coverage which can result from some groups participating less than others. For example, the Florida Agriculture in the Classroom program has been successful in recruiting teachers and students from rural schools but less so in suburban and urban schools (Malecki, 2003; Malecki, Israel, & Toro, 2004). A key concern for stakeholders was the ability of the program to reach suburban and urban students.

Similarly, delivery of the program is affected by the quality of the educational materials, the ease of use and adaptability of the materials, accessibility of program resources for teachers and students (in this case, through the World Wide Web), and compatibility with existing curriculum and state standards. In the case of the "Growing Space" curriculum, the educational materials were developed to meet national science education standards. Findings from an assessment of coverage and delivery of the program can be used to fine-tune a continuing program.

The project team also worked closely with stakeholders from NASA and USDA to plan the program and to incorporate key questions and concerns into the evaluation design so that a focus on utilization (Patton, 1997) was maintained. This participatory approach employed logic models as a tool to focus the program design and to identify outcome measures for the summative component of the evaluation. Logic models provide a graphical display of the key components and processes for a program (Israel, 2001; Rossi et al. 1999). Logic models vary in complexity, with comprehensive models incorporating features of both program organization and service delivery (a process model) and program outcomes (an impact model). Figure 1 shows the short-term and distal outcomes that were identified by the Space Agriculture in the Classroom project team and stakeholders. Since participation is voluntary (see Hatry, 1999), the immediate outcome for the program was to recruit teachers to request a classroom set of materials and to use these materials. Other short-term outcomes focused on student-level measures, as shown in Figure 1.

Based on the logic model, the summative evaluation of the program should focus on measuring net changes in student-level outcomes. Net changes are those attributed to the program after confounding factors and design effects have been taken into account (Rossi et al., 1999). Consequently, some evaluation designs provide a more rigorous assessment of program impact than do others. Because the Space Agriculture in the Classroom program is a partial coverage program (that is, a minority of the potential audience could be accommodated by the program), a strong evaluation design would incorporate a control group. Successively weaker designs would omit a control group and rely on a post-only data collection design. The latter design is adequate, however, when alternative explanations for observed changes can be reasonably ruled out (Rossi et al., 1999:363). In the case of the "Growing Space" curriculum, the choice of measures and collection of follow-up data shortly after implementation are likely to have limited opportunities for factors outside the program to influence the results. Furthermore, key stakeholders found the post-only design to be an acceptable approach.

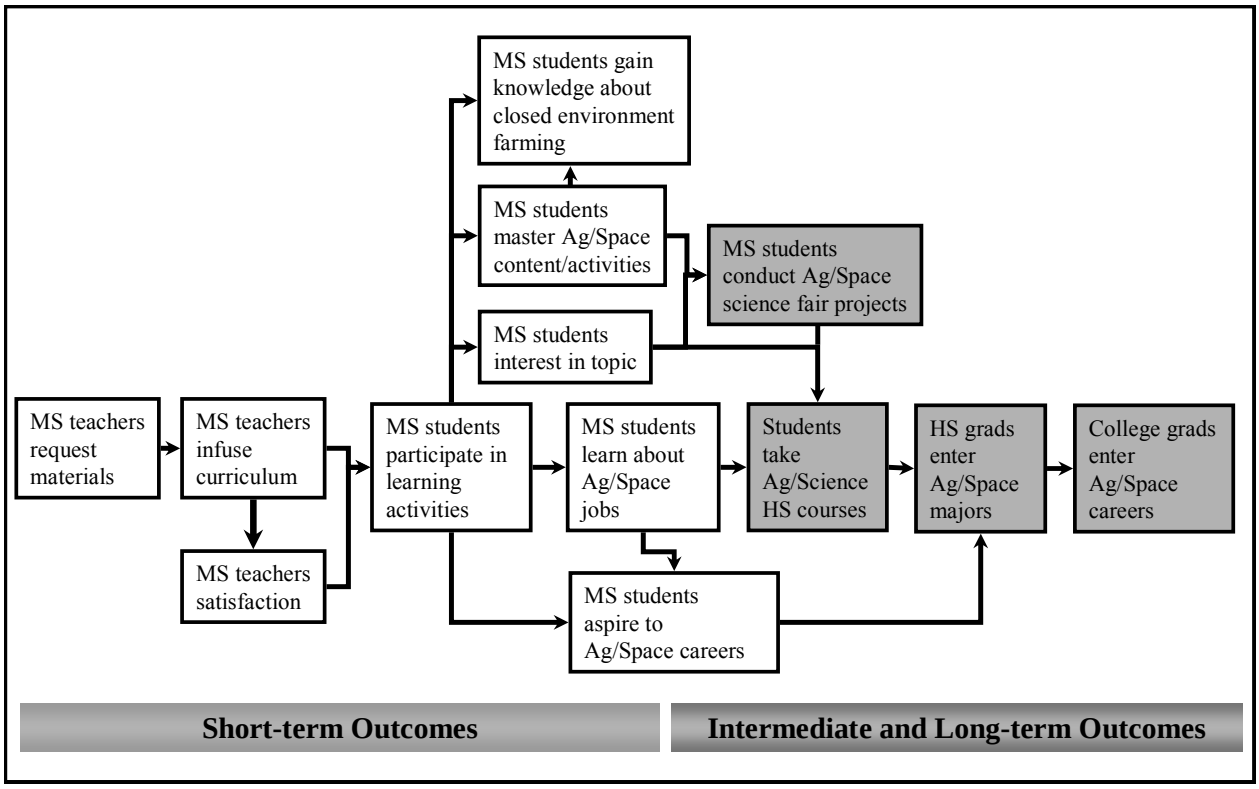


Figure 1. *Impact Model for Space Agriculture in the Classroom Project.*

## Purpose and Objectives

The purpose for evaluation of the Space Agriculture in the Classroom during its initial year of implementation was to ensure that the goals of the Space Agriculture in the Classroom program were being met. The *evaluation objectives* were to:

1. Assess whether program staff were successful in recruiting teachers and students in the target groups, specifically minority and urban students.
2. Assess the extent to which students were interested in and gained knowledge from the curriculum.
3. Assess whether the program stimulated students' interest in relevant careers.
4. Assess the functionality and utility of the curriculum materials for teachers.

The fourth objective was included to allow the project team to fine-tune materials and protocols before expanding the program into a larger number of states during the second and third years of the project.

## Procedures

During the 2003-2004 school year, the Space Agriculture in the Classroom curriculum was piloted to 6$^{th}$ grade classrooms in four states: Florida, Utah, New Mexico, and Alabama. A small number of teachers from other states who requested the

information were included as well. In an effort to evaluate the effectiveness of the curriculum in alignment with the goals determined by the Space Agriculture in the Classroom project team, a survey instrument was sent to all 395 teachers who received the curriculum.

The instrument contained questions that asked respondents to report on classroom and teacher demographic data, students' reactions to the curriculum, and their reactions as educators to the curriculum. Questions about demographics asked teachers to identify the grade level with which the curriculum was used, how many students were in each class and the racial composition of students (African American, Asian American, Hispanic, Native American, and Other), and how long the teacher had been in the profession. Note that teacher reports for the racial composition may be based on either teacher perceptions or knowledge of official school records.

Next, seven items asked teachers for their observations about students' responses to the curriculum. Although collecting data directly from students is desirable for assessing learning and interest, this was outweighed by logistical problems for obtaining human subjects clearance to survey individual students and its associated costs. Some teachers might also overstate the extent of students' interest and learning because of his or her personal investment in using the curriculum. The items about students' responses to the curriculum were followed by 10 items that asked for teachers' perceptions about accessing and implementing the curriculum. The items on students' responses to the curriculum and teachers' implementation used a Likert-type scale with five categories ranging from "Not True" to "Completely True" as well as a sixth "No Opinion" option.

The last section of the survey asked three open-ended questions. The first asked for reasons why the respondent would recommend the Space Agriculture in the Classroom curriculum to other teachers. This was followed by questions asking respondents to list topics they would like to see added to the curriculum and to identify any problems they encountered in accessing or using the curriculum. The complete instrument was reviewed by project team members for face validity. Given the type of data being collected, no further testing was conducted.

The data collection process was initiated late in the school year to allow teachers to complete implementation of the curriculum. Following Dillman's (2000) work, a pre-letter was sent to teachers to alert them to the survey. This was followed five days later by a cover letter and the questionnaire. After, a reminder postcard was mailed to non-respondents and, if necessary, a second round of the survey was also mailed to non-respondents. These steps brought the adjusted response rate to 47% ($n$ = 184). At the time of the survey, three of the 395 teachers could not be contacted because they had retired or moved.

The data from each responding teacher were matched with school information contained in the Common Core of Data from the National Center for Educational Statistics' (NCES) Web site. The NCES data included enrollment numbers, ratio of teachers to students, division of the student population by race, the type of school

(charter, magnet, or regular), the number of students on reduced lunch, as well as the location of the school. The NCES uses eight categories for this data: Large Central City; Mid-size Central City; Urban Fringe of Large City; Urban Fringe of Mid-size City; Large Town; Small Town; Rural, outside Metropolitan Statistical Area (MSA) and Rural, inside MSA. There were eight schools or organizations that were not listed on the NCES database. This was because they were too new or because the organization was not a public school. Knowing this information about the specific school allowed the researchers to assess the type of schools and students that the Space Agriculture program was reaching, because one of the initial goals of this program was to reach minority and urban students. The location data also was used to compare respondents and non-respondents. A Chi-square test showed that there was no significant bias in the data based on location ($\chi^2 = 2.9$, significance level = .894).

The data analysis in this study focused on descriptive statistics. All analyses were conducted using SPSS 12.0 for Windows.

## Findings

*Participation and Use of the Curriculum*

Out of the 3,742 teachers who were sent information on the "Growing Space" curriculum, 395 requested and were sent classroom sets, with 356 of these from the four pilot states -- a participation rate of nearly one in ten. Twenty-three teachers participated from Alabama, 248 from Florida, 9 from New Mexico, and 77 from Utah. Another 39 teachers from other states requested classroom sets. Although the adoption rate for a new curriculum, which also was not mandated and required the teacher to infuse it into an existing curriculum during the school year, might be considered impressive, it was somewhat below the program's capacity. According to project records, 21,500 of the available 30,000 copies of "Growing Space" were distributed.

Of the 184 teachers who responded to the survey, 154 (84%) used the curriculum in their classes. The remaining 16% who returned questionnaires often included a reason why they had not been able to use the curriculum during the school year. It also is likely that a large percentage of survey non-respondents did not use the curriculum.

Although the 2003-2004 Space Agriculture curriculum was intended for sixth graders, the survey respondents reported using the curriculum with students ranging from Kindergarten to 12$^{th}$ grade. Of the teachers who used the curriculum, 66% ($n$ = 101) used the materials with 6$^{th}$ grade classes, as intended. Also, some teachers used the curriculum with other students of middle school age. There were two teachers (1%) who used the curriculum with 5$^{th}$ graders, and 44 teachers (29%) who used it with 7$^{th}$ or 8$^{th}$ graders.

Overall, many of the teachers who used the curriculum had a large class size, with the median at 30 students. Six percent ($n$ = 9) of the classes where "Growing Space" was used had less than 15 students. Seven percent ($n$ = 10) of the classes reported having 15-20 students and 19% ($n$ = 29) of classes had 21-25 students. Another 20% ($n$ = 31) of respondents reported having 26-30 students. Sixteen percent ($n$ = 24) of classes were

between 31 and 40 students. Classes larger than 40 students made up 33% ($n$ = 51) of the respondents. There is evidence that some teachers used the curriculum with more than one class, which may have resulted in the large percentage of teachers who had more than 40 students.

The 154 teachers who used the Space Agriculture in the Classroom curriculum taught a total of 9,378 students. The curriculum reached 1,591 African American students (17%), 1,414 Hispanic students (15%), 268 Asian American students (3%), 258 Native American students (3%), and 5,487 students noted as "Other" (59%). Note that the "Other" category includes Caucasian students as well as other minorities (Figure 2). Also, two respondents included a total number of students but did not identify their students by specific race categories. A few teachers reported the total number of students but when they reported students by race it did not equal the total. Thus, the race is unknown for 333 students (3%).

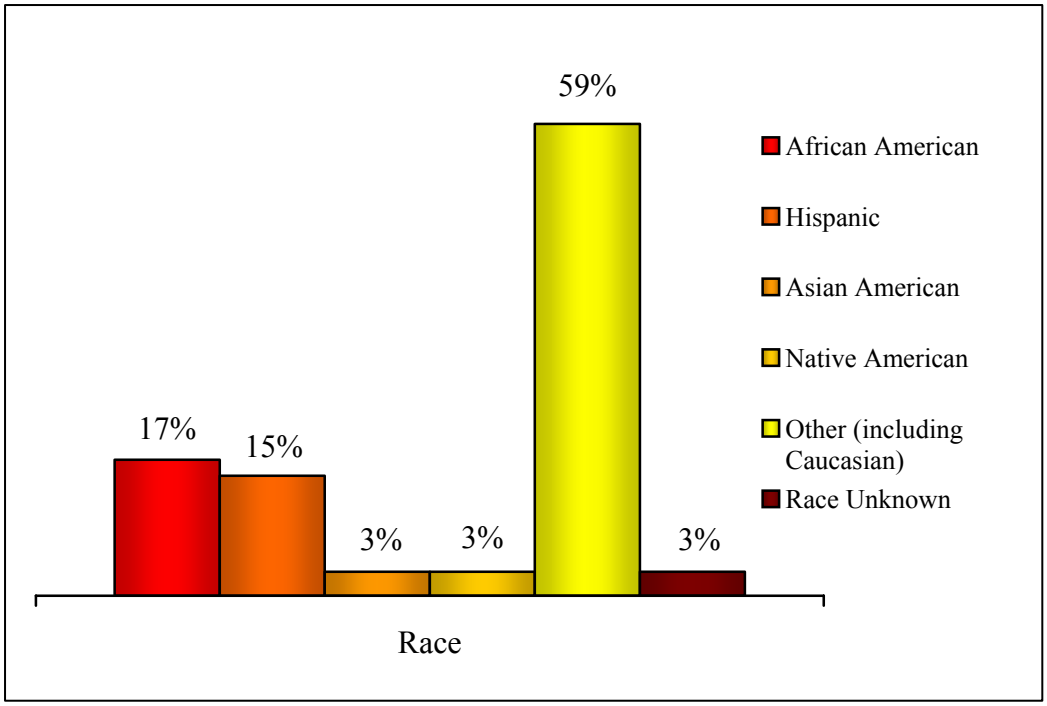


Figure 2. *Percentages of student participants by race.*

Of the 9,378 students who were taught using the Space Agriculture curriculum, it can be seen in Figure 3 that 74% ($n$ = 6,932) of students were enrolled in schools in the top four most urban categories (Large Central City, Mid-size Central City, Urban Fringe of Large City, and Urban Fringe of Mid-size City). The total unduplicated number of schools who used the curriculum is 154. Figure 3 also shows that 75% ($n$ = 116) of schools that used the curriculum were from these same top four urban categories.

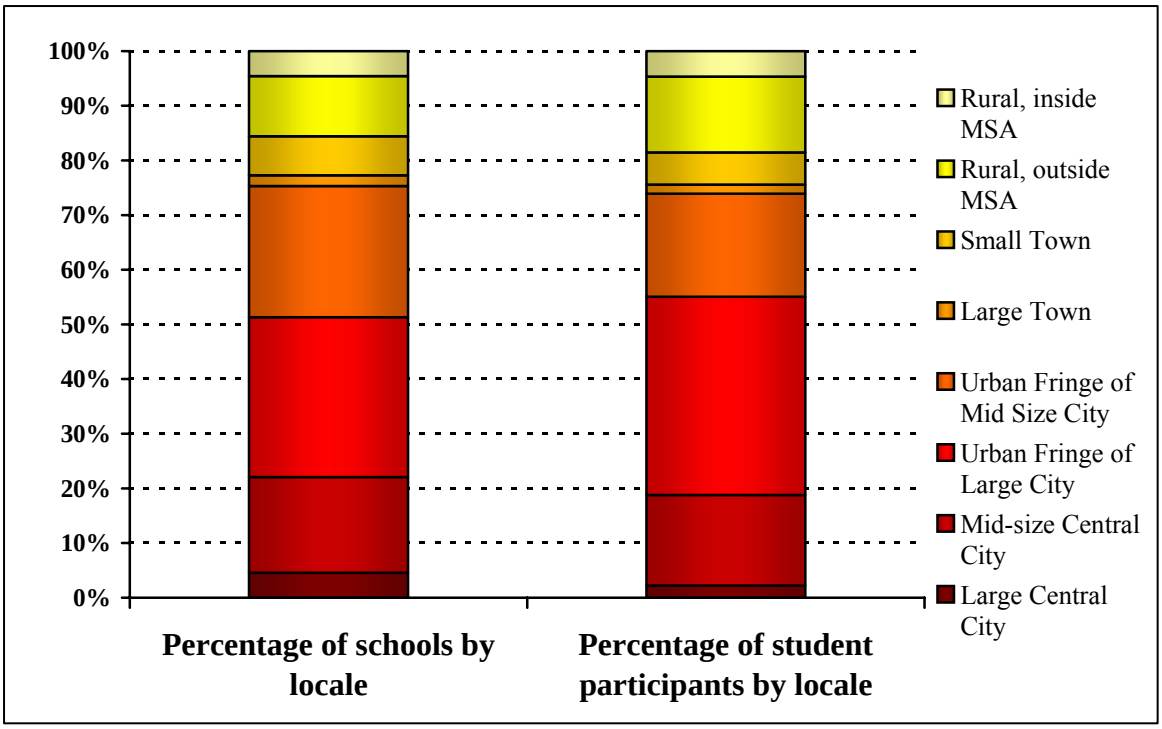


Figure 3. *Percentage of schools and student participants by locale.* *Space Agriculture in the Classroom*

Of teachers using the curriculum, most were experienced professionals. Teachers reported working an average of 13.9 years in the education profession. Relatively few early-career teachers used the curriculum, with 17% ($n$ = 26) having taught less than 3 years.

*Student Outcomes*

The data in Figure 4 show responses to the items regarding students' reactions to the curriculum and teachers' responses to the usability and effectiveness of the curriculum. These data show that the general response among students to the curriculum was very positive. For example, one teacher wrote, "I found the program to be very interesting for my students and me. The materials were up to date and relevant. The students found the water recycling fascinating." Another reported that "It allows the student to draw their own conclusions from the information given and it allows them to experience another aspect of science they may not have much knowledge about." A third wrote, "Good hands on learning experience - also good way to generate excitement about space/agriculture combination." A large majority of teachers reported that the material stimulated interest in science. Moreover, the materials were interesting and understandable across diverse student populations. Finally, the Growing Space curriculum was partially successful in stimulating interest in careers in space and, less so, in agriculture.

