

## **The Use of Teacher Certification Measures in Predicting Secondary Agriculture Instructors' Teaching Performance**

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### **Abstract**

The purpose of this study was to assess the ability of teacher preparation program certification requirements to predict classroom teaching performance. The accessible sample consisted of 12 Agricultural Education graduates. Teaching performance was assessed by the teacher's supervising administrator using the Performance Based Teaching Evaluation instrument, and by the researcher through classroom observations using the Formative Assessment of Teaching instrument.

The first research objective sought to describe the teacher certification requirements that were predictive of teaching performance during the initial years of teaching as assessed by the teachers' administrative supervisors. Agricultural education coursework GPA accounted for 40% of the variance associated with teaching performance, as assessed by public school administrators. The second research objective sought to describe the teacher certification requirements that were predictive of observed classroom teaching performance. Upon regressing the dependent variable, teaching performance, on the seven certification measures, no certification measure, or combination of certification measures, were found that could explain a significant proportion of the variance in teaching performance. Research objective three sought to describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching performance. Administrators, in face-to-face interviews, emphasized the importance of affective characteristics to teaching. Administrators perceived that higher academic abilities did not necessarily equate to successful teaching performance.

### **Introduction/Theoretical Framework**

Developing quality teachers for public schools has been, and continues to be, the goal of teacher education programs in universities and colleges across the United States. The issue of teacher quality is not a new phenomenon. From the early beginnings of formalized teacher education, there have been issues dealing with the recruitment and development of qualified individuals to teach in the public schools. As early as 1750, Benjamin Franklin noted the colonies were "suffering at present very much for want of good schoolmasters" (Lucas, 1997, p.7).

More recently, during the 1970s and 1980s, research confirmed public perception that teachers lacked basic competency skills, and that admission and certification standards into teacher preparation programs were lax (Lucas, 1997; Lyons, 1980; Weaver, 1979). Lyons stated, "Teacher education is a massive fraud. It drives out dedicated people, rewards incompetence, and wastes millions of dollars" (p. 108). Weaver, when discussing the ramifications of the 'education brain-drain' stated, "Schools of education are now selecting potential educators from

among the least academically talented populations applying for college admission” (p. 30).

Reports produced throughout the 1980s, such as *A Nation at Risk* (1983) and *A Nation Prepared: Teachers for the 21st Century* (1986), perpetuated the perception of teachers being academically challenged, and led to the exponential growth in the types of admission and certification measures used in teacher education programs. Yet research found preservice teachers to be as academically qualified as students in non-teaching majors (Abel & Pool, 1990; Barger, et al., 1988). By the late 1980s, admission criteria into teacher preparation programs were found to be as stringent as admissions into engineering, pharmacy, business administration, and other professional degree areas (Lucas, 1997).

Because of the increased requirements for admission and certification placed upon preservice teachers, a burden of accountability to recruit and maintain high quality preservice teacher candidates has been placed on teacher preparation programs and their faculty. Yet a number of these standardized measures for admission and certification are repetitive (Dybdahl, Shaw & Edwards, 1997) and do not accurately predict teaching performance (Daniel, 1993; McCutcheon, Schmidt, & Bolden, 1991; Olstad, et al., 1987; Pigge & Marso, 1989; Riggs & Riggs, 1990; Salzman, 1989, 1991; Villeme, et al., 1982; Wakeford, 1988; Williams & Wakeford, 1990).

Since the increase in use of, and dependence on, academic measures in teacher preparation, researchers have sought to ascertain the ability of the various tests to accurately select individuals that will become successful teachers. Whereas academic assessments have been found to be good predictors of future performance on standardized tests (Villeme, 1982; Wakeford, 1988; Williams & Wakeford, 1990), little conclusive evidence has been found linking admission, retention, and certification measures to teaching performance.

