

## **A FOLLOW-UP STUDY OF AGRICULTURAL EDUCATION PROGRAM GRADUATES ON TEACHING COMPETENCIES**

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### **Abstract**

*The purpose of this follow-up study was to determine perceptions among New Mexico State University pre-service agricultural education program graduates (Bachelor of Science in Agriculture degree completers) from 1990 to 2001 who are currently teaching agriculture on their attainment of teacher competencies and professional development activities influencing their growth on these teacher competencies since graduation. Data were gathered using a researcher-developed questionnaire. Participants perceived their at-graduation teacher competency abilities as satisfactory on average. On average, participants perceived their current teacher competency abilities to be between satisfactory and very good. For each of the 28 teacher competency statements, participants perceived growth from the time of graduation to their current abilities. The biggest improvement was on participants' ability to keep students on task. The least improvement was on their enthusiasm toward all facets of the educational program, however, this teacher competency statement was rated highest at graduation and maintained a high ranking as a current ability. Given a list of professional development activities, participants perceived on-the-job experience as having the highest level of influence on their teacher competency ability growth from the time of graduation to the present. Recommendations for program improvement and further research are offered.*

### **Introduction**

In the summer of 2001, the Agricultural and Extension Education Department at New Mexico State University conducted a follow-up study of pre-service agricultural education program graduates (Bachelor of Science in Agriculture degree completers) from 1990 to 2001 who were currently teaching agriculture. The study assessed the effectiveness of the pre-service program and postgraduate professional development activities in developing New Mexico Board of Education-adopted and other selected professional teacher competencies. Results will guide program improvement in line with the American Association for Agricultural Education (2001) National Standards for Program Improvement and prepare the department for a university-wide accreditation review by the National Council

for Accreditation of Teacher Education (NCATE) in Spring 2002.

The follow-up study was designed to assist the department in complying with NCATE Standard 1: Candidate knowledge, skills, and dispositions, and NCATE Standard 2: Assessment system and unit evaluation (The National Council for Accreditation of Teacher Education, 2000). Standard 1 states:

Candidates preparing to work in schools as teachers or other professional school personnel know and demonstrate the content, pedagogical, and professional knowledge, skills, and dispositions necessary to help all students learn. Assessments indicate that candidates meet professional, state, and institutional standards. (p. 1)

Standard 2 states:

The unit has an assessment system that collects and analyzes data on the applicant qualifications, the candidate

and graduate performance, and unit operations to evaluate and improve the unit and its programs. (p. 1)

NCATE defines candidates as:

Persons preparing to teach, teachers who are continuing their professional development, and persons preparing for other professional roles in schools such as principals, school psychologists, and school library media specialists. (p. 1)

The departmental follow-up study assessed self-perceptions of abilities of candidates (Bachelor's degree completers) on professional and state-adopted content, pedagogical, and professional knowledge, skills, and dispositions for effective teaching (NCATE Standard 1). It also served as part of the department's assessment system of graduate performance for use in program improvement (NCATE Standard 2).

### Theoretical Framework

The Agricultural and Extension Education Department at New Mexico State University (NMSU) has a competency-based agricultural education teacher education program (Dormody, 2001). Courses and experiences have been developed to ensure students develop New Mexico Board of Education (1986, 1988, & 1998) adopted entry-level teacher competencies, seven keys to success in agricultural education (National Council for Agricultural Education, 2000), teacher behaviors related to student achievement (Rosenshine & Furst, 1971), and three essential competencies needed by a master teacher (Hedges, 2000). Students have traditionally been evaluated by their supervising teachers and self-evaluated on these competencies during and after student teaching. Copies of the supervising teacher and self-evaluations on these competencies are part of the departmental student performance portfolio file.

The New Mexico Board of Education adopted entry-level secondary teacher competencies in 1986. These 45 competencies were organized under six major areas: 1) essential competencies for all areas, 2) management skills, 3) human relations, 4) knowledge of the profession, 5) instructional planning and implementation,

and 6) assessment and evaluation of students (New Mexico Board of Education, 1986). In 1998, the Board adopted a new set of entry-level secondary teacher competencies (New Mexico Board of Education, 1998). The new list has 128 competencies organized under 11 major areas: 1) professionalism, 2) instructional planning and implementation, 3) classroom management, 4) assessment, 5) technology, 6) diversity, 7) family and community, 8) inclusion, 9) development of students, 10) communication, and 11) motivation. There is substantial overlap between the two lists. For the purposes of this study, representative teacher competencies that could be found on both the old and new lists were incorporated into the questionnaire. That way, all members of the population would be asked about competencies that had been integrated into their educational program.