*Curriculum Functionality and Utility*

The responses to curriculum implementation are shown in Figure 5. Teachers were asked questions based on the usability and effectiveness of the curriculum and their answers were generally positive. A large majority of teachers reported that the "Growing Space" magazine was easy for their students to understand. "Growing Space was excellent!" wrote one teacher. Some teachers agreed with the statement that the magazine was written on an appropriate reading level, but the responses to this question could be skewed by the fact that some teachers did not use the curriculum with 6th grade classes as it was intended. The general consensus was that the classroom supplies were easy to use, but it seems that some teachers may have had trouble finding the time and resources to fit Space Agriculture into their classes. "It is excellent - just didn't fit my curriculum," a teacher reported. In general, teachers responded positively that the curriculum corresponded with their state standards for education, however, only a slight majority indicated that it helped to prepare for the standardized tests in that subject area.

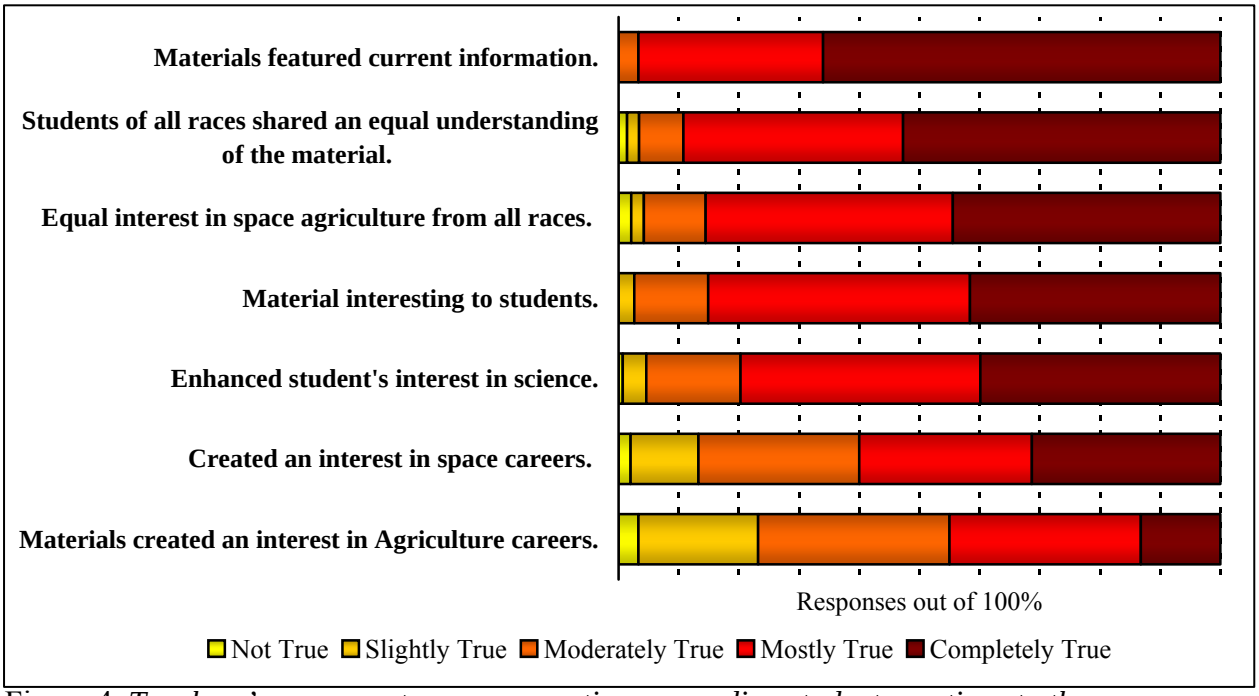


Figure 4. *Teachers' responses to survey questions regarding student reactions to the Space Agriculture in the Classroom curriculum.*

Respondents' reaction to supplemental teaching materials is displayed in Figure 6. A majority of respondents agreed with the statement that the pre-written lesson plans were easy to adapt for use in their classroom. For example, one teacher reported, "It is really easily organized, excellent work sheets and activities." Teachers reacted very positively to the Space Agriculture in the Classroom Web site, reporting that it was easy to navigate and the site's links were useful. Respondents generally reacted positively to the PowerPoint presentations that were provided on the Internet, agreeing that they were useful and could be easily modified. But more teachers rated PowerPoint materials as "moderately useful" or lower than the other supplemental materials and, based on the

comments, some of these teachers had little experience with PowerPoint and, as a consequence, had trouble modifying the presentations.

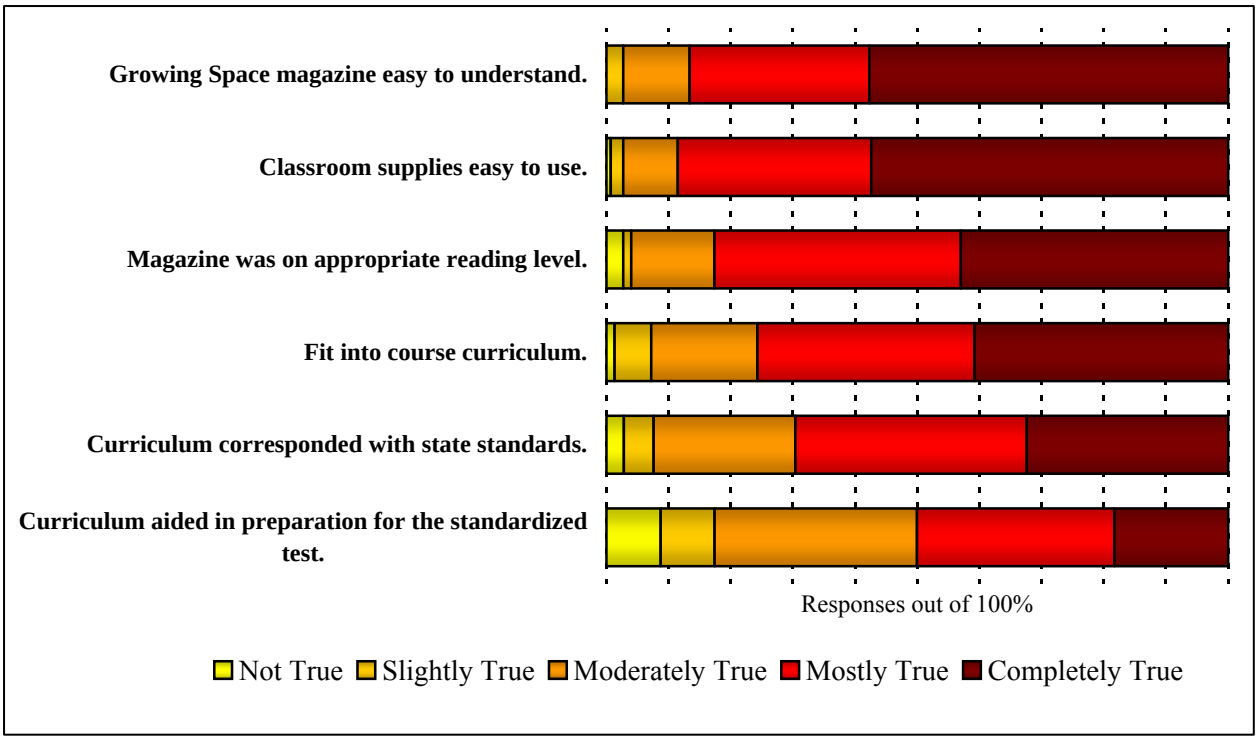


Figure 5. Teachers' responses to curriculum implementation questions regarding Space Agriculture in the Classroom materials.

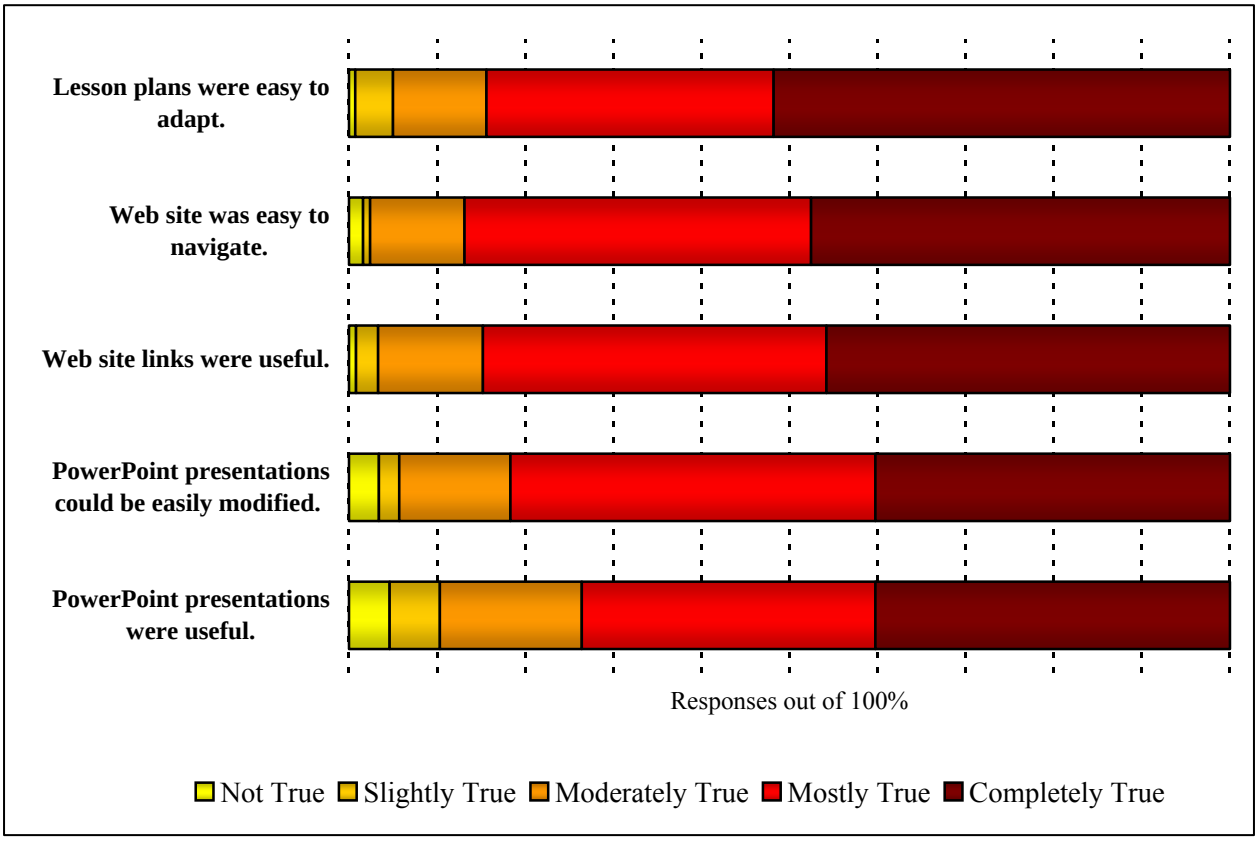


*Figure 6.* Teachers' responses to questions regarding supplemental teaching resources.

## Conclusions

The evidence from the follow-up survey on the Space Agriculture in the Classroom curriculum entitled "Growing Space" supports the view that the project's goals were met in part. Though the program fell short of reaching its capacity for student participation, it was successful in recruiting teachers who work with urban and minority students. Teachers reported that 38% of the students in participating classrooms were minorities and teachers responded positively to questions regarding the interest of minority students in space and agriculture topics. The Space Agriculture curriculum also reached many students in cities and suburbs.

The program also met goals for exposing students of different races and backgrounds to the topics involving space and agriculture for their benefit and, to a lesser extent, in creating an interest in space agriculture careers among minority and urban students. Though the evidence regarding student outcomes is far from definitive, the observations about the program's benefits by educational professionals cannot be discounted. The finding that the materials were interesting and understandable across diverse student populations is important because it contributed to the goal of recruiting and engaging minority students in the Space Agriculture in the Classroom program. On

the other hand, progress toward the goal of stimulating interest in careers in agriculture was limited, which might have been due to the short duration of the curriculum.

The delivery of the program was generally successful from the perspective of teachers who responded to the survey. A large majority of teachers reported the "Growing Space" curriculum to be usable and effective. This is important because the magazine was the key resource for students to read. In addition, a number of teachers included positive comments about the curriculum and provided suggestions for additional topics to include in new materials. Most teachers indicated the resource materials were easy to use and adaptable but a few experienced challenges with accessing and using Web-based materials. Aside from streamlining materials to reduce download times, few issues were identified that related to delivery. Finally, there was evidence that some teachers had trouble fitting Space Agriculture into their existing curriculum which suggests that some practice with the material is needed before it is integrated into the classroom.

## Recommendations

Based on the findings, the Space Agriculture materials can be improved by providing additional guidance for infusing the materials into existing classroom curricula and increasing access to the supplementary resources. In the case of the former, project team members should secure resources to conduct workshops and presentations at professional development conferences for teachers. The workshops will need to focus on strategies for infusing the materials and linking the information to careers in agricultural and space-related sciences. In order to increase access, lesson plans and PowerPoint presentations should be copied to CD-ROM discs and included in the classroom packets that are sent to teachers. In addition, future distribution should provide a set for each classroom rather than a single set per teacher to compensate for wear and tear from heavy use.

It is also clear that additional efforts should be focused on recruitment. Given that the program has the capacity to involve more teachers and students, marketing efforts should be intensified to reach the target audience - 6$^{th}$ grade teachers. In addition to direct mailings to teachers, program personnel might rely on surrogates to advertise and promote the program. This could be done in two ways: 1) Expand the visibility of "Growing Space" in NASA's extensive outreach to public schools, and 2) Contact science curriculum specialists in state departments of education. Support from state departments could help legitimize the curriculum in the eyes of teachers and school districts.

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# Extension Agents' Perceptions of Fundamental Job Characteristics and Their Level of Job Satisfaction

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## Abstract

*The purpose of this study was to determine Extension agents' perceptions of fundamental job characteristics and their level of job satisfaction. The study followed a descriptive design. A modified version of the Job Diagnostic Survey developed by Hackman and Oldham (1980) was sent to 195 Extension agents. Based on 143 usable responses, agents perceived the job characteristics skill variety and task significance to be present most in their jobs, while they perceived feedback from agents the least. Agents were most satisfied with the job satisfaction constructs of growth satisfaction and satisfaction with co-worker relations, while they were least satisfied with the job satisfaction constructs of general satisfaction and satisfaction with pay.*

## Introduction

Job satisfaction can be defined as an individual's attitude about work roles and the relationship to worker motivation. Positive attitudes toward one's job are theoretically equivalent to job satisfaction and negative attitudes toward one's job are equivalent to job dissatisfaction (Vroom, 1964). Employees with higher job satisfaction levels believe that working in their organization will be satisfying in the long run, that they will care about the quality of their work, and that they will be more committed to the organization (Bavendam, 2000). However, as technology and increasing expectations, such as paperwork and travel, continue to place more requirements on jobs, more Americans are becoming dissatisfied with their jobs (The Conference Board, 2003).

The key to job satisfaction in the work place is to focus on changing those areas of work that employees want changed, and not the areas that journalists or behavioral scientists think that employees should want changed (Hackman & Oldham, 1980). Since employee retention and turnover are related to one's level of job satisfaction (Performance Unlimited, 1999), it is important to achieve good person-organization relationships by adapting jobs to people and adapting people to jobs (Hackman & Oldham, 1980). By doing this, employee job satisfaction levels and organization productivity increase, thus benefiting the employee and the employer (Fetsch, Flashman, & Jeffiers, 1984).

Administrators need to understand the level of job satisfaction of their employees. Before organizational changes take place, the anticipated sensitive factors for employees need to be identified and analyzed. By identifying and analyzing these factors, administrators will have an understanding of what their employees want from their work. Understanding what their employees want from work can help administrators develop inservice trainings that will meet the needs of their employees, thus keeping job satisfaction at a maximum while simultaneously reducing job dissatisfaction. Realizing employees' attitudes and behavior during organizational change is imperative in helping administrators plan educational programs that will alleviate possible negative effects of reorganization on job performance (Barnett & Louderback, 1971; Jayaratne & Gamon, 1998).

Studying job satisfaction is important because organizational productivity is influenced by the quality of the relationship between people and the jobs they do. If there is a good fit between people and their jobs, such that work is a personally rewarding experience, then there may be little for management to do to foster high motivation and satisfaction. On the other hand, if there is not a good fit between employees and their jobs and employees are dissatisfied, then there may be little that management can do to produce high productivity and job satisfaction. Internal work motivation is tied closely with how well an employee performs on the job. Therefore, it is important to address the relationship between employees and their jobs before examining other aspects of the work place (Hackman & Oldham, 1980).

Several researchers (Barnett & Louderback, 1971; Bartholomew & Smith, 1990; Gamon & Cassina; 1989; Huerta & Smith, 1994; Hutchins, 1992; Johnson, 1966; King, 1990; Morse, 1987; Rockwell, Furgason, Jacobson, Schmidt, & Tooker, 1993; Taylor-Powell & Richardson, 1990) have studied the job satisfaction of Extension agents after their organization went through a restructuring process. Agents who were reassigned to area work, clustering counties into units, were satisfied with their jobs after the restructuring process. Their reassignment allowed them to develop expertise in a specialized area, allowing them to focus their work more and be more responsive to county concerns (Johnson, 1966; Taylor-Powell & Richardson, 1990). Barnett and Louderback (1971) found agents were most satisfied after restructuring with opportunities for personal growth and with the increased responsibilities that occurred as a result of their new roles. Agents also reported an increase in efficiency, work quality, and more group teaching as a result of multicounty work. Overall, agents had positive attitudes toward restructuring (Bartholomew & Smith, 1990; Gamon & Cassina; 1989; Huerta & Smith, 1994; Hutchins, 1992; King, 1990; Rockwell, Furgason, Jacobson, Schmidt, & Tooker, 1993).

Although restructuring has proven to improve the satisfaction of agents in several states, difficulties have also been discovered. Changes in work context have been primarily associated with job dissatisfaction in Kentucky (Barnett & Louderback, 1971). Lack of time to coordinate statewide issues, work with other issues coordinators, and work as a team were identified as concerns in Texas and Minnesota (Hutchins, 1992; Taylor-Powell & Richardson, 1990), while agents in Ohio mentioned that agent specialization was too time consuming and there was a lack of local support for the new structure (Huerta & Smith, 1994). Program implementation, increased time demands, and poor communication were also identified as areas of difficulty following restructuring in Minnesota and Nebraska (Morse, 1987; Rockwell et al., 1993).

Some studies have examined job satisfaction of Extension agents not involved in the restructuring process (Mallilo, 1990; Riggs & Beus, 1993). Riggs and Beus (1993) found that agents' overall satisfaction with their job, colleagues, and the Cooperative Extension System as an organization was moderately high. However, most agents were more satisfied with the latter two factors than with the job itself. Although Mallilo (1990) also found Extension agents to be moderately to highly satisfied with their jobs in general, he found that the majority of the agents were least satisfied with their pay.

## Theoretical Framework

Hackman and Oldham's (1976) job characteristics theory describes the relationship between job characteristics and individual response to work. This theory is probably the most well-known and widely discussed effort to explain the relationship of job characteristics to job satisfaction. The job characteristics theory was originally tested with the intentions of diagnosing jobs to determine if and how they should be redesigned to improve employee motivation and productivity and then later to be used to evaluate the effects of job changes on employees. At the most basic level, five core job characteristics

lead to a number of personal and work outcomes that are beneficial to the individual (Hackman & Oldham, 1975; 1976).