One criterion extensively used as an admissions and retention measure in teacher preparation programs has been student grade point average (GPA). Research findings have been mixed as to the predictive potential of GPA. Some researchers (Daniel, 1993; Pigge & Marso, 1989; Riggs & Riggs, 1992) found GPA to be a good predictor of student teaching performance and classroom teaching performance. Other researchers (McCutcheon, Schmidt, & Bolden, 1991; Olstad et al., 1987) found that GPA had no predictive capability toward student teaching performance. The lack of consistent findings in regard to student GPA leaves questions as to its use as a selection criterion in teacher preparation.

Furthermore, prior research has focused on the relationship of admission, retention, and certification criteria to future preservice teacher performance. Guyton and Farohki (1987) in examining certification requirements as predictors of a teacher’s classroom performance found no significant relationship between performance on a subject matter test and teaching behaviors. Pigge and Marso (1989) studied the ACT examination and Comprehensive Test of Basic Skills as predictors of student teaching performance, finding neither exam related to student teaching performance. Riggs and Riggs (1990) examined the California Basic Educational Skills Test and the National Teachers Examination (NTE), finding the scores non-significant in predicting student teacher performance.

Dybdahl, Shaw, and Edwards (1997) found the Pre-Professional Skills Test (PPST) to have no relationship to measures of teacher preparation program success, and Salzman (1989, 1991) determined the PPST and National Teachers Examination (NTE) to be weak predictors of student teaching performance. Daniel (1993) investigated the ACT and components of the NTE exam as predictors of student teacher performance, finding them to be poor predictors of teaching behaviors.

Whereas the previously noted studies have focused primarily on relationships between admission criteria and the student teaching practicum, few studies have been conducted that examine the complete continuum from admission to career. In a comprehensive study, Heller and Clay (1993) found that grade point average and NTE-PK (professional knowledge) had a limited ability to predict teaching effectiveness. Nevertheless, many colleges of education across the country continue to utilize academic measures as gatekeeping and retention factors in teacher preparation.

Selecting and preparing qualified individuals to fill teaching vacancies has become a growing concern throughout colleges of education. The use of academic measures to select teacher candidates, while a convenient means of assessing cognitive ability, potentially does not address the broader concern of selecting effective teachers.

Colleges of education continually strive to improve the quality of students entering and completing teacher preparation programs. The use of academic measures of achievement in teacher education has come in response to public and political pressures for more accountability in education. The use of standardized tests, however, may potentially be causing a reverse effect by creating a relatively small homogeneous population of prospective teachers with good test-taking abilities, but who may or may not be effective classroom teachers.

It is the goal of admission committees to use criteria that have the best prediction potential for future teaching effectiveness. Admission and certification decisions need to be based on evidence of predictability for future teaching performance. The currently used admission, retention, and certification criteria used in teacher preparation programs require further investigation to determine if they are good predictors of future teaching performance.

### Purpose/Objectives

The purpose of this study was to assess the ability of teacher preparation program certification requirements to predict classroom teaching performance. Specifically, the study examined the ability of certification requirements employed by the College of Education at the University of Missouri to predict teaching performance of teachers certifying in agriculture. The following research objectives were developed to guide the study:

1. Describe the teacher certification requirements, or combination of requirements, that were predictive of teaching performance, as assessed by administrative supervisors during the initial years (first and second) of teaching.
2. Describe the teacher certification requirements, or combination of requirements, that were predictive of observed classroom teaching performance during the second year of teaching.

3. Describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching performance.

### Methods/Procedures

The target population for the study was Agricultural Education graduates who were certified to teach through the University of Missouri. The accessible sample consisted of (6) male and (6) female ( $n = 12$ ) secondary agriculture teachers who completed teacher certification in 1999. The teachers had completed one year of teaching secondary agriculture, and were engaged in their second year of teaching. Nine of the 12 teachers remained in the same school as their initial year of teaching. Three teachers had changed schools after one year of teaching.

To conduct the study, a total of nine variables were selected (Table 1). Seven variables used by the College of Education were categorized as Teacher Certification Requirements and acted as independent variables (predictor variables). Teaching performance, as assessed by the supervising administrator and the researcher during the second year of teaching, acted as the dependent variables for objectives one and two respectively. For this study, supervising administrators were identified as the high school principals.