The New Mexico Board of Education also adopted entry-level secondary teacher competencies specific to vocational agriculture education (New Mexico Board of Education, 1988). These competencies include ability to teach specific subject areas ranging from agricultural economics to soil science, developing and implementing appropriate supervised agricultural experiences, and operating an FFA chapter. They overlap with and are supplemented by the seven keys to success in agricultural education presented in the *Guide to Local Program Success* (National Council for Agricultural Education, 2000). The seven keys are: 1) strong classroom and laboratory instruction; 2) quality supervised agricultural experiences; 3) an active FFA chapter; 4) building a network of partners, allies, and volunteers; 5) effective program marketing; 6) teachers who remain committed to professional growth; and 7) community-based program planning.

Rosenshine and Furst (1971) surveyed the literature on teacher effectiveness and generalized 11 teacher behaviors related to student achievement. The teacher education program integrates the five teacher behaviors they found to be most highly associated with student achievement: 1) cognitive clarity of a teacher's presentation; 2) teacher's use of variety and variability; 3) teacher's enthusiasm; 4) degree to which a

teacher is task-oriented, achievement oriented, and/or businesslike; and 5) student opportunity to learn criterion material which was paraphrased by Garton, Miller, and Torres (1992) as "the extent to which teachers provide opportunities for students to learn the curriculum as prescribed by performance objectives and included on students' evaluations" (p. 11). Also integrated into the teacher education program are three essential competencies needed by a master teacher (Hedges, 2000). These competencies are 1) being "with-it", 2) having an in-charge image, and 3) being student-centered. A teacher who possesses with-it-ness is "in tune with surroundings, anticipates students' actions and reactions, is aware of direction and pace of the class, and intervenes appropriately" (p. 31). A teacher with an in-charge image "directs momentum and direction of class activities; has appropriate degree of control and organization; is well-prepared and knowledgeable; and likes to teach, is self confident" (p. 31). A student-centered teacher "builds the lesson around students' present and future needs; creates student ownership of learning activities; creates a nurturing, loving, learning atmosphere; and teaches students the subject, not the subject to students" (p. 31).

These six competency frameworks form the foundation for developing and choosing courses and experiences for students in the agricultural education teacher education program at New Mexico State University. They were used as the framework for this follow-up survey of 2000-2001 program graduates who are currently teaching agriculture.

### Purposes and Objectives

The purpose of the study was to conduct a follow-up study of recent graduates. More specifically, the study sought to explore and describe perceptions among New Mexico State University pre-service agricultural education program graduates on their teacher competencies and professional development activities influencing growth on these teacher competencies since graduation. The following research objectives guided the study:

1. To describe recent graduates of the pre-service agricultural education program by the following demographics:
  - a. Age
  - b. Gender
  - c. Highest degree earned
  - d. Teaching endorsements held
  - e. Number of years teaching agriculture
  - f. Number of years advising an FFA chapter
2. To determine perceived teacher competency abilities at graduation from the pre-service agricultural education program.
3. To determine perceived current levels of teacher competency abilities.
4. To determine discrepancy scores between current and at-graduation levels of teacher competency abilities.
5. To determine perceptions of the degree of influence various professional development activities have had on growth in levels of teacher competencies to their current levels.

### Methods and Procedures

The research design of the study was descriptive survey research. The target population was New Mexico State University pre-service agricultural education program graduates (Bachelor of Science in Agriculture degree completers) from 1990 to 2001 who are currently teaching secondary agriculture ( $N = 27$ ). The frame was derived from the *2000-2001 Agricultural Education Teachers Directory* (New Mexico Agricultural Education Office, 2000). Program graduates from 1990 were the first to have experienced a programmatic shift to the New Mexico Board of Education teacher competencies adopted in 1986 and in 1988. Because of the relatively small number of subjects for the study, a census of program graduates was conducted.