A job characteristic is an attribute of a job that creates conditions for high work motivation, satisfaction, and performance (Hackman & Oldham, 1980). According to a job characteristics theory proposed by Turner and Lawrence (1965), employers should build into employees' jobs certain characteristics that create satisfying conditions. Hackman and Oldham (1980) revised this theory and proposed five core job characteristics that should be included in any job. These characteristics include skill variety, task identity, task significance, autonomy, and feedback. However, because people respond differently to the same job, employers must take into consideration both job characteristics and the work context of the job itself when redesigning work for their employees.

Exploration based on Hackman and Oldham's (1975) job characteristics theory can be found in the research conducted by Furgason (1992) on Extension agents in Nebraska. He used a modified version of the Job Diagnostic Survey to ascertain agents' perceptions of the five job characteristics following organizational restructuring. Furgason (1992) found that agents perceived skill variety to be present to a great extent in their jobs, while he found they perceived task identity and task significance to be present in their jobs to a lesser extent. Of all the job characteristics, he found that agents perceived feedback to be present the least.

Hackman and Oldham (1980) also defined the four personal and work outcomes of the job characteristics theory. These outcomes include internal work motivation, growth satisfaction, general satisfaction, and work effectiveness. Internal work motivation indicates an employee's satisfaction when performing well on the job because it is rewarding and satisfying to do so, thus serving as an incentive for continuing to do well. Growth satisfaction indicates employee satisfaction when employees have enriched opportunities for personal learning and growth at work. General satisfaction indicates employee satisfaction when employees indicate how satisfied they are with their jobs and how frequently they think of quitting their jobs. These three affective outcomes combine to form the personal satisfaction constructs. Finally, work effectiveness indicates an employee's satisfaction in both the quality and quantity of goods or services produced (Hackman & Oldham, 1974; 1980).

How satisfied individuals are with certain aspects of their work context may affect their willingness to respond positively to enriched work. Those who are relatively satisfied with job security, pay, co-worker relations, and supervision tend to respond more positively to jobs rating high on the job characteristics, thus having a higher level of context satisfaction. These four aspects of work context combine to form the context satisfaction constructs (Hackman & Oldham, 1980).

At the time of this study, Mississippi's Extension Service was two years removed from restructuring. Prior to reorganization, there was no evidence of Extension agents' job satisfaction. Although agents appeared to be satisfied after being reassigned to their

new positions, there was no evidence of studies examining Extension agents' perceptions of various job characteristics and their level of job satisfaction following organizational restructuring in 2002. Therefore, an assessment of agents' perceptions of the job characteristics and their current level of job satisfaction was warranted.

## Purpose and Objectives

The purpose of this study was to determine Extension agents' perceptions of fundamental job characteristics and their level of job satisfaction. Specific research questions addressed in this study were:

1. What were the perceptions of Extension agents of the five fundamental job characteristics?

2. What was the level of job satisfaction of Extension agents?

## Methods and Procedures

*Population*

The population for this descriptive study was all Extension agents employed by the Extension Service in Mississippi as of May 1, 2004 ($N$ = 195). This included area agents, county directors, and 4-H agents. All 195 were included in the study.

*Instrumentation*

Extension agents' perceptions of the five job characteristics and their level of job satisfaction were obtained utilizing a modified version of the Job Diagnostic Survey developed by Hackman and Oldham (1980). The Job Diagnostic Survey consists of seven different sections, the first five of which were used in this study. An additional section containing 10 questions created by the researcher was added to the end of the questionnaire to collect selected demographic characteristics of the participants.

Section I contained items for agents to describe aspects of their jobs. In Section II, agents rated statements describing their jobs on a 7-point rating scale ranging from very inaccurate to very accurate. Items from Sections I and II yielded scores for each of the job characteristics. Statements in Sections III and V were rated on a 7-point rating scale ranging from strongly disagree to strongly agree. These two sections were used to measure two (internal work motivation and general satisfaction) of the seven aspects of job satisfaction, also called job satisfaction constructs. Section IV items were rated on a 7-point scale ranging from very dissatisfied to very satisfied. This section yielded scores for the remaining five job satisfaction constructs (growth satisfaction, satisfaction with job security, satisfaction with pay, satisfaction with co-worker relations, and satisfaction with supervision) (Hackman & Oldham, 1980). Section VI items consisted of questions that asked the participants pertinent demographic information.

Scale scores for the job characteristics and the job satisfaction constructs were computed for each agent utilizing the scoring key provided by Hackman and Oldham (1980). The job characteristic, feedback, was classified as either job feedback or feedback from agents. Upon calculating scores for the seven job satisfaction constructs, the first three, internal work motivation, growth satisfaction, and general satisfaction, were categorized as personal satisfaction. The last four, satisfaction with job security, pay, co-worker relations, and supervision, were categorized as context satisfaction (Hackman & Oldham, 1980).

*Reliability and Validity*

Hackman and Oldham (1974) established internal consistency reliabilities of each of the scales measured by the Job Diagnostic Survey. Oldham, Hackman, and Pearce (1976) later reported reliabilities for two job satisfaction scales not addressed in the initial study, satisfaction with job security and satisfaction with pay. The coefficient alpha for the job characteristics ranged from .59 (task identity) to .78 (feedback from agents). The reliability coefficients for the job characteristics were established as follows: .71 (skill variety); .59 (task identity); .66 (task significance); .66 (autonomy); .71 (job feedback); .78 (feedback from agents). Reliability coefficients for the job satisfaction constructs ranged from .56 (satisfaction with co-worker relations) to .84 (growth satisfaction). Reliability coefficients were established for the seven job satisfaction constructs: .76 (internal work motivation); .84 (growth satisfaction); .76 (general satisfaction); .62 (satisfaction with job security); .82 (satisfaction with pay); .56 (satisfaction with co-worker relations); .79 (satisfaction with supervision) (Hackman & Oldham, 1974; 1975).

The median of the correlations between the items composing a given scale and all the other items that are scored on different scales of the same general type, often called off-diagonal correlations, provide one indication of the discriminant validity of the items included in the Job Diagnostic Survey. The median off-diagonal correlations ranged from .12 (task identity) to .19 (skill variety, autonomy, and job feedback) for the job characteristics. For the job satisfaction constructs, the span of the correlations ranged from .23 (satisfaction with co-worker relations) to .28 (growth satisfaction) (Hackman & Oldham, 1974).

*Data Collection*

Data collection was accomplished through the use of an electronic survey through SurveyMonkey.com. Prior to data collection, the director of the Extension Service sent an email to all agents notifying them that they would be asked to participate in the study. The email further stated his support for the study and encouraged agents to participate. The initial email from the researcher asking agents to participate in the study was sent the next day. The message included a link to the survey as well as an individual code number. A week later, a second email was sent to those agents who had not responded. A third and final email was sent a week after the second email to the remaining agents who had not responded. The two follow-up email messages also included the link to the survey and the individual code numbers.

Of the 195 agents invited to participate in the study, 168 responded to the survey for an overall response rate of 86%. Due to incomplete data or to participants choosing not to participate, 143 surveys were usable, making the final usable response rate 73%.

Those not responding to the second follow-up email message were declared non-respondents. To handle non-response error, data from those who responded to the initial email message were compared with data from those who responded to either the first or second follow-up email messages. Responses that were collected following both follow-up email messages were used because less than 30 participants responded to the second follow-up email message. According to Linder, Murphy, and Briers (2001), comparing early respondents to late respondents is an acceptable method for addressing non-response error as a threat to external validity. After analyzing the data of early respondents and late respondents, no significant differences were noted.

*Data Analysis*

Data were analyzed using the Statistical Package for the Social Sciences (SPSS® Version 11.5 for Windows). Descriptive statistics, including means and standard deviations, were used to summarize the data. Frequencies and percentages were reported for the demographic data. Means and standard deviations were computed for the job characteristics and the job satisfaction constructs.

## Results

*Population Description*

The largest percentage (41.2%) of the participants identified themselves as county directors, while 32.2% were classified as area agents. 4-H agents accounted for 26.6% of the participants.

*Perceptions of the Job Characteristics*

Using seven point scales, Extension agents provided mean scores for the job characteristics. Of all the job characteristics, Extension agents rated task significance the highest, whereas they rated feedback from agents the lowest. Means ranged from 4.12 to 6.41 (Table 1). Considering the three groups of agents, 4-H agents rated the job characteristic task significance the highest ($M$ = 6.41, $SD$ = .76), while area agents rated the job characteristic feedback from agents the lowest ($M$ = 4.12, $SD$ = 1.50).

Table 1. *Means and Standard Deviations of the Job Characteristics for All Agents*

| Job Characteristic | All Agents ($N$ = 143) | Area Agents ($n$ = 46) | County Directors ($n$ = 59) | 4-H Agents ($n$ = 38) |
|---|---|---|---|---|
| Skill Variety | 6.12 (0.76) | 5.97 (0.83) | 6.29 (0.65) | 6.03 (0.78) |
| Task Identity | 5.10 (1.20) | 5.36 (1.22) | 4.94 (1.21) | 5.05 (1.14) |
| Task Significance | 6.31 (0.79) | 6.18 (0.91) | 6.34 (0.71) | 6.41 (0.76) |
| Autonomy | 5.84 (0.83) | 5.80 (0.88) | 5.77 (0.84) | 6.00 (0.77) |
| Feedback | | | | |
| Job Feedback | 5.21 (0.93) | 5.28 (0.97) | 5.08 (0.95) | 5.31 (0.83) |
| Feedback from Agents | 4.32 (1.47) | 4.12 (1.50) | 4.35 (1.43) | 4.51 (1.51) |

*Note.* Means of the job characteristics were derived from a combination of items contained in Sections I and II of the Job Diagnostic Survey.

*Level of Job Satisfaction*

Using seven point scales, Extension agents provided mean scores for the personal job satisfaction constructs. Agents rated growth satisfaction the highest, while they rated general satisfaction the lowest. Means ranged from 5.04 to 6.18 (Table 2). Of the three groups of agents, 4-H agents rated the job satisfaction construct of growth satisfaction the highest
($M$ = 6.18, $SD$ = .71), while county directors rated the job satisfaction construct of general satisfaction the lowest ($M$ = 5.04, $SD$ = 1.16).

Extension agents provided mean scores for the context job satisfaction constructs using seven point scales. Agents rated satisfaction with co-worker relations the highest and rated satisfaction with pay the lowest. Means ranged from 3.70 to 6.60. Of the three groups of agents, 4-H agents rated the job satisfaction construct of satisfaction with co-

worker relations the highest ($M$ = 6.60, $SD$ = .51), while county directors rated the job satisfaction construct of satisfaction with pay the lowest ($M$ = 3.70, $SD$ = 1.85).

Table 2. *Means and Standard Deviations of the Job Satisfaction Constructs for All Agents*

| Job Satisfaction Construct | All Agents ($N$ = 143) | Area Agents ($n$ = 46) | County Directors ($n$ = 59) | 4-H Agents ($n$ = 38) |
|---|---|---|---|---|
| Personal Satisfaction Construct | | | | |
| Internal Work Motivation | 5.56 (0.61) | 5.51 (0.65) | 5.60 (0.61) | 5.57 (0.59) |
| Growth Satisfaction | 6.04 (0.81) | 5.92 (0.93) | 6.03 (0.76) | 6.18 (0.71) |
| General Satisfaction | 5.13 (1.11) | 5.20 (1.19) | 5.04 (1.16) | 5.17 (0.94) |
| Context Satisfaction Construct | | | | |
| Job Security | 5.45 (1.33) | 5.30 (1.35) | 5.39 (1.36) | 5.71 (1.27) |
| Pay | 3.76 (1.86) | 3.76 (1.84) | 3.70 (1.85) | 3.83 (1.94) |
| Co-Worker Relations | 6.46 (0.60) | 6.25 (0.73) | 6.53 (0.51) | 6.60 (0.51) |
| Supervision | 5.08 (1.76) | 4.80 (1.85) | 5.21 (1.81) | 5.22 (1.54) |

*Note.* Means of two job satisfaction constructs (internal work motivation and general satisfaction) were derived from a combination of items contained in Sections III and V of the Job Diagnostic Survey. Means of the remaining five job satisfaction constructs (growth satisfaction, satisfaction with job security, satisfaction with pay, satisfaction with co-worker relations, and satisfaction with supervision) were derived from items contained in Section IV of the Job Diagnostic Survey.

## Conclusions

Overall, Extension agents perceived skill variety to be present in their jobs, meaning that they felt that their jobs require an array of different activities to carry out the work, requiring them to use a number of different skills and talents. This conclusion is consistent with Ferguson's (1992) study, which indicated that Nebraska Extension agents perceived skill variety to be present in their jobs. County directors perceived skill variety to be present more in their jobs than did other agents in the present study.

Extension agents perceived task significance to be present in their jobs, meaning that their jobs have a substantial impact on the lives of other people, whether those people are in the immediate organization or the world at large. A previous study (Ferguson, 1992) found task significance to be present to a lesser extent in the jobs of Nebraska Extension agents. In the current study, 4-H agents believed task significance to be present more in their jobs than did other agents.

Extension agents perceived feedback from agents to be present in their jobs the least, meaning they perceived clear information about their performance from supervisors or from co-workers is not as prevalent in their jobs as other job characteristics. This conclusion is consistent with Ferguson's (1992) study, indicating that Nebraska Extension agents perceived feedback to be present in their jobs the least. In the present study, area agents perceived this characteristic the least.

County directors and 4-H agents perceived the job characteristic task identity to be present in their jobs to a lesser extent than the other job characteristics. They felt that their jobs may not require the completion of a "whole" and identifiable piece of work, that is, doing a job from beginning to end with a visible outcome. This conclusion is consistent with Ferguson's (1992) study, indicating that Nebraska Extension agents perceived task identity to be present in their jobs to a lesser extent than the other job characteristics. County directors perceived task identity to be present the least in their jobs in the present study.

Area agents perceived job feedback to be present in their jobs to a lesser extent than the other job characteristics. This means that the work activities required by their jobs may not provide them with direct and clear information about the effectiveness of their performance. This conclusion is consistent with Ferguson's (1992) study, indicating that Nebraska Extension agents perceived feedback to be present in their jobs the least.

Overall, Extension agents were satisfied with their jobs. Extension agents were most satisfied with the personal satisfaction construct of growth satisfaction, meaning they were most satisfied with the opportunities that they have for personal learning and growth at work. This conclusion is consistent with Barnett and Louderback (1971), indicating that agents associated opportunities for personal growth with job satisfaction. In the current study, 4-H agents were the most satisfied with this construct.

Extension agents were the least satisfied with the personal satisfaction construct of general satisfaction, meaning that they were least satisfied with their jobs in general. County directors were the least satisfied with this construct in the current study. The literature points to other researchers who arrived at the same conclusion, indicating that agents were the least satisfied with their jobs in general even though their satisfaction levels were still moderately high (Riggs & Beus, 1993).

Extension agents were satisfied the most with the context satisfaction construct of satisfaction with co-worker relations, meaning that they were the most satisfied with the relations that they have with their co-workers. This conclusion is consistent with other studies that indicate an association between positive co-worker relations and increased job satisfaction (Barnett & Louderback, 1971; Riggs & Beus, 1993). In the present study, 4-H agents were the most satisfied with this construct.

Agents were the least satisfied with the context satisfaction construct of satisfaction with pay, meaning agents were least satisfied with the amount of compensation that they receive for their jobs. The same conclusion was found in Mallilo's (1990) study of Rhode Island Extension agents. In the current study, county directors were the least satisfied with this construct.

## Recommendations

Results of this study should be presented to Extension administrators to make them aware of the level of job satisfaction of the agents and to help them understand what agents want from their work. Extension administrators, state specialists, district directors, and others in supervisory positions should then provide more feedback for the agents that they oversee. Additionally, when there is a budget increase for the Extension Service, top priority should be to provide agents with increased salaries and benefits. In the meantime, Extension agents should provide more feedback for their co-workers regarding their job performance.

When researchers conduct similar studies, outside observers should use Hackman and Oldham's (1980) Job Rating Form to perform objective ratings of the job characteristics to be compared with the ratings by the Extension agents. Future researchers studying job satisfaction should also use Sections VI and VII of Hackman & Oldham's (1980) Job Diagnostic Survey to measure the individual growth need strength of each agent since an agent's individuality affects how he or she responds to his or her job.

This study should be replicated in three to five years to determine if the level of job satisfaction of the agents has remained the same, improved, or worsened. Studies should also be conducted to evaluate why agents leave the Extension Service and to determine why agents who are not satisfied with their jobs remain employed with the Extension Service. Finally, Extension Services in other states should replicate this study.

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# The Relationships between Selected Demographic Factors and the Level of Job Satisfaction of Extension Agents

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## Abstract

*The purpose of this study was to determine what demographic factors were related to the level of job satisfaction of Extension agents. The study followed a descriptive correlational design. A modified version of the Job Diagnostic Survey developed by Hackman and Oldham (1980) was sent to 195 Extension agents. Based on 143 usable responses, significant relationships existed between the job satisfaction constructs and the demographic factors of gender and race. When considering Extension agents' current position, a significant difference was found between area agents and 4-H agents regarding how each group rated satisfaction with co-worker relations. Significant relationships were determined at the $p < .05$ level.*

## Introduction

Hoppock (1935) defined job satisfaction as "any combination of psychological, physiological, and environmental circumstances that causes a person truthfully to say, 'I am satisfied with my job'" (p. 47). Employees may be satisfied with some aspects of their jobs, while being dissatisfied with others. It is assumed that employees are able to balance the specific satisfactions against the specific dissatisfactions and arrive at a composite satisfaction with the job as a whole (Hoppock, 1935). According to Poling (1990), the best predictor of job satisfaction is when the employees' personal values match those of the organization.

When considering job satisfaction, demographic variables should be considered to thoroughly understand the possible factors that lead to job satisfaction and dissatisfaction. Herzberg, Mausner, Peterson, and Capwell (1957) identified several characteristics of satisfied/dissatisfied workers. They indicated that morale is high when people first start their jobs. Morale decreases during the next few years and remains at a relatively low level until workers are in their late twenties or early thirties. At this time, job satisfaction levels begin to rise and continue to rise through the remainder of the workers' careers. The same trend is found in regard to a worker's length of service. Workers begin with high morale, which drops during the first year and remains low for a number of years. Then as length of service increases, job satisfaction levels tend to rise.

Concerning gender, there are no simple conclusions about the differences between males and females and their job satisfaction levels. Some studies reviewed by Herzberg et al. (1957) indicate that males are more satisfied with their jobs, while others indicate that females are more satisfied. Educational level is not clear either. Furthermore, these studies showed that workers with more education have a higher job satisfaction level, while other studies indicate that workers with more education have a lower job satisfaction level. Other studies showed no relationship between the two. Herzberg et al. (1957) suggested that a clear conclusion cannot be drawn concerning job satisfaction and its relationship to marital status, number of dependents, number of previous occupations, or ethnicity.