Table 1

#### Variables by Category

Teacher Certification Requirements	Teaching Performance
1. ACT Examination	1. Administrative Supervisor Assessment of Teaching
2. Education GPA	2. Researcher Observed Assessment of Classroom Teaching Performance
3. Agricultural Education GPA	
4. Content Area GPA	
5. Cumulative GPA	
6. NTE Praxis - Specialty Area	
7. C-BASE Examination	

Assessment of the teachers' teaching performance was conducted by supervising administrators using the Performance Based Teaching Evaluation (PBTE) instrument. The PBTE instrument consisted of four performance areas: (a) The Instructional process (nine subcategories), (b) Classroom Management (two subcategories), (c) Interpersonal Relationships (three subcategories), and (d) Professionalism (three subcategories). The assessment utilized a Likert-Type scale of one to six. Guidelines established by the College of Education to complete the PBTE were: a score of one to two equaled Below Expected Performance, scores of three to four equaled Expected Performance, and scores of five to six equaled Above Expected Performance.

Validity of the PBTE instrument was previously assessed by the College of Education through use in evaluating student teaching performance. No test of reliability was documented by the College of Education. A reliability analysis was conducted by the researcher to address the issue of internal consistency. For this analysis, 23 PBTE instruments completed by

supervising agriculture teachers during the 1998 and 1999 student teaching internships were used. Internal consistency of the 17 assessment items yielded a Cronbach's alpha value of .95.

The Formative Assessment of Teaching instrument was used to assess the agriculture teacher's classroom teaching performance. One classroom visitation and two follow-up teaching video tapes, developed by the agriculture teachers, were evaluated using the Formative Assessment of Teaching instrument. This instrument was developed and utilized by faculty in the Department of Agricultural Education to assess student teacher performance. The instrument evaluated a teacher's instructional process and teaching performance. The assessment utilized a Likert-Type scale of one to six. Guidelines to assess teaching performance were: One to two equaled Below Expected Performance, three to four equaled Expected Performance, and five to six equaled Above Expected Performance. The instructional process section of the instrument assessed a teacher's performance in the following eight areas: (a) Establishing Set, (b) Stating Lesson Objective, (c) Providing Input, (d) Checking for Comprehension, (e) Modeling Ideal Behavior, (f) Providing Guided Practice, (g) Providing Independent Practice, and (h) Achieving Closure. The performance criteria section of the instrument was based upon the Rosenshine and Furst (1971) effective teaching characteristics, and evaluated a teacher's teaching performance on the following seven areas: (a) Preparation, (b) Clarity, (c) Variety, (d) Enthusiasm, (e) Task-Oriented, (f) Opportunity to Learn, and (g) Students and the Learning Environment.

Validity of the Formative Assessment of Teaching instrument had previously been established by faculty in the Department of Agricultural Education. To determine intra-rater reliability, a coefficient of stability was calculated by re-evaluating the video tapes 30 days following the initial on-site observation. Coefficients of stability were .95, .90, and .96 respectively for section I (Instructional Process), section II (Performance Criteria) and the overall total on the instrument.

To address objective three, personal interviews were conducted with supervising administrators. The purpose of these interviews was to ascertain the administrator's perceptions as key informants. Interview questions for the key informant interviews were developed by the researcher, and validated by the Agricultural Education faculty. The semi-structured interview involved developing three structured questions that were followed up with probing questions during the interview process.

### Results/Findings

The first research objective sought to describe the teacher certification requirements that were predictive of teaching performance during the initial years of teaching as assessed by the teachers' administrative supervisor. The issue of multi-collinearity was addressed using procedures suggested by Lewis-Beck (1980) where each certification measure (independent variable) was regressed on the remaining certification measures. The results of this analysis identified high coefficients of determination ( $r^2$ ) for ACT composite score (.76), Education coursework GPA (.76), C-BASE English (.84), and C-BASE Written (.74). Based upon the high coefficients of determination, ACT composite score, Education coursework GPA, C-BASE English, and C-BASE Written data were removed from further consideration in the study.