A researcher-constructed questionnaire was developed to address the objectives of the study. Salant and Dillman's (1994)

recommendations were followed for constructing and designing the questionnaire. The questionnaire was divided into three parts. Part one was designed to measure participants' perceived teacher competency abilities at graduation (section 1) and at the present time (section 2). Response-shift bias was addressed by employing self-reported retrospective pretest and posttest evaluations on the teacher competencies (Howard, Ralph, Gulanick, Maxwell, Nance & Gerber, 1979). Using a 5-point Likert-type scale, participants rated their perceived ability on 28 teacher competency statements. The scale ranged from 1 (*No Ability*), to 5, having *Exceptional* ability. The 28 teacher competencies were derived from State Board of Education (New Mexico State Board of Education, 1986, 1988, & 1998) teacher competency lists, Rosenshine and Furst (1971) teacher behaviors related to student achievement, Hedge's (2000) essential teacher competencies needed by a master teacher, and seven keys to success in agricultural education from the *Guide to Local Program Success* (National Council for Agricultural Education, 2000). Multiple-barreled teacher competency statements were rewritten to measure a single concept. Duplicate competency statements were eliminated. Examples were provided with some teacher competencies to increase clarity.

Part two of the questionnaire sought to measure participants' professional development activities during their time as a secondary agricultural education teacher. Participants were asked to reflect generally on the teacher competencies in part one of the questionnaire in which they perceived improved ability between graduation and the present ability. Then, from a list of professional development activities, they were asked to rate the level of influence each activity had on their perceived general improvement. Participants rated the 17 professional development activities on a 4-point scale ranging from 1 (*No Influence*) to 4 (having *Strong Influence*). Participants could also select *No Participation* as an option to each professional development activity.

The third part of the questionnaire was designed to gather demographic data.

Participants were asked to provide information to profile their age, gender, highest degree held, teaching endorsements, and number of years teaching and advising an FFA chapter.

To ensure the questionnaire would yield trustworthy data, a panel of individuals with expertise in instrument development and teacher competencies reviewed the questionnaire to ascertain content validity. To assess internal consistency, the questionnaire was pilot tested with a sample (n=19) consisting of agricultural education teachers who graduated from the Bachelor's program before 1990. Series means were substituted for missing values to attain complete data sets for the 19 subjects who served in the pilot test.

Part one of the questionnaire yielded Cronbach's alpha reliability estimates of .91 and .87 for section one (abilities at graduation) and two (current abilities), respectively. Part two (professional development activities) of the questionnaire yielded a Cronbach's alpha of .79 as a reliability estimate. Reliability estimates were only reported for parts one and two of the questionnaire because they were subject to reliability issues. Given the static nature of demographic data, part three was not subject to reliability issues, thus, no reliability estimate was reported.

Data were collected during the summer state agricultural education teachers' conference. Researchers hand delivered a questionnaire to each person in the frame who was in attendance and asked that it be completed in a location isolated from other conference participants. Each person was offered a curriculum incentive for completing and returning the questionnaire. Subjects who were in the frame and not in attendance were sent the questionnaire, a self-addressed postage paid envelope, and personalized note asking them to participate in the study. These efforts yielded an accepting sample of 25 respondents or a 93% response rate. No further effort was made to obtain data from non-respondents. Data from this study should be interpreted with care so as not to extrapolate beyond those who responded.

Data were coded and analyzed using SPSS/pc (version 10). Descriptive statistics

such as measures of central tendencies and measures of dispersion were used to characterize the data by objective.

### **Results/Findings**

The personal characteristics of participants in the study are presented in Table 1 and include age, gender, highest degree earned, teaching endorsements held, and years teaching and advising an FFA chapter. The average age of the participants

was approximately 30 years ( $SD = 4.46$ ). The majority ( $n = 15$ ; 62.5%) of the participants were male. Approximately 33% ( $n = 8$ ) of the participants identified having earned a master's degree as the highest degree earned. All participants were endorsed to teach agricultural education with 76% ( $n = 19$ ) also having an endorsement to teach science. Three participants reported having a technology/industrial arts teaching endorsement.

Table 1  
 Characteristics of 1990-2001 Graduates (n = 25)

Characteristics	Frequency	Percent	M	SD
Age			29.76	4.46
Gender*				
Male	15	62.5		
Female	9	37.5		
Highest Degree Earned*				
Bachelor's	16	66.7		
Master's	8	33.3		
Teaching Endorsements Held				
Agriculture	25	100.0		
Science	19	76.0		
Technology/Industrial Arts	3	12.0		
Years Teaching Agriculture			4.40	3.22
Years Advising an FFA Chapter			3.80	3.25

\*Note. Values do not total 25 because of missing data.