In a study of agricultural education teachers in Ohio, Cano and Miller (1992b) found that the teacher's age, years in current position, total years teaching, and degree status were not significantly related to overall job satisfaction. In general, both males and females were equally satisfied with their jobs. These findings are similar to a later study of the same nature by Castillo, Conklin, and Cano (1999). Therefore, over an approximate ten year period, agriculture teachers' selected demographic characteristics were not significantly related to their overall level of job satisfaction. The findings from these two studies (Cano & Miller, 1992b; Castillo et al., 1999) implied that older or younger teachers were not necessarily more or less satisfied with their jobs. Additionally, the longer a teacher remained in the profession the less his or her overall job satisfaction level was affected (Castillo & Cano, 1999). When the same demographic variables were examined in yet another study that explored six different classifications of

agriculture teachers (Cano & Miller, 1992a), it was found that overall job satisfaction was not significantly related to any of the demographic variables.

Although the Ohio researchers' findings are consistent, their findings on age, total years teaching, and degree status are contrary to the findings of Berns (1989) and Grady (1985). Berns (1989) found that as the age of the teacher increased, so did his or her overall job satisfaction level. Grady (1985) found that as the number of years of teaching experience increased, overall job satisfaction increased as well. Berns (1989) discovered that a teacher's educational level also affected his or her overall job satisfaction level. A teacher with a master's degree was more satisfied with his or her teaching position than a teacher with only a bachelor's degree. Because of these inconsistencies in the literature, perhaps findings on the relationship of demographic variables to overall job satisfaction should only be applied to the area in which the study was conducted.

Research has been conducted on whether Extension faculty's level of job satisfaction was related to age, years of experience, educational level, and marital status (Andrews, 1990; Bowen, Radhakrishna, & Keyser, 1994; Fetsch & Kennington, 1997; Griffin, 1984; Nestor & Leary, 2000). Regarding age, intrinsic job satisfaction was higher for those in the age groups of 23 to 33 and 46 to 50 (Nestor & Leary, 2000). This is consistent with the findings of Griffin (1984), who found in a study of Extension home economists that age was related to job satisfaction. The findings of Bowen et al. (1994) indicated that age was related to job satisfaction, since they found in a study of 4-H agents that those who were older had a higher level of job satisfaction. On the other hand, Andrews (1990) found no relationship between age and the job satisfaction levels of Extension agricultural agents.

Nestor and Leary (2000) did find that as one's years of experience increased as an Extension faculty member, his or her intrinsic and overall job satisfaction increased as well. Bowen et al. (1994) also found this to be true for 4-H agents, while Fetsch and Kennington (1997) found it to be true for all Extension agents in their study. In contrast, Griffin (1984) and Andrews (1990) both found no relationship between job satisfaction and years of experience.

Concerning the educational level of Extension faculty, Andrews (1990) discovered a relationship between educational level and job satisfaction. However, Bowen et al. (1994) and Griffin (1984) found no such relationship.

Marital status was related to the job satisfaction levels of 4-H agents as indicated by Bowen et al. (1994) who found in a study that married 4-H agents were more satisfied with their jobs than those who were single. Fetsch and Kennington (1997) also found a relationship between marital status and job satisfaction levels. They found both divorced and married agents to be more satisfied with their jobs than agents who were never married, remarried, or widowed.

Several studies involving Extension agents regarding their job satisfaction levels and gender have been conducted (Bowen et al., 1994; Nestor & Leary, 2000; Riggs &

Beus, 1993). However, the literature is divergent, illustrating that some studies indicate that females have higher levels of job satisfaction, while other studies indicate that males do (Bowen et al., 1994; Riggs & Beus, 1993). There are even some studies that indicate that there is no relationship between gender and job satisfaction levels (Nestor & Leary, 2000).

Whereas Nestor and Leary (2000) found no relationship between gender and job satisfaction, Riggs and Beus (1993) found that as the number of areas of responsibility increased for female agents, job satisfaction increased as well. The opposite was true for males. When their areas of responsibility increased, their job satisfaction levels decreased. However, males with more areas of responsibility were more satisfied with their colleagues than were female agents. It was also found that both male and female agents alike who had fewer areas of responsibility and fewer children living at home were more satisfied. Bowen et al. (1994) as well found a relationship between job satisfaction and gender. They discovered that female 4-H agents were more satisfied with their jobs than male agents.

## Theoretical Framework

Hackman and Oldham's (1976) job characteristics theory describes the relationship between job characteristics and individual response to work. This theory is probably the most well-known and widely discussed effort to explain the relationship of job characteristics to job satisfaction. The job characteristics theory was originally tested with the intentions of diagnosing jobs to determine if and how they should be redesigned to improve employee motivation and productivity and then later to be used to evaluate the effects of job changes on employees. At the most basic level, five core job characteristics lead to a number of personal and work outcomes that are beneficial to the individual (Hackman & Oldham, 1975; 1976).

A job characteristic is an attribute of a job that creates conditions for high work motivation, satisfaction, and performance (Hackman & Oldham, 1980). According to a job characteristics theory proposed by Turner and Lawrence (1965), employers should build into employees' jobs certain characteristics that create satisfying conditions. Hackman and Oldham (1980) revised this theory and proposed five core job characteristics that should be included in any job. These characteristics include skill variety, task identity, task significance, autonomy, and feedback. However, because people respond differently to the same job, employers must take into consideration both job characteristics and the work context of the job itself when redesigning work for their employees.

Hackman and Oldham (1980) also defined the four personal and work outcomes of the job characteristics theory. These outcomes include internal work motivation, growth satisfaction, general satisfaction, and work effectiveness. Internal work motivation indicates an employee's satisfaction when performing well on the job because it is rewarding and satisfying to do so, thus serving as an incentive for continuing to do well. Growth satisfaction indicates employee satisfaction when employees have enriched

opportunities for personal learning and growth at work. General satisfaction indicates employee satisfaction when employees indicate how satisfied they are with their jobs and how frequently they think of quitting their jobs. These three affective outcomes combine to form the personal satisfaction constructs. Finally, work effectiveness indicates an employee's satisfaction in both the quality and quantity of goods or services produced (Hackman & Oldham, 1974; 1980).

How satisfied individuals are with certain aspects of their work context may affect their willingness to respond positively to enriched work. Those who are relatively satisfied with job security, pay, co-worker relations, and supervision tend to respond more positively to jobs rating high on the job characteristics, thus having a higher level of context satisfaction. These four aspects of work context combine to form the context satisfaction constructs (Hackman & Oldham, 1980).

At the time of this study, Mississippi's Extension Service was two years removed from restructuring. Prior to reorganization, there was no evidence of Extension agents' job satisfaction. Although agents appeared to be satisfied after being reassigned to their new positions, there was no evidence of studies examining Extension agents' level of job satisfaction as it related to selected demographic factors following organizational restructuring in 2002. Therefore, an assessment of the relationship between selected demographic factors and Extension agents' current level of job satisfaction was warranted.

## Purpose and Objectives

The purpose of this study was to determine what demographic factors were related to the level of job satisfaction of Extension agents. The specific demographic factors addressed in this study were:

- Gender
- Race
- Age
- Marital status
- Education
- Previous position(s) with the Extension Service
- Current Extension Service position

## Methods and Procedures

*Population*

The population for this descriptive correlational study was all Extension agents employed by the Extension Service in Mississippi as of May 1, 2004 ($N$ = 195). This included area agents, county directors, and 4-H agents. All 195 were included in the study.

*Instrumentation*

Extension agents' level of job satisfaction was obtained utilizing a modified version of the Job Diagnostic Survey developed by Hackman and Oldham (1980). However, the Job Diagnostic Survey was modified such that only three of its seven sections were used in this study. An additional section containing 10 questions created by the researcher was added to the end of the questionnaire to collect selected demographic characteristics of the participants.

Statements in two of the sections were rated on a 7-point rating scale ranging from strongly disagree to strongly agree. These two sections were used to measure two (internal work motivation and general satisfaction) of the seven aspects of job satisfaction, also called job satisfaction constructs. Items in the third section were rated on a 7-point scale ranging from very dissatisfied to very satisfied. This section yielded scores for the remaining five job satisfaction constructs (growth satisfaction, satisfaction with job security, satisfaction with pay, satisfaction with co-worker relations, and satisfaction with supervision) (Hackman & Oldham, 1980). The last section consisted of questions that asked the participants pertinent demographic information.

Scale scores for the job satisfaction constructs were computed for each agent utilizing the scoring key provided by Hackman and Oldham (1980). Upon calculating scores for the seven job satisfaction constructs, the first three, internal work motivation, growth satisfaction, and general satisfaction, were categorized as personal satisfaction. The last four, satisfaction with job security, pay, co-worker relations, and supervision, were categorized as context satisfaction (Hackman & Oldham, 1980).

*Reliability and Validity*

Hackman and Oldham (1974) established internal consistency reliabilities of each of the scales measured by the Job Diagnostic Survey. Oldham, Hackman, and Pearce (1976) later reported reliabilities for two job satisfaction scales not addressed in the initial study, satisfaction with job security and satisfaction with pay. Reliability coefficients for the job satisfaction constructs ranged from .56 (satisfaction with co-worker relations) to .84 (growth satisfaction) (Hackman & Oldham, 1974; 1975).

The median of the correlations between the items composing a given scale and all the other items that are scored on different scales of the same general type, often called off-diagonal correlations, provide one indication of the discriminant validity of the items included in the Job Diagnostic Survey. For the job satisfaction constructs, the median off-diagonal correlations ranged from .23 (satisfaction with co-worker relations) to .28 (growth satisfaction) (Hackman & Oldham, 1974).

*Data Collection*

Data collection was accomplished through the use of an electronic survey through SurveyMonkey.com. Prior to data collection, the director of the Extension Service sent an email to all agents notifying them that they would be asked to participate in the study. The email further stated his support for the study and encouraged agents to participate. The initial email from the researcher asking agents to participate in the study was sent the

next day. The message included a link to the survey as well as an individual code number. A week later, a second email was sent to those agents who had not responded. A third and final email was sent a week after the second email to the remaining agents who had not responded. The two follow-up email messages also included the link to the survey and the individual code numbers.

Of the 195 agents invited to participate in the study, 168 responded to the survey for an overall response rate of 86%. Due to incomplete data or to participants choosing not to participate, 143 surveys were usable, making the final usable response rate 73%.

Those not responding to the second follow-up email message were declared non-respondents. To handle non-response error, data from those who responded to the initial email message were compared with data from those who responded to either the first or second follow-up email messages. Responses that were collected following both follow-up email messages were used because less than 30 participants responded to the second follow-up email message. According to Linder, Murphy, and Briers (2001), comparing early respondents to late respondents is an acceptable method for addressing non-response error as a threat to external validity. After analyzing the data of early respondents and late respondents, no significant differences were noted.

*Data Analysis*

Data were analyzed using the Statistical Package for the Social Sciences (SPSS® Version 11.5 for Windows). Descriptive statistics, including means and standard deviations, were used to summarize the data. Frequencies and percentages were reported for the demographic data.

Means and standard deviations were computed for the job satisfaction constructs. Point-biserial correlation coefficients ($r_{pb}$) were calculated to determine the relationships between the job satisfaction constructs and gender, race, marital status, and whether or not the participant had held a previous position with the Extension Service prior to his or her current position. The rank-biserial correlation coefficient ($r_b$) was calculated to determine the relationships between the job satisfaction constructs and age, while the Spearman's rho correlation coefficient ($r_s$) was calculated to determine the relationships between the job satisfaction constructs and education. Significant relationships were determined with an a priori alpha level of .05. To describe the strength of the relationships calculated in the study, Davis' conventions were utilized (Davis, 1971).

## Results

*Population Description*

The largest percentage (41.2%) of the participants identified themselves as county directors, while 32.2% were classified as area agents. 4-H agents accounted for 26.6% of the participants.

*Gender*

As reported in Table 1, low significant relationships were found between gender and three of the job satisfaction constructs, growth satisfaction ($r_{pb}$ = .22), satisfaction

with job security ($r_{pb}$ = .19), and satisfaction with pay ($r_{pb}$ = .23). After examining the scatter plots for the relationships between gender and these three constructs, it was found that females rated growth satisfaction, satisfaction with job security, and satisfaction with pay higher than males. All other relationships were low as well except for the one between gender and satisfaction with co-worker relations ($r_{pb}$ = .08), which was negligible.

*Race*

Low significant relationships were found between race and two of the job satisfaction constructs, general satisfaction ($r_{pb}$ = .22) and satisfaction with supervision ($r_{pb}$ = .24) (Table 1). After examining the scatter plots for the relationships between race and these two constructs, it was found that Caucasians rated general satisfaction and satisfaction with supervision lower than other races. Negligible relationships were found between race and internal work motivation ($r_{pb}$ = .03) and between race and satisfaction with pay ($r_{pb}$ = .09).

*Age*

No significant relationships were found between age and the job satisfaction constructs. Satisfaction with job security ($r_b$ = - .12) and satisfaction with pay ($r_b$ = .10) were the only two job satisfaction constructs having low relationships with age. All other relationships were negligible.

*Marital Status*

No significant relationships were found between marital status and the job satisfaction constructs. Only two low relationships were found. These relationships were found between marital status and internal work motivation ($r_{pb}$ = .10) and between marital status and satisfaction with pay ($r_{pb}$ = .11). All other relationships were negligible.

*Education*

Again, no significant relationships were found between the demographic factor and the job satisfaction constructs. The only low relationship found was between education and satisfaction with pay ($r_s$ = .14). All other relationships were negligible.

*Held a Previous Position with the Extension Service*

No significant relationships were found between whether or not a participant had held a previous position with the Extension Service and the job satisfaction constructs. All relationships were negligible, except for the low relationship with satisfaction with supervision ($r_{pb}$ = .10).

Table 1. *The Relationships Between the Job Satisfaction Constructs and Gender and Race for All Agents (N = 143)*

| Job Satisfaction Construct | $r_{pb}$ Gender[a] | $r_{pb}$ Race[b] |
|---|---|---|
| Personal Satisfaction Construct | | |
| Internal Work Motivation | .15 | .03 |
| Growth Satisfaction | .22* | .16 |
| General Satisfaction | .10 | .22* |
| Context Satisfaction Construct | | |
| Job Security | .19* | .11 |
| Pay | .23* | .09 |
| Co-Worker Relations | .08 | .10 |
| Supervision | .16 | .24* |

[a] 1 = Female; 2 = Male.
[b] 1 = Other (African-American, Asian-American, American, or Irish-American); 2 = Caucasian.
*p < .05.

*Current Extension Service Position*

Job satisfaction means for all agents ranged from 3.70 to 6.60 (Table 2). 4-H agents rated the job satisfaction construct of satisfaction with co-worker relations the highest ($M$ = 6.60), while county directors rated the job satisfaction construct of satisfaction with pay the lowest ($M$ = 3.70). The means among the agent groups were alike for six of the seven job satisfaction constructs. A significant difference was found between area agents and 4-H agents (Scheffé Mean Difference = .3429, $p$ = .032) regarding how each group rated satisfaction with co-worker relations. Area agents rated this construct significantly lower than 4-H agents.

Table 2. *Means of the Job Satisfaction Constructs for All Agents (N = 143)*

| Job Satisfaction Construct | *M* | | |
|---|---|---|---|
| | Area Agents | County Directors | 4-H Agents |
| Personal Satisfaction Construct | | | |
| Internal Work Motivation | 5.51 | 5.60 | 5.57 |
| Growth Satisfaction | 5.92 | 6.03 | 6.18 |
| General Satisfaction | 5.20 | 5.04 | 5.17 |
| Context Satisfaction Construct | | | |
| Job Security | 5.30 | 5.39 | 5.71 |
| Pay | 3.76 | 3.70 | 3.83 |
| Co-Worker Relations* | 6.25 | 6.53 | 6.60 |
| Supervision | 4.80 | 5.21 | 5.22 |

*Note.* Means of two job satisfaction constructs (internal work motivation and general satisfaction) were derived from a combination of items contained in two of the sections of the Job Diagnostic Survey. Means of the remaining five job satisfaction constructs (growth satisfaction, satisfaction with job security, satisfaction with pay, satisfaction with co-worker relations, and satisfaction with supervision) were derived from items contained in another section of the Job Diagnostic Survey. Area Agents differed from 4-H Agents. County Directors did not differ from the other two groups.
*$p < .05$.

## Conclusions

The results of this study can only be inferred to Extension agents in Mississippi. Low relationships were observed between gender and the job satisfaction constructs of growth satisfaction, satisfaction with job security, and satisfaction with pay. Females rated all three of these constructs higher than males, indicating a higher level of satisfaction with personal learning and growth opportunities at work, job security, and compensation. Previous studies have shown similar findings (Bowen et al., 1994; Riggs & Beus, 1993). However, even though the literature indicates a relationship between gender and job satisfaction, some studies are inconclusive regarding whether males or females are more satisfied (Herzberg et al., 1957). In contrast, other studies have shown that gender is not related to job satisfaction (Cano & Miller, 1992a; Cano & Miller, 1992b; Castillo & Cano, 1999; Castillo et al., 1999; Nestor & Leary, 2000).

Age was not related to any of the job satisfaction constructs for Extension agents. This conclusion is consistent with other studies (Andrews, 1990; Cano & Miller, 1992a; Cano & Miller, 1992b; Castillo & Cano, 1999; Castillo et al., 1999). However, several studies have shown a relationship between age and job satisfaction, indicating that older workers are more satisfied with their jobs than younger workers (Berns, 1989; Bowen et al., 1994; Griffin, 1984; Herzberg et al., 1957; Nestor & Leary, 2000).

For Extension agents, race had low relationships with the job satisfaction constructs of general satisfaction and satisfaction with supervision. Caucasians rated both of these constructs lower than other races, indicating a lower level of satisfaction with their jobs in general and with the supervision that they receive. However, some studies have shown that race and job satisfaction are not related (Herzberg et al., 1957).

Marital status was not related to any of the job satisfaction constructs for Extension agents. This conclusion is consistent with other studies (Herzberg et al., 1957). However, several studies have shown a relationship between marital status and job satisfaction, indicating that married or divorced agents are more satisfied with their jobs than remarried, never married, or widowed agents (Bowen et al., 1994; Fetsch & Kennington, 1997).

Education was not related to any of the job satisfaction constructs for Extension agents. Other researchers have found this same conclusion (Bowen et al., 1994; Cano & Miller, 1992a; Cano & Miller, 1992b; Castillo & Cano, 1999; Castillo et al., 1999; Griffin, 1984; Herzberg et al., 1957). However, the literature does indicate a relationship between education and job satisfaction, even though studies are inconclusive regarding whether or not workers increase or decrease their job satisfaction when they increase their educational level (Herzberg et al., 1957). Even so, some studies do indicate that increasing one's educational level increases his or her level of job satisfaction (Andrews, 1990; Berns, 1989).

Comparing the means of the job satisfaction constructs for the three groups of Extension agents revealed that for the most part, there was no difference among the three groups regarding how satisfied each group was with the seven job satisfaction constructs. Two groups differed only on one of the seven job satisfaction constructs. A significant difference was found between area agents and 4-H agents regarding how satisfied each group was with their co-worker relations. Area agents rated this construct lower than 4-H agents, indicating a lower level of satisfaction with their relationships with their co-workers. However, having held a previous position with the Extension Service was not related to any of the job satisfaction constructs for Extension agents.