Bivariate correlational analysis revealed substantial (Davis, 1971) positive correlations between teaching performance and agricultural education GPA ( $r = .68$ ) and cumulative GPA ( $r = .60$ ) (Table 2). A moderate positive correlation was found between teaching performance and agriculture coursework ( $r = .39$ ). Low positive correlations were found between teaching performance and C-BASE Social Science ( $r = .28$ ) and C-BASE Math ( $r = .14$ ). A low negative correlation was identified between teaching performance and NTE Praxis (Agriculture) ( $r = -.14$ ), and a negligible negative correlation was found with C-BASE Science ( $r = -.03$ ).

Stepwise multiple regression analysis was conducted to identify the best certification measure, or combination of certification measures, that were predictive of teaching performance as assessed by supervising administrators (Table 3). The analysis revealed that agricultural education coursework GPA contributed significantly ( $p = .021$ ) to explaining 40% of the variance associated with teaching performance, as assessed by supervising administrators. The remaining certification measures failed to enter into the regression equation.

Table 2

Intercorrelations between Teaching Performance and Certification Measures

	1	2	3	4	5	6	7	8
1. Cumulative GPA	1.00	.78	.35	.47	.33	-.13	.20	.60
2. Agriculture GPA		1.00	.50	.63	.58	.00	.52	.39
3. Agricultural Education GPA			1.00	.36	.26	-.01	-.01	.68
4. C-BASE Math				1.00	.49	.10	.35	.14
5. C-BASE Social Science					1.00	.69	.46	.28
6. C-BASE Science						1.00	.35	-.03
7. NTE Praxis (Agriculture)							1.00	-.14
8. Teaching Performance								1.00

Table 3

Stepwise Regression of Certification Measures on Teaching Performance

Variable	Adjusted $R^2$	b	t
Agricultural Education GPA	.40	.68	2.79*
(Constant)		-5.60	

\* $p < .05$ .

The second research objective sought to describe the teacher certification requirements that were predictive of observed classroom teaching performance. To assess research objective two, data collected from the three teaching observations were combined and converted to a percentage score (Table 4). The mean overall performance was 68.9 ( $SD = 11.82$ ), compared to a high mean of 71.2 ( $SD = 11.03$ ) from the on-site observations, and a low mean of 64.7 ( $SD = 12.37$ ) on the first video taped evaluation.

Table 4

Summative Scores of Teaching Performance of Secondary Agriculture Teachers Measured on the Formative Assessment Instrument

	Instructional Process		Performance Criteria		Overall Assessment	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
On-Site Observation	68.88	11.15	73.62	11.73	71.20	11.03
Video Tape One	64.31	11.44	65.48	14.09	64.79	12.37
Video Tape Two	66.80	12.67	67.46	14.04	67.12	13.09
Combined Scores	67.41	11.38	70.56	13.00	68.93	11.82

Bivariate correlational analysis between teaching performance, as measured by the Formative Assessment instrument and the certification measures, was performed (Table 5). Analysis revealed substantial positive correlations between teaching performance and C-BASE Social Science ( $r = .54$ ), and agriculture coursework GPA ( $r = .53$ ), and moderate positive correlations between teaching performance and cumulative GPA ( $r = .45$ ) and agricultural education GPA ( $r = .45$ ). A low positive correlation was found between teaching performance and C-BASE Math ( $r = .19$ ), and a negligible positive correlation with C-BASE Science ( $r = .07$ ). A negligible negative correlation was found between teaching performance and NTE Praxis (Agriculture) ( $r = -.01$ ).