The average number of years participants have taught secondary agricultural education was approximately four with a range from one to 10 and a median of four. Additionally, the average number of years participants advised an FFA chapter was also approximately four with a range from zero to 10 and a median of four (Table 1).

#### *Objectives Two and Three*

As a follow-up of individuals who graduated with a major in Agricultural and Extension Education between 1990 and 2001 and were currently teaching agriculture, the study sought to determine participants' perceived teacher competency abilities. Twenty-eight teacher competency statements were rated on a 5-point scale beginning from 1, indicating *No Ability*, 2, *Unsatisfactory/Needs Improvement*, 3, *Satisfactory*, 4, *Very Good*, and concluding with 5, indicating *Exceptional* ability. For each of the 28 teacher competency statements, participants rated their perceived abilities at graduation with their Bachelor's degree, and their current perceived ability for the same teacher competency statements.

Table 2 presents the mean teacher competency ability scores. The teacher

competency statements are arranged from the highest to lowest mean perception score at graduation. For each teacher competency statement, a current perceived mean teacher competency score is also presented. It was found that overall, participants perceived their teacher competency abilities to be satisfactory ( $M = 2.97$ ) at graduation. At graduation, participants perceived they had the highest levels of teacher competency associated with enthusiasm toward all facets of the education program ( $M = 3.54$ ), having rapport with students ( $M = 3.38$ ), and being able to demonstrate student-centeredness ( $M = 3.32$ ). The lowest teacher competency ability among the 28 statements was in using computer technology in the classroom ( $M = 2.33$ ).

In terms of participants' current teacher competency abilities, it was found that they perceived their abilities as satisfactory to very good ( $M = 3.58$ ). Teacher competencies on which participants currently feel most able were in having rapport with students ( $M = 4.08$ ), using a variety of instructional methods ( $M = 3.92$ ), and demonstrating an in-charge image ( $M = 3.88$ ). The computer technology in the classroom competency was again, rated the lowest ( $M = 2.91$ ).

*Objective Four*

Table 2 also presents a discrepancy score for each of the 28 teacher competency statements. This score was calculated by subtracting the mean current ability score from the mean ability score at-graduation. The largest improvements in teacher competency abilities were associated with

abilities in keeping students on task (item 20; discrepancy = 1.00), demonstrating knowledge of the teacher profession (item 25; discrepancy = .95), understanding how demographics affect the selection of various techniques used to meet student needs (item 21; discrepancy = .86), and classroom management (item 22; discrepancy = .83).

Table 2  
 Mean Teacher Competency Ability Scores as Perceived by 1990-2001 Graduates (n = 25)

Teacher Competency	At Graduation	Current Ability	Discrepancy Score
1. Is enthusiastic toward all facets of the educational program.	3.54	3.57	.03
2. Has rapport with the students.	3.38	4.08	.70
3. Demonstrates student-centeredness.	3.32	3.78	.46
4. Strives for professional improvement in all areas.	3.29	3.61	.32
5. Demonstrates an in-charge image.	3.28	3.88	.60
6. Uses a variety of instructional methods.	3.24	3.92	.68
7. Communicates to all groups in an appropriate manner.	3.21	3.87	.66
8. Demonstrates a grasp of technical subject matter.	3.16	3.71	.55
9. Carries out instructional planning.	3.16	3.46	.30
10. Demonstrates program-planning skills.	3.12	3.63	.51
11. Uses appropriate teaching methods to achieve desired instructional goals.	3.08	3.75	.67
12. Undertakes responsibilities necessary for operating an FFA chapter.	3.08	3.83	.75
13. Demonstrates an ability to work with diverse populations.	3.08	3.78	.70
14. Makes rational decisions within the classroom (e.g., development of instructional plans).	3.08	3.86	.78
15. Uses techniques that enhance the motivation of students.	3.04	3.79	.75
16. Coordinates effective Supervised Agricultural Experience Programs.	2.96	3.65	.69
17. Presents subject matter clearly.	2.92	3.67	.75
18. Uses appropriate assessment strategies to evaluate learning.	2.92	3.67	.75
19. Demonstrates understanding of how students learn.	2.91	3.55	.64
20. Demonstrates an ability to keep students on task.	2.88	3.88	1.00
21. Understands how demographics (e.g., culture, ethnicity, and gender) affect the selection of various techniques used to meet student needs.	2.84	3.70	.86
22. Applies appropriate classroom management skills.	2.84	3.67	.83
23. Allows students ample opportunity to learn the material.	2.84	3.43	.59
24. Includes exceptional students in the instructional process (i.e., students with disabilities and gifted students).	2.80	3.38	.58
25. Demonstrates knowledge of teaching as a profession (e.g., responsibilities and rights of professional teachers).	2.76	3.71	.95
26. Is skillful in forming strategic partnerships.	2.76	3.38	.62