## Recommendations

Results of this study should be presented to Extension administrators to make them aware of which demographic factors were related the level of job satisfaction of Extension agents. Extension administrators should then design inservices and trainings to help male Extension agents increase their level of satisfaction with personal learning and

growth opportunities at work, job security, and compensation. They should also address the need for Caucasian Extension agents to increase their level of satisfaction with their jobs in general and with the supervision that they receive. Since area agents indicated a lower level of satisfaction with their relationships with their co-workers as compared to 4-H agents, Extension administrators should adjust area agents' job duties so that they are able to build relationships with their co-workers.

This study should be replicated in three to five years to determine if the level of job satisfaction of Extension agents is related to the same demographic factors, to other demographic factors, or to none of the demographic factors. Finally, Extension Services in other states should replicate this study to make administrators aware of possible inservice needs among their employees.

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# Characteristics of Creative County Extension Programs in Texas: Comparison of Administrative Perceptions to Observations in Identified Creative Programs

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## Abstract

*A study on creativity in Texas Cooperative Extension (TCE) was conducted in 2004 in response to increasing interests in creative thinking in academia and industry and the inclusion of creative requisites in county agent performance and promotion measures. State and mid-level TEC administrators were given an e-mail questionnaire to determine attributes of successful, creative programs. Seventeen creative programs identified by mid-level administrators were qualitatively examined through informal interviews. Perceptions by administrators were then compared to characteristics revealed through county agent program descriptions. Administrators recognized audience-related factors including reaching new audiences and addressing relevant issues. These were seen in the programs identified along with identification of a target audience. Administrators discussed using new, non-traditional methods. Program examination revealed the use of a variety of delivery methods, an activity-based component, and multiple teaching experiences in the form of a series or an intensive workshop. Effective program planning, including grassroots planning groups, evaluation, and sufficient time to plan and implement were seen in creative programs. Technology, marketing, and outside funding were identified at lower levels.*

## Introduction

In the latter part of the twentieth century, interest in creativity has increased in research and in applications of creative thinking in academia and industry (Baker, Rudd, & Pomeroy, 2001; Kvashny, 1982). Creativity is based on divergent thinking, looking at a multitude of ideas, and is sometimes confused with critical thinking which contrastingly centers on convergent thinking or eliminating unreasonable or seemingly impractical possibilities (Beyer, 1987). Creative Problem Solving (CPS) models stretch the imagination by alternating between divergent thinking and convergent thinking in each step (Parnes, 1992). In this manner, the CPS process is used to "increase the probability of the generation and implementation of more or deeper relevant interrelationships of the wealth of data our brains contains and continually absorbs" (Parnes, 1992, p. 134).

## Theoretical Framework

Torrance's (1966) classic definition described creativity as a natural human process of sensing incompleteness and/or disharmonies and then engaging in conscious or unconscious activities to resolve the tensions created by this incompleteness. Amabile (1983/1999) took a slightly different approach, explaining that creativity is most often seen in the form of an end product which must be viewed and evaluated contextually.

> A product or response is creative to the extent that appropriate observers independently agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced. (Amabile 1983/1999, p. 206)

Creative value according to this definition requires worth not just by the creator, but also by peers, supervisors, team members, or field experts in the case of workplace applications. When creativity is defined as a product, the creative process results in an invention, a scientific theory, an improved product, a literary work, or a new design, etc (Torrance & Goff, 1989/1992).

"Creativity can be considered a function of knowledge, imagination, and behavior" (Parnes, 1992, p. 137). All must be present to maximize creativity. Parnes compared rearranging current knowledge into new patterns to a kaleidoscope. Individuals who achieve new ideas simply from information obtained from one's senses mimic a teleidoscope which uses colors and images from outside to form new patterns. The human brain, however, uses both internal (knowledge) and external (sensory) data in creative problem solving to generate new patterns or ideas like a "kaleido-teleido-scope" (Parnes, 1992, p. 137).

Business leaders and managers currently face the challenge of not just releasing and nurturing creative talents, but also focusing them to achieve desired effects or results

(Groth & Peters, 1999), which Plesk (1997) termed "directed creativity."

Creativity has also been recognized as an important attribute within the Cooperative Extension System (CES) since the mid 1980s with Warnock (1985) calling creativity "Extension's Future" and noting that practically every major innovative extension program was preceded by creative thinking on the part of the researcher or the extension agent. The Futures Task Force to Extension's Committee on Organization and Policy reported that Extension professionals needed a sense of vision, innovation, and/or creativity (Smith, 1988).

Texas Cooperative Extension (TCE) did not ignore the call to promote creativity. Document analysis revealed that creativity has been added as a performance measure noted in county agent performance appraisal instruments, career ladder promotion criteria, competency models, and in the TCE competency model (Womack, 2004). County extension agents are therefore required to be creative and/or innovative in order to excel within the organization. Adding such terminology to performance standards also necessitates defining creative program or creative work.

## Purpose and Objectives

This research focused on the question, "What constitutes a creative county-level program?" Naturalistic inquiry and emergent design (Lincoln & Guba, 1985) was used to examine extension administrators' perceptions of characteristics of creative county-level programs and to compare them with observed characteristics of programs identified as creative. The study was therefore designed to determine a creativity standard for creative programming so that county agents can meet the performance expectations of their supervisors. This research was part of a larger study that also examined perceptions of the value of creativity to Extension along with promoters and inhibitors of creativity (Womack, 2004).

## Methods

A census of mid-level and state administrators was conducted using a written questionnaire to determine administrative perspectives of creative programming because administrators evaluate individual performance of agents including creative requisites. State and mid-level administrators were asked to provide written answers to open-ended questions including "what makes a program creative?" Mid-level administrators were also asked to identify two programs which they considered to be both creative and successful, explain what makes them creative, and identify the lead agent(s). These responses provided an information-rich, purposeful sample to examine programs that met mid-level administrators' creative expectations (Borg, Gall, & Borg, 1996; Lincoln & Guba, 1985). Responses from state and mid-level administrators were randomly assigned an audit trail number beginning with the letters "S" and "M," respectively. Questionnaires were sent electronically using pre-notification and follow-up procedures described by Dillman (2000) and responses were returned via e-mail, fax, postal mail, and telephone transcription of answers resulting in a 100% response rate.

Programs identified as creative were examined using "unstructured" or exploratory interviews conducted via telephone or Internet conferencing with the lead agents for those programs to identify common characteristics (Lincoln & Guba, 1985, p. 269). The interviewer asked for elaboration until or used branching questions until the interviewer had an accurate understanding of the respondent's thoughts or feelings. Sampling continued until redundancy of answers occurred (Lincoln & Guba, 1985). Interviews were transcribed and subjected to member check procedures for accuracy (Lincoln & Guba, 1985). Responses from county agents were randomly assigned an audit trail number beginning with the letter "A."

The written answers to administrative questionnaires and transcripts from county extension agent interviews were unitized and categorized by emergent themes according to accepted qualitative means of naturalistic inquiry (Lincoln & Guba, 1985; Berg, 1998). Data from the two sources were then compared to other data sources including organizational reports, literature, and other documents using triangulation to ensure trustworthiness of the data sources (Gall, Borg, & Gall, 1996; Lincoln & Guba, 1985).

## Findings

The descriptions by administrators continuing to identify specific criteria they commonly associated with creative programs. The descriptions by county agents who were responsible for creative programs as identified by administrators were also examined to compare characteristics. Table 1 compares the administrative expectations to the actual characteristics of creative programs identified through county agent interviews.

A wide range of adjectives were used by both administrators and county agents to describe "creative" programs. Although administrators were directly asked "what makes a program creative," responses from county extension agents were derived from descriptions of their respective program and how creativity related to the planning process. Descriptors of creative programs and/or their components were "new," "unusual," "original," "innovative," and "out of the box." Although not specifically asked to define creativity, county agents also used "out of the box" to describe creative programs.

Table 1. *Perceptions of Common Characteristics of Creative Programs*

| Characteristics | Administrators | Agents |
|---|---|---|
| Audience Factors | | |
| Target Audience | .41 | .94 |
| New Audiences/Broad Appeal | .81 | .67 |
| Audience Convenience Factor | .03 | .59 |
| Program Planning | | |
| Relevant issue | .43 | .77 |
| "Grassroots" planning group | .32 | .59 |
| Evaluation / program planning model | .22 | .47 |
| Time to plan & implement | .32 | .77 |
| Outcome program | ___ | .24 |
| Interdisciplinary program | ___ | .35 |
| Delivery methods | | |
| New, non-traditional method(s) | .43 | .77 |
| Multiple delivery methods | .16 | .88 |
| Activity-based component | .03 | .82 |
| Technology component | .14 | .29 |
| Multi-generational component | ___ | .29 |
| Bilingual component | ___ | .17 |
| Educational program series | ___ | .65 |
| Workshop or conference | ___ | .18 |
| Collaboration | .11 | .94 |
| Catchy name or logo | .03 | .59 |
| Marketing component | .24 | .47 |
| Outside funding and grants | .35 | .53 |
| Teamwork (staff/volunteers) | .32 | .41 |

The most common description reported by administrators was the belief that an idea or subject did not have to necessarily be new, but could be presented with a different method that departs from routine. Typical quotes within this theme described creative programs as "any program that departs from traditional approaches, yet adheres to sound research-based methodology and subject matter" (M8), or using a "non-traditional approach to teaching a traditional audience" (M20), by "putting new/fresh approaches on old, familiar programs" (M21). Similarly, more than one-half of the agents agreed with

administrators that creative programming did not have to be a new program, but strictly a new twist on materials.

Some of the programs submitted initially did not provide much insight into what made the program creative. A peer reviewer with expertise in extension program development and evaluation noted that eleven of the forty-two programs nominated by the initial response deadline appeared to very effective or successful but not necessarily creative based on his interpretation of the administrators' explanations. Descriptors of "effective," "productive," or "quality" attached to programs with little or no explanation about its creative characteristics suggested confusion by some mid-level administrators between an "effective" and a "creative" program, possibly using the terms synonymously at times.

Identified characteristics fell within broad themes related to audience factors, program planning process, delivery methods, and other considerations. Analysis of the data revealed that creative programs effectively used one or more of the following components of the program planning process: audience identification, needs assessment, grassroots planning, and evaluation.

Audience-related characteristics, including audience identification and attracting new audiences, were common responses in descriptions of creative programs for both administrators and county agents. Identification of a target audience was a characteristic described in 94% of the creative programs examined; however, only 19% of administrators specifically used the words "target audience" when explaining attributes of creative programs. Other administrators described creative programs as satisfying the specific needs of an audience, which was interpreted as the concept of a target audience within explanations about the value of creative programs. A similar characteristic identified by 67% of administrators as an element of creative programs was attracting new audiences or having broad appeal. Audience convenience factors like special locations, weekend and evening times, and Internet access to information were noted in 59% of the programs, but only one administrator acknowledged the importance of this factor by suggesting that creative programs be "user-friendly" (M31).

Program planning characteristics identified by both administrators and seen in program examinations included addressing relevant issues, grassroots planning, evaluation and program evolution, and adequate time to plan and implement creative programs. Issue-based programming was a criterion for effective creative programs according to 43% of administrators; it was also observed in 77% of the programs examined.

Grassroots involvement is one of the cornerstones of accepted program planning models in Extension. Grassroots planning was specifically mentioned as a characteristic or as a promoter of creative programs by 32% of administrators.

> I think most creative and successful programs are identified and developed through local committees that are very familiar with the issue to be addressed, but have very little knowledge of how traditionally Extension or other groups

> addressed similar issues. . . . committees should have a variety of personality types to stimulate new ideas and creative solutions. (M23)

Similarly, 53% of county agent responses also revealed the importance of grassroots committee planning. According to county agents, committees provided a plethora of viewpoints during the program planning process. Agents related that effective committees can bring in "new blood and new ideas, new thoughts of how to do things or what to do" (A6). If an agent can "take some of those ideas and merge them, [they] can really produce some outstanding creativity" (A3). Simply having a committee did not appear to be sufficient, but having the "right" members on that committee was identified as equally important. Committees were also recognized as an inhibitor when they are steeped in tradition and resist change.

> If you have committees that have been around for twenty or thirty years, . . . unless they themselves are very . . . active and open to new ideas, then I think that's going to make it hard for you to do your work or maybe to identify areas where you can maybe branch out (A9).

Another similar way to increase the divergent thinking and to keep programs relevant is by "making sure you're in contact with the people who need it" (A5), which may include "going out and mingling with people in the industry" (A15). A creative agent stays relevant by

> paying attention to trends . . . [and] what people are seeking and looking for . . . a whole lot of that we've got to get from asking people. They'll tell you . . . what they want . . . it's just a matter of figuring out a way of adapting what they are telling you into a program" (A10).

One agent explained part of his needs assessment process: "I polled a bunch of [target audience] and asked them, 'What do you need from Extension? What are your greatest needs and how can we help?' which is always a dangerous thing to do, but they were very responsive" (A16).

Program evolution and adaptability often occurs through effective use of evaluation. Evaluation allows for improvement in ongoing or repeated programs, a characteristic of 84% of the programs examined. Planning and implementing such improvements requires additional time. For example, agents reported that additional planning was required of interdisciplinary and annually required outcome-based programs.

Incorporating innovative, unique, or non-traditional methods was mentioned by 43% of administrators (e.g.) "Usually it is not that the information is particularly new, but that a new way of presenting it is utilized" (M17). However, administrators did not define terms like "unique" or "non-traditional" nor did they give examples.

A common characteristic seen in the 88% of the creative programs examined was use of multiple delivery methods within a program. A plethora of learning experiences was identified including use of lecture, demonstration, field trips and tours, hands-on

experimentation, self-directed projects, case studies and investigation, medical tests and results interpretation, newsletters, Web sites, mentoring, public speaking, and community service. A common thread in delivery methodology, however, was active-learning or hands-on experiences which were identified as a critical component in 82% of the programs. Technology was mentioned as a common element in creative programs by only 14% of administrators and only 24% of examined programs identified a technology component. Other methodology characteristics that were seen at much lower frequencies included a multi-generational facet and a bilingual component.

Another common theme found in most of the identified programs was the use of multiple learning experiences and not strictly single presentations. An educational program series was used in 65% of the creative programs studied. Intensive study with multiple presentations and experiences through a conference, retreat, or short-term camp were used in an additional 18% of the programs.

Collaboration was present in 94% of the programs examined but not identified as a characteristic by administrators specifically. Other characteristics were less common. A marketing component was identified by administrators, including such things as a catchy logo or name in 59% and special marketing/promotional efforts used by 42% of the programs examined. Grant support of outside funding was noted by 35% of administrators and in 53% of the programs. Teamwork including support by co-workers and/or volunteers was identified by 32% of administrators and in 41% of the programs (Table 1).

## Conclusions

The researchers observed from written responses that state administrators generally provided more complete explanations of what makes a program creative and appeared to have a broader understanding of creativity's value on multiple levels. Few mid-level administrators were able to provide clear, concise answers to "what makes a program creative." The variety within answers suggested that creative expectations are poorly defined for county agents and vary depending on their supervisor. Some of the programs initially submitted did not provide much insight into what made the program creative by the mid-level administrators' descriptions. A peer reviewer with experience in extension programming and evaluation noted eleven of the forty-two programs that were nominated by the initial response deadline appeared to be very effective or successful, but not necessarily creative based on his interpretation of the administrators' explanations. Those observations coupled terminology confusion and the use of descriptors like "effective," "productive," and "quality" by 22% of administrators suggests that some mid-level administrators might have difficulty deciphering between creative and successful programs.

The terms "new," "unusual," "original," or "different" were used to describe an overall program, approach, or method. However, 70% of administrators and 53% of county agents recognized that a creative program may not have new subject matter but is being delivered using a new method that departs from routine or tradition.

Administrators may need to identify a list of "traditional" delivery methods (i.e., lecture, visual demonstration) to provide a benchmark for identifying methodologies considered to be "creative," "innovative," or "non-traditional.". Extension literature supports the use of innovative program delivery methods (Taylor-Powell & Richardson, 1990) and new approaches and tools to improve Extension's effectiveness (Warner, 1993).

Program planning models provide a framework for creating a successful, relative educational program with measurable impacts. Administrators' descriptions of creative program criteria mirrored elements commonly found in widely accepted extension program planning models.

Use of committees and grassroots efforts in program planning was one of the key components discussed by both administrators and agents for an influx of ideas. When used effectively, committees and task forces provide the source for divergent thinking during program planning and allow Extension to bring in the ideas and resources of collaborators. These findings are supported by Parnes' (1992) "kaleido-teleido-scope" effect where new patterns and combinations are made from both internal and/or external elements.

A creative program incorporates innovative, unique, or non-traditional methods according to 43% of administrators. One mid-level administrator explained, "Most often when we think of creative programming it is the delivery methods that are creative" (M17). That statement aligns with performance appraisal measures requiring "creative and innovative methods" (Texas Agricultural Extension Service, 2000, p. 20). However, because less than one-half of administrators identified delivery methods as a characteristic of creative programs, one might wonder if the administrators consciously recognize that using creative and innovative program delivery methods is one of the evaluation standards for county agents.

A variety of delivery methods were used in the seventeen programs examined with most using multiple methods. The use of active learning seen in 65% of creative programs may suggest that traditional methods may be more passive delivery practices including lectures and distribution of printed publications and newsletters.

Although technology is specifically mentioned in performance appraisal standards, technology use was not prevalent in program descriptions. However, concerns were voiced by both administrators and agents that Extension may be behind the technology adoption levels of clientele. It was also noted that providing clientele with more on-line learning experiences might help Extension appear technologically savvy and relevant. Technology was also suggested as a venue to provide information to computer-literate clientele who seek assistance after traditional work hours. Concerns were voiced about potential clientele going elsewhere for information if they could not find it on-line on demand. Therefore, it might be beneficial to incorporate technology as one of the multiple methods in programs to assist Extension in meeting its mission to provide quality, relevant outreach and continuing education programs and service to the people of Texas. Texas Cooperative Extension should carefully examine the best

applications of technology to meet the needs of clientele.

Collaboration is another performance standard, but was absent in the descriptions of creative program criteria by administrators. One or more major collaborators were identified in 94% of the creative programs examined. Collaborators provided facilities, financial support, personnel support, or significant assistance in planning. The lack of administrative acknowledgment may stem from collaboration being a performance standard and thus assumed to be part of programs; however, its appearance in the vast majority of programs studied warranted its inclusion in creative programming criteria.

Marketing and promotion was identified as a component or promoter of creative programs by 22% of mid-level administrators and was seen in 47% of the programs. Targeted marketing and specific promotional components may be considered creative due to deviation from traditional Extension program promotion. Creativity and divergent thinking may help to expand the marketing efforts of all extension programs. This conclusion was supported by the report of the TAEX Urban Task Force Subcommittee on Expansion which recommended finding readily identifiable banner programs along with an internal and external marketing plan (Texas Agricultural Extension Service, 2001).

The researchers also noted that program development models provided the framework for creating a successful, relevant educational program with measurable impacts in the creative programs examined. Administrators' descriptions mirrored elements (i.e., issue identification, target audience identification, grassroots planning, and evaluation) commonly found in widely accepted extension program development models.

Use of committees and grassroots efforts in program planning was one of the key components discussed by both administrators and agents for an influx of ideas. When used effectively, committees and task forces provide the source for divergent thinking during program planning and allow Extension to bring in the ideas and resources of collaborators. These findings are supported by Parnes' (1992) "kaleido-teleido-scope" effect where new patterns and combinations are made from both internal and external elements.