Table 5

Intercorrelations between Teaching Performance, as Measured on the Formative Assessment Instrument, and Certification Measures

	1	2	3	4	5	6	7	8
1. Cumulative GPA	1.00	.78	.35	.47	.33	-.13	.20	.45
2. Agriculture GPA		1.00	.50	.63	.58	.00	.52	.53
3. Agricultural Education GPA			1.00	.36	.26	-.00	-.01	.45
4. C-BASE Math				1.00	.49	.10	.35	.19
5. C-BASE Social Science					1.00	.69	.46	.54
6. C-BASE Science						1.00	.35	.07
7. NTE Praxis (Agriculture)							1.00	-.01
8. Teaching Performance								1.00

Stepwise multiple regression analysis was conducted to identify the best certification measure, or combination of certification measures, that were predictive of teaching performance as assessed by the researcher using the Formative Assessment instrument. Upon regressing the dependent variable, teaching performance, on the seven certification measures, no certification measure, or combination of certification measures, were found that could explain a significant proportion of the variance in teaching performance.

Research objective three sought to describe school administrators' perceptions of necessary teaching characteristics and the relationship between cognitive abilities and teaching

performance. Three major categories were identified from administrator comments: (a) Teacher Characteristics, (b) Evaluation and Assessment, and (c) Relationship of Cognitive and Affective Characteristics to Teaching Ability.

In addressing teaching characteristics in relation to assessment of teaching performance, supervising administrators discussed the importance of both cognitive and affective traits. Administrator comments relating to Teaching Characteristics were:

ATeachers that are successful have diverse presentation schemes, and as a result it keeps the students attentive and it keeps the teachers fresh.@

AOrganization, planning, being prepared to teach each day is maybe 80% of the ball game.@

AThey must be able to articulate ideas and concepts, and be attuned to details.@

AThey need to be able to communicate well and with all different levels of learning. You have to be able to communicate or you won't teach the kids anything.@

AThey need to be solid in their content area.@

ACaring is very important.@

AYou've got to have a desire to work with kids, without a doubt.@AThey need to . . . present themselves with confidence and self-esteem.@

AI guess they're enthusiastic because they like what they're doing, and they want others to like what they're doing. Those types of teachers motivate kids more easily than the old professorial behind the lectern.@

ATeachers need to . . . have a natural ability to interact in the classroom.@

In discussing the Evaluation and Assessment of Teaching Characteristics, supervising administrators noted:

AThere should be an effective screening process that addresses these [affective] characteristics . . .@

AI do look at academic standards. Are they committed to their subject?@

AYou can look at a person's transcripts and get a reading on how they've done.@

AI just go a lot on my feelings, a lot on the impressions I get just setting and talking and discussing things. More on talking about their interests and things.@

AQuestions like >what did you do in high school?=-or >how active have you been?=@

ADuring the interview process, questions are asked that address a teacher's degree of attainment of the necessary qualities.@

It's very difficult to do it in the interview. I think you can get a feel for the personality of a person.@

In discussing the relationships of Cognitive and Affective Characteristics, supervising administrators stated:

AI know I have, or have had, some teachers that are really brilliant, and top 4.0, the whole nine yards . . . but they don't necessarily make the best teachers.@

AStraight As don't always impress me because the straight A student a lot of times hasn't had to work at things nearly as hard as I have, and it might be difficult for them to teach to someone else. It's [learning] always come natural to them.@

“That teacher that was a B average, maybe a C student, had to work a little harder and maybe understands a little more.”

Four-point-0 students often lack rapport with students, especially those that may be struggling or lack motivation to learn. Those individuals typically have had no problems learning, and find it difficult to connect with students who have learning challenges.

I’ve seen guys that were brilliant . . . too smart for the kids and couldn’t reach them. There’s a fine line.

In general, I would rather have somebody with a 2.5 to 3.5 instead of a 4.0 that’s not been involved. They sometimes don’t have the communication skills and abilities, or maybe even empathy.

You can be the smartest person in the world standing up there, and if you can’t relate to them [students], they shut you off.