Table Continues

Table 2 Continued

Table 2

Mean Teacher Competency Ability Scores as Perceived by 1990-2001 Graduates ( $n = 25$ )

Teacher Competency	At Graduation	Current Ability	Discrepancy Score
27. Demonstrates skill in marketing the program.	2.68	3.29	.61
28. Employs computer technology in the classroom.	2.33	2.91	.58
Overall	2.97	3.58	.61

Note. Scale is based upon 1 = No Ability, 2 = Unsatisfactory/Needs Improvement, 3 = Satisfactory, 4 = Very Good, 5 = Exceptional.

Teacher competencies, where marginal improvements were made, were associated with enthusiasm toward all facets of the educational program (item 1; discrepancy = .03), striving for professional improvement in all areas (item 4; discrepancy = .32), and carrying out instructional planning (item 9; discrepancy = .30) (Table 2). However, these competency statements were rated satisfactory at graduation and at their current ability level.

#### Objective Five

Participants were also asked to rate the degree of influence selected professional development activities have had on their improved current general teacher competency ability. Table 3 reveals the mean professional development activity scores as perceived by participants. Mean scores for selected professional development activities are arranged from high to low. While all selected professional development activities were found to have some degree of influence, on-the-job experience ( $M = 3.82$ ;

$SD = .39$ ) was found to have the greatest influence on participants' improved teacher competency ability scores. Other notable professional development activities perceived to be influential were having a student intern ( $M = 3.47$ ;  $SD = .72$ ) and assistance from the State FFA Executive Secretary ( $M = 3.40$ ;  $SD = .82$ )

Within in-service professional development activities, state level professional organization ( $M = 3.41$ ;  $SD = .94$ ) and NMSU-sponsored activities ( $M = 3.33$ ;  $SD = 9.0$ ) were perceived by participants as the most influential on growth to their current teacher competency abilities (Table 3). Local school ( $M = 2.38$ ;  $SD = 1.02$ ) and regional or national professional organization ( $M = 2.58$ ;  $SD = .79$ ) inservice activities were identified as having a slight influence on growth of the teachers' competency levels. The least influential professional development activity as perceived by participants was associated with assistance from the State Department of Education ( $M = 2.11$ ;  $SD = 1.13$ ).

Table 3  
*Mean Professional Development Activity Scores as Perceived by 1990-2001 Graduates*

Professional Development Activity	<i>M</i>	<i>SD</i>
On-the-job experience	3.82	.39
Student intern(s)	3.47	.72
Assistance from FFA Executive Secretary	3.40	.82
Information by other teacher(s) in your discipline	3.33	.80
Informal mentoring by local school teacher(s) outside your discipline	3.22	.88
Formal courses (non-degree or part of a graduate degree program)	3.15	.81
Self-directed study in special interest area(s) (e.g., reading, internship, etc.)	3.10	.79
Local school mentoring program	3.00	.69
NMSU new teacher induction program	2.92	.76
Material acquired from Internet	2.91	.68
Formal local school performance evaluation program	2.77	.87
Inservice (overall)	2.75	.93
<ul style="list-style-type: none"> <li>• Professional organization inservice (state) (e.g., NMAETA Summer Conference)</li> </ul>	3.41	.94
<ul style="list-style-type: none"> <li>• NMSU in-service (e.g., on-campus workshops, traveling seminars)</li> </ul>	3.33	.90
<ul style="list-style-type: none"> <li>• Professional organization inservice (regional/national)</li> </ul>	2.58	.79
<ul style="list-style-type: none"> <li>• Local school inservice</li> </ul>	2.38	1.02
Assistance from State Department of Education	2.11	1.13

*Note.* Scale is based upon 1 = No Influence, 2 = Slight Influence, 3 = Moderate Influence, 4 = Strong Influence.

### Conclusions and Recommendations

The 1990-2001 program graduates can be profiled as being mostly males having an average age 30 years with a limited number having a Master's degree. All participants held a teaching endorsement in agriculture with the majority of them having a science teaching endorsement. On average, participants had four years of experience in teaching and advising an FFA chapter.