## Recommendations and Implications

The linkage between creative programming and successful or effective programming is a natural association for administrators and managers who are looking at productivity as one of the measures of the organization. Extension administrators face the same challenges as industry leaders and managers, of not just releasing and nurturing creative talents, but also focusing them to achieve desired effects or results (Groth & Peters, 1999). However, guidelines that distinguish creative from simply traditional, successful programs should be further clarified since agent performance and promotion measures are specifically linked to creative programs.

Diverse delivery methodologies were reported to be a key element of creative programs. In an effort to identify creative methodologies, providing a list of specific

creative techniques might actually limit creativity; a better approach could be to create a list of methods that are typically considered traditional (i.e., lecture, visual demonstration, etc.). TCE should assist county agents in divergent thinking exercises associated with programming. For example, recognizing creative programs or having agents share their creative programming success stories may spark new ideas or approaches for educational programs for other county agents and thus promote creativity within the organization.

Creativity should be promoted within the organization since creative products are required of employees according to performance and promotion measures. Furthermore, creativity appears to be linked to organizational and professional excellence according to responses by administrators, agents, and selected literature reviewed (Groth & Peters, 1999).

As agents pointed out during interviews, many creative programs already exist in counties, but concerns are still apparent that agents may be stretched too thin. The ability to produce exceptional extension programs will not come from expecting miracle performance in increasingly demanding situations, but when agents are provided the time and resources needed to adequately develop creative programs and exercise their own unique creative potentials.

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# Student Demographics, Extracurricular Participation and Safety Education of Students Participating in the 2003 Houston Livestock Show and Rodeo Agricultural Mechanics Project Show

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## Abstract

*The Houston Livestock Show and Rodeo Agricultural Mechanics Project Show is the largest show of it kind in Texas, and perhaps the largest in the nation. This extracurricular activity provides students and agricultural education programs an opportunity to display skills developed in agricultural mechanics laboratories by exhibiting projects constructed entirely by students. Projects such as gooseneck trailers, bulk feeders, cattle chutes, truck bumpers, and tractor accessories are designed, constructed and exhibited. It is perhaps the most comprehensive opportunity for authentic assessment in agricultural education.*

*The primary method of data collection for this descriptive study was a survey completed and collected during the 2003 Project Show. Results of the study revealed that an overwhelming percentage of students in the activity were white males. Surprisingly over one-third indicated the FFA was the only extracurricular activity in which they participated. Regarding safety, more than 90% indicated they had taken a safety exam and received instruction in topics such as fire, ear/hearing, tool, chemical, greenhouse, and eye safety. Unfortunately, just over three-fourths had learned about electrical safety, and even lower percentages had received instruction on electrical and equipment safety. More than two out of five students indicated they were not required to wear eye protection in the agricultural mechanics laboratory, and almost four out of five were not required to wear ear/hearing protection.*

## Introduction

Agricultural education programs offer many unique hands-on opportunities and extracurricular activities to develop both valuable academic and career skills for its students. A large body of research exists that indicates that extracurricular activities improve students self-esteem, self-perception, grades and health, as well as a wide variety of other issues including lowering absenteeism and disciplinary problems (Grafford, 2004). Mahoney and Cairns (1997) looked at the positive connection to school that participating in extracurricular activities created among student whose prior commitment to the school had been marginal. They discovered that a wider choice of activities resulted in a stronger effect because students' individual needs and interests were more likely to be met. Agricultural laboratories provide opportunities for students to engage in scientific inquiry and application through the design, development and presentation of mechanics projects. Experiential learning, or learning by doing, is the foundation of agricultural education (Making a Difference, 2002).

The interrelationship of extracurricular participation and classroom learning is unique to career and technology [vocational education] especially in agricultural education. Laboratories and out-of-school activities available in secondary agricultural education programs are very diverse. Facilities are a mix of classrooms, greenhouses, agricultural mechanics, aquaculture, food processing laboratories, school farms, and off-campus livestock facilities. Extracurricular activities available to students are just as diverse as the facilities. Activities including leadership, communication and personal skills development, judging and livestock showing events and mechanical skills development are widely available.

While preparing students for progression to the university, community college, or careers in the agricultural industry, traditional vocational laboratories of programs are often less than ideal examples of appropriate work environments (Hubert, Ullrich, Lindner & Murphy, 2001). Agricultural laboratories also create the opportunity for students to design and build various projects and offers opportunities for these students to exhibit their projects at organized events. McNeal (1995) indicated that extra curricular participation provide previously marginalized students with access to a more "elite" stratum of the student population and exposes the students to peers who have better attitudes toward school.

Student popularity of traditional laboratory courses, particularly agricultural mechanics, is substantiated as up to two-thirds of teacher course assignments may be spent in these laboratories (Shinn, 1988). Unfortunately, teacher preparation in the area of agricultural mechanics and safety instruction continues to be limited (Hubert, 1996) and this may indicate a weakness in safety preparedness and the creation of a total safety climate within the program. Furthermore, participation in agricultural mechanics project shows in Texas has increased dramatically during the past decade (Harrell & Muller, 2003). Extracurricular activities such as these offer opportunities for students to learn the values of teamwork, individual and group responsibility, physical strength and endurance, competition, diversity, and a sense of culture and community. Lamborn

(1992) and Finn (1993) stated that extracurricular activities provide a channel for reinforcing the lessons learned in the classroom, offering students the opportunity to apply academic skills in a real-world context, and are thus considered part of a well-rounded education.

## Theoretical/Conceptual Framework

Over the past decade, concerns for the health and safety of student populations, as well as extracurricular involvement, in Texas have grown in importance. Districts have complicated these two issues by increasing demands on teachers to improve scores on state-mandated tests and through Texas policy of local control of state-based educational funding. These decisions have placed career and technology (vocational-based) programs at the bottom of the importance hierarchy; thus, such programs have endured financial neglect by administrators in favor of computer labs or other hi-tech courses that seem to emphasize test-taking skills (Harrell & Muller, 2003). This is a concern in the case of student health in laboratories stocked with dangerous equipment, as the cause of greatest concern for the health of children and adolescents has become unintentional injuries (U.S. Department of Health and Human Services, 1990.)

According to Dyer and Andreasen (1999), agricultural education laboratories and shops can be hazardous teaching and learning environments. In such laboratories, injuries and mishaps often go unnoticed by the teacher and contribute to inadequate reinforcement of proper student work habits (Hubert, Ullrich, Lindner & Murphy 2001). This may be especially true when teachers and students rush to meet deadlines for entry into various agricultural mechanics project shows.

In such project-oriented courses, Phipps and Osborne (1988) question whether the primary aim of laboratory instruction is skill development or project construction. Too often project completion timetables are set by fair entry deadlines. Project completion takes precedence over skill development progress. If skill development is the focus of laboratory instruction, then thorough attention to all its components, including safety instruction, is essential. These authors further indicate that teachers need to use the laboratory to help students learn and develop efficient work habits and positive attitudes toward working, while also insuring safe laboratory conditions conducive to the growth of each student.

To combat the prospect of student injury in shops or laboratories, a strong safety climate must be instituted in programs. It is recognized that safety is not the most glamorous component of most courses. Safety education is covered, albeit in various degrees, within a lesson for specific tool use or unit of instruction (Hubert, Ullrich and Murphy 2000). Teachers must be aware of what they say and do for they are the ones ultimately responsible for the consequences of their own actions (McCormick, 1994). If teachers fail to promote and follow safety procedures, students may likely follow suit. From this perspective, one must be mindful of the consequences teachers' actions and behaviors have on students' learning and attitudes toward safety.

Adolescents tend to see things in black and white and fail to take into account the perplexities and complexities of the real world (Clark & Starr, 1996). They tend to live in a risk-taking world where ignoring the rules adds to the excitement of the moment. Frequent risk-taking is "normative, healthy, developmental behavior for adolescents" (Ponton, 1997). Agricultural education programs supported with laboratories are designed to present real-world situations to students in safe learning environments. The primary focus of laboratory instruction should be to develop students' ability to perform the skills needed in real occupational settings (Hubert, Ullrich, Lindner & Murphy, 2001). In the course of skill development, evidence suggests that students will be more safety conscious if teachers also follow proper safety practices, demonstrate accurate safety knowledge, provide a safe laboratory environment, convey a positive safety attitude, and relay safety expectations to students (Harper, 1984).

Phipps and Osborne (1988) assert that a major portion of laboratory supervision by the teacher is to emphasize and demonstrate safety, provide feedback on students' safety procedures, and provide relevant feedback and reinforcement for student performance. No teacher wants to be the defendant in a negligence lawsuit brought against his or her district. Teachers of vocational agriculture, school administrators, and boards of education have been found extremely vulnerable to being found negligent and liable if a student were injured in the agriculture shop (Gliem and Hard, 1988). Crunkilton and Krebs (1982) asserted that a person learns what is practiced, whereas McCormick (1994) stressed learning connotes a change of behavior. Unsafe student behaviors put a program at risk. Sullivan (1990) concluded that modeling safe behavior is one of the 16 actions necessary to protect students from injury. Thus, a student injured from an unsafe practice demonstrated by the teacher could result in costly and preventable consequence to the teacher, program, school, and district. We must remember the teacher is responsible for promoting desirable attitudes that assist pupils in developing a proper respect for safety (Kigin, 1983).

Further identification of the less safe practices of teachers is necessary. That is, those teachers who believe safety is important are more willing to adhere to safety laws, policies, and practices, thereby resulting in safer teaching and learning environments, lower student injury rates, and decreased legal liability (Hubert, Ullrich, Lindner & Murphy, 2001). The Houston Livestock Show and Rodeo Agricultural Mechanics Project Show is most likely the single largest authentic assessment activity completed on the basis of actual demonstration of mechanical and presentation skills. Furthermore, issues concerning the development of safety skills and attitudes during project construction are essential to reduce the incidence of future injuries.

The Agricultural Mechanics Project Show held during the Houston Livestock Show and Rodeo has been an integral part of developing the workmanship and mechanical skills of youth in Texas for over 20 years. During the 2002 event nearly 700 projects, ranging from gooseneck trailers to bulk feeders to cattle chutes to truck bumpers and tractor accessories, were displayed by approximately 800 agricultural education youth and constructed by well over 2400 in laboratories dispersed across the state (W. Harrell & J. Muller, personal communications, October 15, 2003). This being the largest single event

of its kind, data concerning participant demographics, extracurricular activities and safety education would be helpful in identifying weaknesses in safety education program.

## Purpose and Objectives

This project's purpose was to gather data concerning the participating students and schools that participated in the Houston Livestock Show and Rodeo's Agricultural Mechanics Project Show. The specific objectives were to:

1. determine demographic characteristics of respondents;
2. determine extracurricular activities in which the students participate; and
3. determine the types and extent of safety education received before working on projects.

## Procedures

The target population of this study was Texas agricultural education students participating in the 2003 Houston Livestock Show and Rodeo Agricultural Mechanics Project Show. Because this is descriptive research sponsored by the Houston Livestock Show and Rodeo, a questionnaire was developed based upon a series of student and program characteristics and following a review of the literature by the researchers. The instrument consisted of three sections: Demographics, Extracurricular Participation and Personal Health and Safety Training.

A panel of high school agricultural mechanics students and agricultural education teachers reviewed the instrument and identified items to be included, modified or removed to improve for face and content validity. To improve reliability, the instrument was field tested with agricultural science teachers and high school students involved in agricultural education programs during the Area IX, Sam Houston District FFA meeting at Huntsville High School.

Eight hundred surveys were prepared and 650 were distributed during the entry and set-up day of the 2003 Houston Livestock Show and Rodeo Agricultural Mechanics Project Show. Students returned 568 survey or 87.38% of those distributed. A qualifying question was used to eliminate those students whose projects were entered through 4-H programs; thus, 43 surveys were removed. Also, 31 surveys were found to be incomplete and therefore unusable. This allowed for 494 useable surveys and a return rate of 76.15%. Descriptive statistics were tabulated using Microsoft Excel®.

## Findings

Objective one was to describe students participating in the 2003 Houston Livestock Show and Rodeo Agricultural Mechanics Project Show. An overwhelming majority (88.06%) of the respondents were males. The average age of the respondents was 16.86 years old and the age and ethnicity distribution is shown in Table 1. It is also obvious when reviewing the data illustrated in Table 2, that Anglo (non-Hispanic) students

comprise the vast majority (93.50%) of the participants with Hispanics being a distant second (4.07%).

Table 1. *Age Distribution of Respondents*

| Age in Years | Frequency of Responses |
|---|---|
| 13 | 19 (3.85%) |
| 14 | 51 (10.32%) |
| 15 | 77 (15.59%) |
| 16 | 194 (39.27%) |
| 17 | 138 (27.93%) |
| 18 | 15 (3.04%) |

n = 494

Table 2. *Ethnicity Distribution of Respondents*

| Ethnicity | Frequency of Responses |
|---|---|
| Anglo (non-Hispanic) | 460 (93.50%) |
| Hispanic | 20 (4.07%) |
| African American | 6 (1.22%) |
| Other | 3 (0.61%) |
| Native American | 2 (0.41%) |
| More than one ethnicity | 1 (0.20%) |
| Asian | 0 (0.00%) |

n = 494

Objective two was to describe the extracurricular participation of students involved in the 2003 Houston Livestock Show and Rodeo Agricultural Mechanics Project Show. All 494 respondents were members of the Texas FFA Association. One item of note was that over one-third of the respondents listed FFA as their only extracurricular activity. Table 3 describes the various activities in which the respondents identified as being involved.

Table 3. *Frequency of Respondents Extracurricular Activities*

| Activity | Frequency of Responses |
|---|---|
| FFA | 494 (100%) |
| Football | 153 (30.97%) |
| 4-H | 102 (20.64%) |
| Track | 102 (20.65%) |
| Baseball | 74 (14.98%) |
| Basketball | 70 (14.17%) |
| Volleyball | 16 (3.23%) |
| Softball | 15 (3.05%) |
| Tennis | 14 (2.83%) |
| Other various activities | 74 (14.98) |
| Other C&T Clubs | 70 (14.17%) |
| Beta / Honor Society | 64 (12.96%) |
| Band / Choir | 33 (6.68%) |
| Foreign Language Club | 24 (4.86%) |
| Cheerleading / Dance | 16 (3.24%) |

n = 494

Objective three was to determine the types and extent of safety education received before working on projects, and these results are displayed in Table 4. The vast majority of responding students (96.36%) indicated that they had taken a safety exam and had been presented material on: fire safety (95.55%), CPR instruction (95.14%), ear or hearing safety (94.13%), chemical safety (93.32%), greenhouse safety (91.30%), and eye safety (90.69%). Also, almost 95 percent of students understood that their safety exams were filed at school.

To a lesser degree students were presented material on electrical safety (77.33%), biohazard safety (71.26%) and equipment safety (67.61%). Interesting to note is that over three-fourths of the students were presented material through computers to learn about safety or first aid. Furthermore, a slight majority indicated that they were required to wear safety glasses in the laboratory (57.70%), have received first aid training (53.24%) or had a teacher demonstrate hand and power tool safety (52.43%). Not surprisingly, less than half had a guest speaker present topics concerning safety in class and were presented topics on animal safety. A last item is that just slightly more than 20 percent indicated that they were required to wear ear protection when working in the laboratory.

Table 4. *StudentSafetyInstruction n = 494*

| Question | **Yes** | *No* | *N/A* |
|---|---|---|---|
| Have you ever taken a safety exam? | 476 (96.36%) | 18 (3.64%) | 0 (0%) |
| Were you provided or presented material on fire safety? | 472 (95.55%) | 7 (1.42%) | 15 (3.04%) |
| Have you received CPR instruction? | 470 (95.14%) | 11 (2.23%) | 13 (2.63%) |
| Are your safety exams kept on file at school? | 469 (94.94%) | 11 (2.23%) | 14 (2.83%) |
| Were you provided or presented material on ear or hearing safety? | 465 (94.13%) | 11 (2.23%) | 14 (2.83%) |
| Were you provided or presented material on tool safety? | 461 (93.32%) | 15 (3.04%) | 18 (3.64%) |
| Were you provided or presented material on chemical safety? | 461 (93.32%) | 17 (3.44%) | 16 (3.24%) |
| Were you provided or presented material on greenhouse safety? | 451(91.30%) | 27 (5.47%) | 16 (3.24%) |
| Were you provided or presented material on eye safety? | 448 (90.69%) | 29 (5.87%) | 17 (3.44%) |
| Were you provided or presented material on electrical safety? | 382 (77.33%) | 81 (16.40%) | 31 (6.23%) |
| Were you provided or presented material on computer to learn about safety or first aid? | 379 (76.72%) | 91 (18.42%) | 24 (4.86%) |
| Were you provided or presented material on biohazard safety? | 352 (71.26%) | 97 (19.64%) | 45 (9.11%) |
| Were you provided or presented material on equipment safety? | 334 (67.61%) | 108 (21.86%) | 52 (10.53%) |
| When working in the agricultural mechanics laboratory were you required to wear eye protection? | 285 (57.70%) | 183 (37.04%) | 26 (5.26%) |
| Have you received first aid instruction? | 263 (53.24%) | 206 (41.70%) | 25 (5.06%) |
| My teacher has conducted hand and power tool safety demonstrations. | 259 (52.43%) | 187 (37.85%) | 48 (9.72%) |
| Have you had a guest speaker in class talk to you about safety? | 225 (45.55%) | 215 (43.52%) | 54 (10.93%) |
| Were you provided or presented material on animal safety? | 223 (45.14%) | 221 (44.74%) | 50 (10.12%) |
| When working in the agricultural mechanics laboratory were you required to wear ear protection? | 109 (22.06%) | 52 (10.53%) | 333 (67.41%) |

## Conclusions

Positive safety climates and active extracurricular programs are essentials for the students to be successful and safe in any school system. Both of these topics are of concern to all agricultural education teachers to ensure the social development, skill improvement and the creation of safety attitudes, beliefs and practices.

One item of great concern to the researchers is the data concerning gender and ethnicity. Few females and students of an ethnicity other than Anglo are represented. Granted, a wide array of research studies illustrate that the ethni issue is not confined to agricultural mechanics participation.

Secondly, it can be inferred from a review of the data that a larger than expected number (175, or 35.43%) of participating students are active in the FFA program only. It might be further assumed that these students are largely involved only in the agricultural mechanics activities sponsored by the Houston Livestock Show and Rodeo and other similar organizations sponsoring project shows.

A vast majority of students are receiving safety education and materials concerning fire, ear and hearing protection, tools, chemicals, greenhouses and eye protection. Two issues of concern are that only three-fourths of the students are receiving instruction concerning electrical safety and equipment safety.

It is odd that a large majority of students are receiving CPR training but only slightly more than one-half receive training on first aid procedures. Is it possible that the term "CPR" confused the students? The researchers cannot explain this seemingly contradictory data and further review is necessary in this area.

Other issues that should be immediately addressed is the data revealing that less than 60 percent of the students were required to wear safety glasses, just over one-half had teachers that conducted tool and equipment demonstrations, and only 22 percent were required to wear hearing protection in the laboratory.