### Conclusions/Recommendations/Implications

Agricultural education coursework GPA was the best predictor of teaching performance as assessed by supervising administrators. This finding supports previous research conducted by Guyton and Farokhi (1987) in which a relationship was reported between upper level GPA (closely associated with teacher preparation coursework) and teaching performance. Having knowledge of the potential of agricultural education coursework to predict future teaching performance has implications for the agriculture teacher preparation program. The utilization of coursework GPA in agricultural education as a predictor of teaching ability can be a tool for teacher educators in the guidance of potential agriculture teachers. It should be noted, however, 12 of 29 credit hours associated with agricultural education coursework are accounted for during the student teaching practicum. With student teaching accounting for slightly less than half of agricultural education GPA, this finding should be viewed with some caution. Further, the inability of the other certification measures to account for 60% of the variance associated with teaching performance would also imply that there may be other factors that should be examined as potential means of predicting a teacher’s teaching potential. Further research should be conducted to identify the courses and concepts taught in the Agricultural Education program that account for the degree of relationship with administrator assessment. Further studies should also attempt to separate and examine agricultural education GPA in relation to the undergraduate coursework and the student teaching practicum. This would provide further insight into those factors identified and assessed by supervising administrators.

None of the teacher certification measures were predictive of the agriculture teachers’ classroom teaching performance, as observed by the researcher. Analysis of the data further revealed that the teachers were on average at or above expected levels of performance. This conclusion would imply that the primary use of the identified certification measures to serve a gatekeeping function in the teacher preparation process for agricultural education students may be unjustified. The inability of the certification measures to predict teaching performance would imply that there may be other factors that could be utilized to more accurately identify individuals who have the potential to become successful agriculture classroom teachers. A further implication is that if this finding is replicated across subject matter areas, teacher educators should question the validity and application of academic certification measures as the sole means of assessing the future teaching potential of preservice teachers.

Based upon the perceptions of the supervising administrators, it can be concluded that cognitive and affective characteristics are important to effective teaching. Supervising administrators identified those traditional abilities of content knowledge and instructional methodology as important, but also noted a caring nature, being people-oriented and self reflective as being crucial to successful teaching. Furthermore, in relation to the hiring and assessment of teachers, supervising administrators' addressed the importance of, and relationships between cognitive and affective characteristics and teaching ability. An overall perception expressed was that of a greater emphasis on the affective characteristics. A majority of the administrators perceived higher academic abilities to be negatively related to a teacher's ability to connect and relate with students. A relatively high degree of importance was placed on affective characteristics such as personality, caring, and desire to work with students. This would imply the recognition of traditionally unmeasurable characteristics as being critical to teaching success, thus providing a focus point for teacher educators to develop instructional models that incorporate the teaching and learning of affective characteristics into the teacher preparation program. Further study should be conducted to investigate affective characteristics and to develop means of assessing preservice teachers on the characteristics. The findings from such studies could potentially provide different (and perhaps more accurate) measures used in the admission and retention process in teacher preparation.

Results indicated an overlap in measurement between a number of certification measures. This finding supports previous research by Dybdahl, Shaw, and Edwards (1997). Knowing that certain certification measures are related, further investigation should be conducted into the appropriateness of using multiple academic assessments that measure identical criteria. It is recommended that the ACT exam be reexamined as an admission criteria into the teacher preparation program, in particular for those students pursuing certification in agricultural education. Further inquiry should be conducted to assess the use of the ACT as an appropriate instrument in the admission of teacher preparation students. Furthermore, components of the C-BASE exam should be analyzed for measurement overlap between areas, and appropriate changes made to the instrument.

Future research should be conducted that includes teachers certified through alternative processes. The assessment of alternative and temporary certificate teachers could provide valuable information as it pertains to the use of certification measures in admission and certification. Furthermore, future studies should be conducted that incorporate student learning into the assessment of teaching performance. If the overriding goal of teacher preparation programs is to develop competent teachers that elevate student learning, it would be justified to include this component in the assessment of teaching performance. Findings from such research could provide valuable information that could lead to modifications in current theory and practice as it relates to teacher preparation.

The existing teacher preparation admission and certification measures at the University of Missouri may be excluding potential agriculture teachers. While standardized test scores and grade point averages are readily available, easily quantifiable, and useful in an academic setting, the use of such measures as admission, retention, and certification criteria may be overused in the admission and certification process. Further investigation into the prediction potential of the

certification measures should be conducted with larger populations and across teaching disciplines.

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