Participants felt satisfied overall with their ability to perform teacher competencies at the time of graduation. In general, the data would support that the pre-service program at NMSU is providing instruction and experiences that yield satisfactory teacher competency results by the time they graduate. Teacher competencies that top the list were: enthusiasm toward the educational program, having rapport with students, demonstrating with-it-ness, striving for professional improvement, and

demonstrating an in-charge image among students. While all teacher competency mean scores suggest opportunity for program improvement, selected teacher competencies drawing the most concern are: employs computer technology in the classroom, demonstrates skill in marketing the program, forming strategic partnerships, demonstrating knowledge of teaching as a profession, and including students with exceptional learning abilities in the instructional process.

New opportunities to use computers in departmental courses should be explored. For example, faculty should encourage students to use graphic software such as PowerPoint to present assignments, include Internet assignments, and use electronic templates for developing lesson plan assignments. Faculty teaching the College's general education computer technology course should be asked to provide individualized programming in

classroom computer technologies (e.g., digital cameras, scanners, projection systems) for agricultural and extension education majors.

Marketing the program, forming strategic partnerships, and demonstrating knowledge of teaching as a profession match up with three of the seven keys to success in agricultural education (National Council for Agricultural Education, 2000). Recent efforts to integrate the local program success model across the department's curriculum should lead to higher competency abilities in these areas among future graduates.

The department should consider integrating more instruction and experiences related to exceptional learners. Faculty should consider requiring a course on exceptional learners offered by the Department of Special Education and Communications Disorders.

For teachers' current competency abilities, participants felt satisfied to very good about their abilities. Of their perceptions toward current teacher competency abilities, participants rated rapport with students the highest. This particular teacher competency was ranked relatively high at graduation and currently and also was a competency where relatively high improvement was observed. Other highly-rated teacher competency statements include: using a variety of instructional methods, demonstrating an in-charge image, demonstrating an ability to keep students on task, and making rational decisions within the classroom. Teacher competency statements having the lowest mean scores include: employs computer technology in the classroom, demonstrates skill in marketing the program, is skillful in forming strategic partnerships, includes exceptional students in the instructional process, and allows students ample opportunity to learn the material.

Participants perceived improvement on all 28 of the teacher competency statements. Those teacher competencies rated relatively lower in ability at graduation that remained relatively low in current ability were: employs computer technology in the classroom, demonstrates skill in marketing the program, is skillful in forming strategic partnerships, and includes exceptional

students in the instructional process. The most growth in participants' teacher competency abilities after graduation were abilities in: keeping students on task, demonstrating knowledge of teaching as a profession, applying appropriate classroom management skills, and allowing students ample opportunity to learn the material.

The researchers feel that if the aforementioned recommended actions for the preservice teacher education program are made, they should also produce higher current levels of competency among future graduates. The one competency that should be addressed through professional development activities is employs computer technology in the classroom. This competency should be targeted for strengthening through formal courses, inservice activities, and other appropriate interventions.

All selected professional development activities were perceived to have an influence on participants' general teacher competency improvement. From the list of professional development activities, it is concluded that on-the-job experience was considered to have the highest influence on participants' general teacher competency improvement. Other professional development activities perceived to influence participants' current teacher abilities were having a student intern, assistance from the FFA Executive Secretary, and information from other agricultural education teachers. Overall, the researchers concluded that there is a strong comprehensive professional development system in place for agricultural education teachers in New Mexico.

Additionally, assistance from the New Mexico Department of Education was perceived as least influential in improving participants' teacher competency abilities. A possible explanation for the perceived low influence of the State Department of Education on professional development is that the State Department has transferred most of the responsibility for professional development activities of career and technical education teachers to university teacher education programs through Carl D. Perkins contracts.

### Recommendations for Further Research

Further research should attempt to determine factors related to or explaining at-graduation and current levels of teaching competency abilities. Differences in competency abilities by gender or highest degree held should also be explored. Additionally, the study should be expanded to include graduates from the department's technology education teacher licensure option, and the graduate students who obtained a bachelor's degree in a technical major and met the requirements for licensure in the Agricultural and Extension Education master's degree program. Furthermore, other teacher education programs in agriculture may wish to consider these teacher competencies or survey methods in their follow-up assessment of program graduates.

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