Teachers should use all avenues to address safety issues with their students, including demonstrations, guest speakers and computer aided instruction. None of these avenues were used at acceptable levels.

## Recommendations

It is essential that agricultural education teachers involved in this program reflect upon this issue and identify roadblocks to ethnic and female participation. The ethnicity concern certainly expands across agricultural education and the FFA, but the gender issue is less prevalent. Barriers to participation, as well as factors contributing to existing stereotypes, needs further research. Further study of teacher and student attitudes is recommended to identify possible biases.

If FFA agricultural mechanics activities are the only extracurricular activities in which 35.43% of these students are involved, the concept of project shows needs to be broadened and more outlets developed for student exhibits. As Black (2002) stated, students who participate in structured extracurricular activities are likely to have higher academic achievement and higher levels of commitment and attachment to school.

The percentage of students receiving instruction in electrical safety and equipment safety should be much higher and should be immediately addressed by agricultural educators. Anything less than 100% could prove fatal.

Similarly, 100% of the students should be responding that they are required to wear safety glasses and hearing protection in the laboratory. While economics should not be a limiting factor in this matter, national and state agricultural education leaders should develop partnerships with major companies in the safety industry to provide safety materials at little or no cost.

Perhaps the strongest recommendation that can be made is the proposal of a required course focusing solely on shop and laboratory safety in all teacher preparation programs or at the least coordination of required agricultural mechanics/engineering course curriculum to include necessary safety and health issues. The agricultural education profession gives much attention to skill acquisition, and in some cases, requires special certification to teach related courses. Unfortunately, safety often receives only a token mention. The agricultural education program is always only one major laboratory accident away from having its safety instruction questioned and scrutinized.

Additional research in the area of FFA activities is recommended to further assess their impact on student accomplishment and skill acquisition in high school and beyond. It is suggested that research from athletics program be used as a model of research for FFA activities research

## Discussion/Implications

The implications that many students only participate in extracurricular agricultural mechanization exhibits creates unique implications. If such a large percentage of students only participate in these types of activities, we must develop other avenues for these students to exhibit their skills and more research needs to further define this area of perceived need.

Other findings of the study identified strengths and possible weaknesses in the safety education of students involved in programs that are widely considered premier or at least very good agricultural mechanics programs. Even though the issues of safety, safety education, facility management and safety problem identification has been a hot topic during the past five years at Professional Development Conferences in Texas, studies such as these still find concerns that need to be addressed.

Safety issues cannot be ignored and the development of a statewide safety development program is essential. If organizers of project shows, agricultural educators and experts from industry stress the importance of safety, continuous and systematic positive change will occur.

From another standpoint the researchers noticed the lack of ethnic and gender diversity in the project shows participants. This issue is of great concern and further effort and research needs to follow.

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# Correlational and Predictive Attributes of Demographic Factors and Their Relationship to Hispanic Participation in Texas Extension Programs

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## Introduction

In keeping with its mission, Extension education continues to change its programs to meet the needs of a changing society. Once a rural, agrarian state with the bulk of the population concentrated in the eastern portion of the state, Texas has changed significantly in the last century. By 2030, trends suggest a population that is 63% ethnic minority and is poorer, less educated, and less equipped to compete globally. Growth patterns suggest increases in demand for owned housing, health care, personal care costs, and reduced demand for traditional educational services. The future of Texas is one of increased use of welfare and human service programs, lower per capita tax revenues, and increased government costs (Murdock et. al, 1997).

For an agency dedicated to education and, in addition, one that is non-formal in nature, Extension has great potential to position itself to meet the educational needs of Hispanic audiences if it can dedicate itself to reducing institutional barriers, developing relevant competencies among its faculty, and implementing methodologies that will serve the specific needs of Hispanic audiences. Otherwise, Extension may be perceived as a traditional educational service that serves a very narrow audience and not valued as highly by nontraditional audiences or viewed as a contemporary provider of educational programs and services.

Bernard Jones, former chair of ECOP, Dean and Director of Nevada Cooperative Extension, stated that the land grant system, including Cooperative Extension, was not created with a narrow focus on agriculture. He went on to say that the land grant system was created based on societal needs of the people and of the nation and the mission of Extension reflects this strong commitment to the needs of people. Further, he indicates that Extension cannot expect a great future if it remains primarily focused on 2% of the

population involved in production agriculture. Jones insisted that only quality programs will receive funding in the future and while Extension has quality programs, it also has a number of outdated programs. Extension must also hire more diverse faculty and must expand the scholarly achievements of faculty to assure that they maintain credibility and respect among peers and the public (Jones, 1992).

As a provider of non-formal education, Extension is in a position to respond to the needs of the fast growing Texas Hispanic community by developing and delivering appropriate educational responses that can be helpful to Hispanic audiences throughout Texas and the nation. An understanding of the specific needs of this audience and the skills to effectively develop, deliver, and evaluate educational programs to these audiences is critical to any successful effort. A three-year average of reporting data (2001–2003) from the Texas Cooperative Extension report database (TCE, 2003) showed an average of 58,049 records per year, 132,176 group methods per year, and 2,908,715 educational contacts per year. Of those contacts, Hispanics accounted for an average of 683,485 per year, or 23.5%. At this level and considering the 33.9% Hispanic share of the Texas population, Extension programs are reaching Hispanics at a 69.3% parity level (Census, 2002).

Parity was used as a performance factor in this study to describe the degree to which Extension agents successfully reached Hispanics in their county at a level that mirrored the demographics of the county. It was also used as a way to compensate for the range of differences in Hispanic populations throughout the 254 counties in Texas. The use of the term parity was in the place of formal legal terms such as disparate treatment or disparate impact because it was the purpose of this study to identify variables that could reasonably lead to higher levels of Hispanic participation in Extension programs and not to identify elements of Texas Extension programs that had discriminatory intent or effect. Nonetheless, the issue of civil rights cannot be separated from studies that explore reasons why certain protected populations are not served or do not benefit from public services in equitable proportions to mainstream populations.

Further analysis of state reporting data by state goal and by selected identifier codes allowed more precise description of data relevant to this study. Table 1 illustrates Hispanic participation in each of four state goals and parity levels for each goal. State Goal 1 is related to the issues of health, safety, and well-being and showed the highest percentage of Hispanic participation at 33.8%. This participation rate is 99.7% of parity. Parity was calculated by dividing percent participation by 33.9%, a fixed factor that represented the percent Hispanic population for Texas.

On the opposite end of the scale, the state goal dedicated to economic competitiveness, goal 3, had a participation rate of 13.2% Hispanics, 38.9% of parity. The other two goals, environmental stewardship and life skills/leadership, showed 21.6% and 21.3% Hispanic participation, respectively. These statistics place Extension programming for one goal at parity with the population and leave the other three goals at significantly lower levels ranging from 38.6% to 63.7% of parity.

Table 1. *% Hispanic participation and parity levels by state goal, 2001-2003*

| State Goal | Health (1) | Env. Stew. (2) | Econ. Comp (3) | Life Skills (4) |
|---|---|---|---|---|
| % Hispanic Part. | 33.8 | 21.6 | 13.2 | 21.3 |
| % Hisp. Pop. (2002) | 33.9 | 33.9 | 33.9 | 33.9 |
| % Parity | 99.7 | 63.7 | 38.9 | 62.8 |

To further describe current levels of Hispanic participation in Extension programs, monthly report data was retrieved according to a variety of statewide initiatives. A total of 38 statewide initiatives were examined. Only 11 of the 38 initiatives selected met or exceeded parity. Overall, Exension's average for Hispanic participation falls below that of their share of the population. While some programs clearly exceed parity, others fall sufficiently short of it so as to draw the organizational average to its level at 69.3% of parity.

The need to improve Hispanic outreach in TCE has been driven by fast changing demographics in the state, state administrative support for a state diversity plan, including staffing priorities for minority faculty and emphasis on hiring county faculty that reflect the demography of the state and the counties they serve (Gillespie, 2003). Furthermore, Gillespie (1996) provided evidence that Hispanics will participate in Extension programs given the opportunity, relevant programs that meet their needs, and appropriate educational approaches. Gillespie (1996) cited a finding in her five-year project for Texas Cooperative Extension that Hispanics were eager to participate in Extension educational programs. These findings challenge the common assumption that a lack of participation by Hispanics is caused wholly by their lack of interest and has no relationship to organizational variables. Conversely, these findings support the need for more detailed study of variables that affect Hispanic participation in Extension programs and eliminate audience initiative or interest as the lone variable(s).

## Theoretical Framework

Knowles' et al. (1998) core principles of adult learning are a critical framework from which to consider strategies that could improve programs and services for Hispanics. While some references to pedagogical theory were cited, adult learning theory is considered most relevant to this study for three reasons. One is that the majority of Extension audiences are adults (TCE, 2003). The second is that the nature of non-formal education employs program development and delivery processes that are consistent with adult learning theory (Harman, 1976). Finally, much of the pedagogical theory is shifting from a teacher-centered focus to learner-centered approaches such as "learning communities" that are also consistent with Knowles' learning theory (Reyes, Scribner, & Scribner, 1999).

Grossman (1984) found that ethnicity was a factor in successful educational approaches for Hispanics. Hispanic learners whose teachers were also Hispanic experienced greater success in school while those with non-Hispanic teachers didn't.

Non-Hispanic teachers were also less likely to make accommodations for Hispanics. However, as non-Hispanic educators gained experience working with Hispanic learners, the differences in student performance based on ethnicity declined.

Warrix and Bocanegra (1998) found that efforts to reach Hispanic Day Care Providers in the Cleveland area were more successful when Hispanics were placed on Extension advisory committees and involved in focus groups that. Cano and Bankston (1992) studied minority participation in the 4-H program. They found that a lack of role models among agents, staff, and volunteers affected participation.

Finally, Hispanics are overrepresented in urban areas. According to U.S. Census data, (U.S. Census, 2003), the proportion of Hispanics living in urban areas exceeds that of the population as a whole. While only 58% of the composite state population lives in the six most populous counties in Texas, approximately 67% of Hispanics reside in the largest six urban areas. This suggests that urban areas could be a factor in reaching Hispanics.

## Purpose and Objectives

The purpose of this study was to identify demographic variables that affect the levels of Hispanic participation in Texas Extension programs. Given Extension's charge to serve the people of Texas and given that Hispanics are underrepresented in many Extension programs, this study compared the dependent variable "program parity" to a series of demographic variables to determine those factors positively and negatively correlated to the level of Hispanic participation in a given county program. Program parity allowed for the comparison of Hispanic participation in a given county program to be compared to the Hispanic population in that given county rather than to a state average. To assure broad representation of programs, the study included agriculture and natural resources, family and consumer sciences, 4-H and youth development, and community development programs. It also included the full scope of field-based Extension agents from both Texas Cooperative Extension (1862) and the Prairie View A&M Cooperative Extension Program (1890).

The following objectives were identified for this study:

1. What demographic variables are correlated to Hispanic participation in Texas Extension programs?
2. What characteristics do demographic variables possess in predicting Hispanic parity, or participation, in Texas Extension programs?

## Procedures

The population of this study included all Extension agents working on behalf of Texas Cooperative Extension (TCE) and Prairie View A&M University's Cooperative Extension Program (CEP). The population for both agencies included approximately 650 faculty members of which 332 met the criteria for the study. Only faculty that were

currently employed with TCE or CEP and had three years of data in the same county were included in the census. Any county faculty who had been hired or had moved since January 1, 2001, was excluded from the study to assure each included subject had a full three year report record in a single county. This three year report record provided the basis for the calculation of the dependent variable, program parity. A consolidated list of eligible faculty was established that included both Texas Cooperative Extension and Prairie View Cooperative Extension Program faculty included in the study.

This research design for this study was causal-comparative as recognized by Gall, Borg, and Gall (1996). Percent Hispanic participation in the subject's program, weighted based on potential Hispanic population in the county, was the variable used as a performance factor in this study and was named "program parity." This measured the level of Hispanic participation relative to the potential population in the county. Parity values were calculated by dividing percent program participation by the percent Hispanic population in the county. This "program parity" factor was used as the dependent variable for this study and was calculated for each subject in the population.

Data were collected through a survey instrument and through Human Resource departments at both Texas Cooperative Extension (TCE) and at the Prairie View Cooperative Extension Program (CEP). Other data were collected through publicly available web sources such as the U.S. Census Bureau (2002) and TCE monarch reporting system. For the data collected through the instrument, the Hardin-Brashears Bi-Modal method (Fraze et al. 2002) was employed to improve response rate.

Data were analyzed through the SPSS statistical analysis package, version 11.0. A total of 194 cases were considered. Using SPSS's option for scale measures, these cases were analyzed and yielded an alpha of .79. Reliability was consistent with the pilot test. Confidence levels were set at 95%, a priori. Control for non-response error on the survey was accomplished by a t-test of early and late respondents. No t values were found to be significant when equal variances were assumed and not assumed to be equal.

Data for respondents were categorized based on several characteristics. These categories represented multiple titles within each category. Agriculture and natural resources (ANR) agents included agriculture and natural resource, natural resources, horticulture, marine, and integrated pest management titles. These represented 113, or 53.1%, of all responses. Family and consumer science (FCS) agents represented family and consumer science and expanded nutrition program titles. These represented 73, or 34.3%, of all responses. The final two categories were 4H titles, representing 21 responses, or 9.9%, and other titles, representing 6 responses, or 2.8%.

Responses by ethnicity included White agents, representing 179 responses, or 84%. Hispanic agents responding to the survey numbered 16, or 7.5%, and Other agents numbered 18, or 8.5%. This final category of "other" agents included African-American, Asian, and other ethnic categories. A total of 56 respondents, or 26.3%, had a Bachelor's degree. One hundred fifty, or 70.4%, had a Master's degree. Finally, seven of the respondents, or 3.3%, had a doctoral level degree.

Texas Cooperative Extension (TCE) provided the greatest proportion of respondents with 197, or 92.5%. Respondent county faculty from the Prairie View Cooperative Extension Program (CEP) accounted for the remaining 7.5%. The TCE employees represent the Extension program established by the Morrill Act of 1862 (CSREES, 2004), while the CEP employees represent the Extension program established by the Second Morrill Act (CSREES, 2004), enacted in 1890 to serve through the historically black colleges and universities in the South.

For analysis purposes, respondents from counties with a population over 250,000 were identified as "urban" while the remaining respondents, representing counties with a population less than 250,000, were identified as "non-urban." A total of 169 respondents, or 79.3%, came from non-urban counties while the remaining 44, or 20.7% were from urban areas. While the Hispanic population in Texas, estimated at 33.9% statewide in 2002, continues to grow at a rapid pace, the distribution of Hispanic population ranged from 1.7% in the northeast County of Cass to 97.4% in Starr County along the southern border of Texas (Census, 2002). The mean Hispanic population from respondent counties was 28.4%. It did not include all counties and counties with multiple respondents likely contributed in part to a mean that was 5.5% lower than the state average. Given that each county stood on its own demographics, this lower mean did not play a role in the overall study.

The dependent variable for this study was program parity and was calculated by dividing the percent Hispanics participation by the percent Hispanic population in the county of the responding agent. Table 2 shows a mean parity value of 66.87. The range of values for program parity was 2.85% to 409.39%. This range indicates that some county faculty were reaching 2.85% of the potential Hispanics in their county while others were reaching Hispanics in proportions that were four times higher than their share of their county population. The mean parity level was 66.9%, which was consistent with the 69.3% state average for the 2001-2003 reporting period. A similar parity value was calculated for committee membership. The range of committee parity values ranged from 0% to 500.8%.

Table 2. *Measures of central tendency and dispersion for program parity values*

| | n | Mean | Median | Mode | SD | Range | Variance |
|---|---|---|---|---|---|---|---|
| Parity | 213 | 66.87 | 60.45 | 2.85 | 49.86 | 406.54 | 2485.93 |

## Findings

Measures of central tendency and dispersion for each of the demographic variables tested were collected and are shown in Table 3. With the exception of committee parity, total experience in years, and education, all variables were dummy coded to determine the presence or absence of the selected characteristic. Committee parity showed a mean of Hispanic participation that is just above 50% of the potential for the given county. Education showed a mean that approached a Masters Degree, which is

represented by a value of "5." Experience was shown to be slightly more than 18 years with a range of more than 31 years of experience.

Correlations were conducted for the thirteen variables in addition to the dependent variable, program parity. The results of these correlations are in Table 3. The agriculture and natural resources (ANR) title category showed the highest correlation to the dependent variable at -.50. Following ANR in the descending strength of correlation to the dependent variable were gender (-.43), ethnic white (-.30), FCS (.29), 4-H (.29), non-urban (-.29), committee parity (.25), ethnic other (.22), ethnic Hispanic (.19), and 1862/1890 (.14). Those variables with a positive correlation with program parity included FCS, 4-H, committee parity, ethnic other, ethnic Hispanic, and employer (1890). Variables with a negative correlation with program parity included ANR, gender (male), ethnic white, and non-urban. Variables found to have no relationship with program parity included education, total experience, and titles other than ANR, FCS, and 4-H. These were mostly community development positions.

Table 3. *Relationship Between Program Parity and Selected Variables (n=213)*

| Variables | % | M | SD | R | p |
|---|---|---|---|---|---|
| Program Parity | | 66.87 | 49.86 | 1.00 | |
| Committee Parity | | 56.04 | 62.56 | .25* | <.01 |
| County Population | | 0.79 | .41 | -.29** | <.01 |
| Non-Urban | 78.8 % | | | | |
| Urban | 21.2 % | | | | |
| Education | | 4.77 | .49 | -.09* | .21 |
| Bachelors | 26.3% | | | | |
| Master | 70.4% | | | | |
| Doctorate | 3.3% | | | | |
| Years Extension Experience | | 18.11 | 8.92 | -.08* | .28 |
| Gender | | | | -.43** | <.01 |
| Male | 56.0% | | | | |
| Female | 44.0% | | | | |
| Employer | | | | .14** | .04 |
| 1862 (TCE) | 91.8% | | | | |
| 1890 (CEP) | 8.2% | | | | |
| Ethnic White | | .84 | .37 | -.30** | <.01 |
| Ethnic Hispanic | | .08 | .26 | .19** | .01 |
| Ethnic Other | | .08 | .28 | .22** | <.01 |
| Title – ANR | | .53 | .50 | -.50** | <.01 |
| Title – FCS | | .34 | .48 | .29** | <.01 |
| Title – 4-H | | .10 | .30 | .29** | <.01 |
| Title – Other | | .03 | .17 | .13** | .06 |

* Pearson Product Moment; ** Point Bi-serial

To address objective 2, multiple regression was performed. Variables were examined for evidence of multicollinearity. Those variables correlated to each other at a level of 0.60 or higher were assumed to be collinear. Where confidence levels were met,

correlations between variables ranged from a low of .15 to a high of .81. There was a very strong correlation (.81) between gender and title categories for agriculture and natural resources (ANR) and family and consumer science (FCS). As a result, gender was dropped as a variable insofar as it was significant only to the extent that it was correlated to those two title categories. In addition there was a very strong correlation (-.77) between FCS and ANR titles. Because the ANR title showed a stronger correlation to the dependent variable, it was retained as a variable and the FCS variable was dropped. Finally, there were strong correlations among ethnic groups. The White variable was correlated to both Hispanics (-.65) and Others (-.70). The was no correlation between Hispanics and Others. Following the same protocol as prior variables, the variable(s) with the strongest correlation to the dependent variable, ethnic White (-.30) was retained and the other two ethnic variables (.22 & .19) were dropped from the model.

A total of six demographic variables were retained from the original thirteen variables tested for correlation. Those demographic variables remaining, in descending order based on the strength of their correlation to parity, were ANR (-.50), ethnic white (-.30), 4-H (.29), non-urban (-.29), committee parity (.25), and employer (.14).

The six demographic variables retained were entered into a regression equation using the forced entry method. Variables were entered in descending order according to the strength of their correlation with the dependent variable. As such, ANR was entered into the model first and followed by ethnic White, 4-H, non-urban, committee parity, and employer (1862/1890) variables. The results of the model are shown in Table 4. This model explained 35% of the variance ($R^2$=.35) and produced an F value of 18.18. Four of the six predictors in this model met confidence levels set at .05 a priori. They included ANR, 4-H, non-urban, and committee parity variables. The ethnic white variable was slightly over the confidence level at .06 and the 1862/1890 variable showed a p value of .52, considerably higher than confidence limits set. From these p-values, predictions of parity may be made based on those four predictors that showed statistical significance in the model.

The B value for the constant in the model, 110.61, represents the y-intercept value from which predictors can be used to predict parity values. The value of the constant is calculated based on the inclusion of all variables except for those held independent in this model. When ANR titles are introduced into the model, the predicted effect on parity is a decrease of 36.36 points, reducing parity from 110.36 to 74.25. The next predictor, 4H, predicts an increase of 20.02 points in parity that results in a predicted parity value of 130.62. When non-urban counties are introduced into the model, parity is predicted to decrease by 23.08 points to 87.53. The last predictor that met confidence levels was committee parity and unlike the other demographic variables, was measured at the interval level. As a result, its B value is considerably different from the others at .10. Because the other variables were dichotomously coded, the only predicted effects on parity are based on the inclusion or exclusion from the model. Unlike those variables, committee parity predicts a .10 increase in program parity for every unit increase in committee parity. If an increase of 1 point in program parity were desired, it would require a 10 point increase in committee parity.

Table 4. *Regression Coefficients for Demographic Variables (n=213)*

| | B | SE | Beta | t | p |
|---|---|---|---|---|---|
| Constant | 110.61 | 9.89 | | 11.19 | .00 |
| ANR | -36.36 | 6.53 | -.37 | -5.57 | <.01** |
| Ethnic White | -17.09 | 8.84 | -.13 | -1.93 | .06 |
| 4-H | 20.02 | 10.28 | .12 | 1.95 | .05* |
| Non-urban | -23.08 | 7.40 | -.19 | -3.12 | <.01** |
| Committee Parity | .10 | .05 | .13 | 2.10 | .04* |
| 1862/1890? | 7.49 | 11.49 | .04 | .65 | .52 |

* significant at .05 level; ** significant at the .01 level
$R^2$=.35; F=18.18
dependent variable: program parity

## Conclusions

The following summary of conclusions was made based on the findings of this study.

1. It was concluded that the level of Hispanic participation in program development committees is a strategy that can lead to higher levels of Hispanic participation in programs.
2. The variables ANR, ethnic White, 4-H, non-urban, committee parity, and employer (1862 vs. 1890) are good predictors of Hispanic participation and account for more than 1/3 of the characteristics that explain the level of Hispanic participation in Texas Extension programs.
3. Gender is correlated to the level of Hispanic participation only to the extent that it is correlated to ANR and FCS titles.
4. Expanding urban programs could lead to higher levels of Hispanic participation. It was also concluded that there are likely characteristics about large, urban county programs that promote higher levels of Hispanic participation and characteristics about smaller, rural counties that lead to lower levels of Hispanic participation.
5. The relationship between TCE and CEP is one that significantly helps TCE improve its levels of Hispanic participation.
6. Ethnic White agents have a negative effect on Hispanic participation levels while minority agents, regardless of ethnicity, have a positive effect on Hispanic participation.

## Recommendations

As a result of conclusions drawn from this study, the following recommendations have been made.

1. Increase the number of ethnic minority county faculty, specialists, supervisors, and state administrators (a goal of 25% would be 75% parity at 2002 population estimates)
2. Appoint minority mentors for newly hired minority faculty
3. Preserve and improve the TCE/CEP relationship and develop voluntary and involuntary opportunities for meaningful joint program development, delivery, and evaluation along with meaningful joint training and education.
4. Improve the current program planning system such that it sets goals related to inclusion and diversity in program plans. Plans should include goals, activities, and evaluation strategies for minority participation in program development committees, programs, and activities. It should also include research-based action strategies for which agents assume responsibility. These strategies should address and overcome barriers and lead to improved Hispanic participation in programs and not be limited to the documentation of "all reasonable efforts" as cited in the Civil Rights Act of 1964 (USDOJ, 2004).
5. Given that ANR agents represented the single strongest variable that had a negative relationship with Hispanic parity levels, it is recommended that a group of stakeholders in that program examine it and develop research-based strategies that would lead to increased levels of Hispanic participation. These strategies might include:
    - ❖ a state Hispanic/minority agriculture advisory committee that would provide guidance and support for the development of state programs for minority stakeholders in agriculture including but not limited to minority farmers and ranchers,
    - ❖ develop a structured urban agriculture initiative that develops, pilots, and supports sustained, research-based food and fiber programs that address urban issues.

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# The Impact of Socioeconomic Status on Leadership Potential in an Agricultural Leadership Program

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## Abstract

Rural leadership programs are designed to teach citizens how to become leaders for the purpose of community improvement. Research has shown that socioeconomic status has a significant impact on an individual's level of participation. Using factor analysis the study tested the impact of socioeconomic status on the leadership and participation of agricultural leadership program graduates at a major land-grant university in the Midwest. Levels of education and income were still significantly related to community commitment. Program directors need to address the effects of tuition and travel expenses to recruit participants from various socioeconomic groups.

## Introduction

Agricultural leadership programs have a 70-year history in the United States (Heasley, 1986). There is a need for leadership programs that teach citizens how to cope with a barrage of change in the rural environment (Flora, Flora, & Fey, 2004). Citizens must be educated and prepared with essential knowledge, skills, and abilities in order to engage in leadership positions that concentrate on the many obstacles faced by rural America (Winter, Sloggett, Doekson, & Sanders, 1989).

The current array of agricultural leadership programs demonstrates a significant societal investment towards the important goal of fostering community and public affairs participation of rural citizens (Rossing & Heasley, 1987). Rural community development (RCD) is especially critical in the Midwest where the region is faced with a variety of problems symptomatic of a declining economy and a lack of leadership capacity due to outmigration. Effective RCD depends on the knowledge, skills, and willingness of local leaders to assume key roles in the development process (Mulkey, 1989).

To train more citizens to assume leadership positions, a major land-grant university in the Midwest founded an agricultural leadership program in 1982. The target audience was adults (ages 25-45) involved in agriculture production or agribusiness. The program was designed to provide the training and experience necessary for participants to assume leadership roles within the community and state. Ten classes of approximately 30 participants per class had completed the program at the time of this study. The program objectives included 1) increasing participants' awareness of the agricultural industry, 2) expanding participants' understanding of U.S. economic, political, cultural, and social

systems, 3) increasing participants' ability to analyze and react to complex problems affecting rural communities, 5) increasing participants' leadership involvement, and 6) helping participants increase and use their knowledge and skills to solve community problems. Each participant contributed a $1,500.00 fee plus travel expenses. This fee only covered 15% of the actual expenses of the program. A partial fee waiver was only available to full-time agriculture producers who participated in the program.

The program for the most recent cohort consisted of 13 seminars, including a seven-day trip to Washington, D.C., and a two-week trip to New Zealand. The weekend seminars (Friday afternoon to Sunday evening) focused on personal development issues, tours of agricultural research facilities, tours of specialty agricultural enterprises, tours of the state capital and discussions with state leaders, visits with agricultural association leaders, visits with media personalities, and visits to farm shows. Participants also learned about future trends in rural America, including economic and demographic trends in the state.

## Theoretical Framework

Rural community development literature emphasizes the importance of citizen participation as a means of strengthening communities (Flora, Flora, & Fey, 2004; Martin & Wilkinson, 1985). A central objective of the agricultural leadership program was to increase the involvement of participants at the local, state, and national levels. Advocates and practitioners of RCD also believe that citizens should be meaningfully involved in community decision-making (Coe, 1990). RCD programs have four basic components: public policy, economic development, community service, and of necessity, leadership (Seevers, Graham, Gamon, & Conklin, 1997). Thus, leadership development is a complex process focusing on changes in knowledge, skills, and abilities of participants.

The current trend of conditions in rural communities suggests that development of local leaders is an essential part of community survival (Kirk & Shutte, 2004; Robinson, 1994). Kirk and Shutte's (2004, p. 234) framework for leadership development include "leading change through dialogue, collective empowerment, and connective leadership". Leadership development programs that ensure an adequate supply of effective leaders are an important aspect of RCD.

Leaders provide the basis for improving the quality of life in communities (Fear, Vandenburg, Thullen, & Williams, 1985). Because effective local leadership does not exist in many rural communities, RCD efforts should include identifying and training potential leaders from diverse backgrounds (Winter, Sloggett, Doekson, & Sanders, 1989). Leadership training may be incorporated as in integral part of RCD programs, or alternately, a leadership training program may serve as the vehicle to allow the identification of community problems, an assessment of alternative approaches to solving problems, and the design of action programs to address community problems.

Socioeconomic status is an indicator derived from income, level of education, and occupation (Link & Phelan, 1995). As residents with lower socioeconomic status tend to

participate less in public affairs activities than those with higher socioeconomic status, RCD efforts need to address this participation gap (Martin & Wilkinson, 1985). In some cases, the socioeconomic status of people often limits their access to the decision-making process, excluding them from community affairs. As public policy issues are debated, it is important to remain sensitive to the fact that not all voices are being heard. Leaders must make every effort to recruit and involve people of both racial and ethnic diversity and with lower socioeconomic status as their interests and concerns should not be ignored (Beaulieu & Smith, 2000). By striving to involve new people in the leadership structure of a community, one may introduce new ideas and reach a broader segment of the community (Williams, 1989).

Martin and Wilkinson (1985) stated that leadership programs could effectively close the participation gap between individuals of higher and lower socioeconomic status. Leadership development can enhance the ability of all individuals to participate by developing skills for RCD. Closing the participation gap, therefore, would be a means of promoting RCD by consciously attempting to broaden leadership skills and participation among groups not usually involved in community leadership roles.

The need for effective leadership at the local level has never been greater. Actions at the state and federal levels of government have shifted the responsibility for many programs and services to the local level. As a result local leaders are making more decisions with significant political, social, and economic impacts (Rinehart & Smith, 1995). Those interested in leadership programs aimed at RCD processes should understand the role that socioeconomic status plays in asking citizens to get involved improving the quality of life within communities.

## Purpose and Objectives

The purpose of the study was to test the assumption that participants of an agricultural leadership program with higher socioeconomic status tend to participate at higher levels in RCD processes than those with lower socioeconomic status. Specific objectives included 1) describing participants demographically, 2) identifying factors associated with rural community development processes, and 3) determining the relationship between socioeconomic status and participation in RCD processes.

## Methods

The population for the study was all graduates of the program (Class I to Class X, 1982 to 2001) ($N$=290). A census was used based on the database kept by the program director. Three individuals were excluded from the study due to death ($n$=1) or incorrect address ($n$=2). The response rate was 43% ($n$=125).

An original survey instrument was developed modeled after Pigg's (2001) *EXCEL: Experience in Community Enterprise and Leadership*. The questions from the survey were grounded in the literature on community development, leadership theory and development, and past evaluation studies of leadership programs. The instrument was a

then-post design with Likert-type scales. The ratings included strongly agree, agree, disagree, and strongly disagree and were scored 1-4, respectively. Not sure/not applicable was coded 0 and excluded from the analysis. The Cronbach coefficient alpha for internal consistency for the instrument was calculated at 0.96.

The then-post design was chosen to control for several threats to validity and reliability, including *overestimation of changes in knowledge* and *response-shift bias* among participants. When pretest-posttest information has been collected, actual changes in knowledge and behaviors may be altered if the participants overestimate their knowledge and skills on the pretest. Similarly, pretest overestimation is likely if participants lack a clear understanding of the attitude, behavior, or skill the program is attempting to affect (Pratt, McGuigan, & Katsev, 2000).

Changes in participants' frame of reference due to program training is called *response-shift bias* (Rohs, 1999). To avoid this source of contamination for self-report surveys, a then-post method was used to collect retrospective data at the conclusion of the program as participants rated themselves with a single frame of reference and at a single point in time.

A panel of experts consisting of four faculty members with expertise in leadership education or RCD processes confirmed content and face validity of the survey. A pilot test was conducted with 30 randomly selected participants. The Dillman (2000) four-phase mailing approach was used for both the pilot survey and the final survey, which resulted in a 43% response rate. The surveys were qualitatively analyzed after the pilot test and minor revisions were made. Because only minor revisions were required, the pilot data were pooled with the final survey data, yielding a 57% total response rate.

Double-dipping was used to determine differences between the respondents and non-respondents (Lindner, Murphy, & Briers, 2001). Along with an early-to-late respondent comparison, a random sample of 10% ($n$=20) of the non-respondents was administered portions of the survey via telephone. The two groups were compared on gender, employment status, level of educational attainment, and marital status with a Pearson Chi-Square. There were significant differences between non-respondents and respondents in gender, employment status, and marital status. There were no significant differences between the early-to-late respondents on any variable. Therefore, generalizing the results of this study must be made with caution.

Survey data were analyzed using SPSS® v. 8.0. An alpha level of .05 was set *a priori* to determine statistical differences among variables. The statistical tests used were descriptive, t-tests, Cohen's *d* effect size, and ANOVA. Likert-type data is ordinal in nature; thus, it is acceptable and practical to treat it as interval data and subject it to statistical analyses as long as care has been taken in the interpretation of the results (Kerlinger, 1986). Inferential statistics were used as a guide to understanding the relationships between variables.

A factor analysis on Likert-type survey items was used as a data reduction tool and to study the correlations among interrelated variables. The analysis involved varimax rotation and Kaiser normalization, which helped determine the factors impacting community development. With the varimax rotation, the factors were orthogonal (uncorrelated) and independent from one another even if some variables loaded on more than one factor (Kim & Mueller, 1982). Factor scores were then compared with the independent variables of the participants' gender and martial status using an independent t-test to determine significance. A Levene's test determined equality of variances, a prerequisite to the parametric tests. The independent variables of education level and income were compared with the factors in an ANOVA with a Tukey's post hoc test. To the "extent that a test measures a factor, it is said to be loaded on the factor" (Kerlinger, 1973, p. 661). With a sample size greater than 100, loadings of at least 0.40 were considered important and were used to determine which variables were included in a factor (Hair et al., 1998). This factor analysis has required a combination of complex statistical computation and a thoughtful study of the factor structure. Statistics determines which survey items cluster together, but only an observer can determine what each factor may be assessing. In some ways factor analysis is both science and art form.

## Findings and Conclusions

One-hundred and thirteen men (90%) and 12 women (10%), all graduates of the agricultural leadership program, responded to the survey. The mean age was 43 years, they had lived in their communities for an average of 24 years, and the average community size was 30,000 people. Respondents were married (90%), well-educated, middle-class working adults who were civically engaged. The majority (54%) graduated from college and 32% had earned graduate credit. Twenty-three percent earned $30-$50,000/year, 54% earned $51-$100,000/year, and 27% earned more than $100,000/year. One-hundred percent of the respondents voted in the last presidential election, while over 93% voted in the last state and local elections. Sixty percent volunteered 5 to 10 hours per month in social service activities. The remaining 40% volunteered between 10 and 20 hours per week. Sixty-nine percent were involved in 5 to 10 hours of economic development activities per month. The remaining 31% gave over 10 hours per week to economic development activities.

The factor analysis produced five conceptual factors that indicate the relationship among the variables.

- Factor 1: Community commitment and future directions
- Factor 2: Expanding participation and community improvement
- Factor 3: Civic engagement
- Factor 4: Community knowledge and personal development
- Factor 5: Community dedication

The factor scores were compared with the independent variables of the participants' gender and marital status using an independent t-test to determine

significance. A Levene's test for equality of variances showed equality for all factors for gender.

The factor scores were compared, with the independent variables of the participants' level of education and income using an ANOVA with a Tukey's post hoc test. Factor 1, *community commitment and future directions*, differed with college graduates having a higher factor 1 score than those with only some college ($p < 0.005$).

Factor four, *community knowledge and personal development*, differed for males and females with females being significantly more positive on this dimension ($p < 0.032$). This finding supported Giebink's (1975) finding that women indicated an increase in personal development after participating in a leadership program. Gittell, Ortega-Bustamante, and Steffy (2000) also found that women leaders use the discourse of personal development for community development work and that women in community development organizations assessed community needs more than men did.

When income levels were compared a significant difference was found in factor 5, *community dedication*. In general, the higher the income category, the higher the factor 5 score. Put simply, the higher the income the higher the *community dedication*.

Based upon the response to the survey it is concluded that participants' socioeconomic status (levels of education and income) did impact their participation in rural community development processes in regard to factors 1 and 5. Citizens with higher levels of education tended to participate more in *community commitment and future directions* issues than those with lower socioeconomic status even after participation in the agricultural education leadership program. Those with higher incomes reported higher scores for *community dedication* than those with less income in each of the 4 income categories. Women scored more positively in *community knowledge and personal development* than men.

## Discussion and Recommendations

As women in this study were found to be more inclined than men to engage in community knowledge and personal development issues, the program directors should encourage more women to participate in the program. Also, the content of the program should be modified to allow for training in the issues and concerns that women face as rural community leaders. Kirk and Shutte's (2004) framework for community leadership development embraces dialogue and collective empowerment, both feminine strengths, and could serve as a model for enhancing the agricultural leadership program under current study. Since the program is partially self-funded, tuition necessarily excludes certain socioeconomic status groups. The program director might consider offering scholarships to those individuals who can not afford the required tuition fee to close the socioeconomic status participation gap.

The finding that participants with higher educational and income levels were more committed to the future direction of their communities than those with less

education and income confirms previous findings (Link & Phelan, 1995). However, recruiting only those individuals at the higher echelons of society promotes elitism and maintains the current parochial system in rural America. To encourage democracy within the program, the program director should engage individuals from a range of socioeconomic status levels, thus, disseminating RCD process throughout the community. This recommendation is supported by Mulkey's (1989) observation that by consciously attempting to broaden the leadership skills and participation among groups not usually involved in community leadership roles, leadership training programs can increasingly overcome the participation gap between individuals of higher and lower socioeconomic status. When leadership trainees are representative of the community in terms of race, gender, and socioeconomic status, interactions within the group can begin the process of fostering mutual understanding to bridge community groups.

Recommendations for future research include further testing for intervening variables between income and community dedication and for developing strategies to increase participation among lower socioeconomic status groups in agricultural leadership programs, especially those who receive partial fee waivers.

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Acknowledgement: This research was paid for by the Oklahoma Agricultural Experiment Station through HATCH funds