

Quantitative type of research

The Perceived Effectiveness of Teacher Education Programs in Preparing Teachers on Iowa Standards and Agriculture Subject Matter

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Abstract

This was a descriptive study examining the perceptions of secondary school teachers of agriculture in the State of Iowa, USA, regarding the effectiveness of undergraduate programs in addressing standards and subject content during teacher preparation. The study also described teachers' perceptions regarding the importance of teaching standards and subject matter content in their teaching. We used an online questionnaire to survey 96 agriculture teachers who started teaching between 1995 and 2006 in secondary schools in the State of Iowa. We obtained usable data for this study from 62 (65%) responses out of 96 teachers. The study found that respondents perceived programs as effective in addressing standards and moderately effective in addressing the agriculture science subject content. Findings also revealed that the respondents perceived that their training had prepared them well in relation to the Iowa teaching standards and agriculture subject content which they teach in schools, with the exception of Agricultural Mechanics.

Key words: education programs, effectiveness, agriculture

Introduction

The effectiveness of education programs in preparing teachers is an important part of quality of education which is worth investigating (Croom, 2009). Teachers believe that education programs that adequately prepare them for teaching influence their performance. For example, Feiman-Nemser (2001) stated, "What and how teachers teach depends on the knowledge, skills and commitments they bring to their teaching and the opportunities they have to continue learning in and from their practice" (p. 1013). Effectiveness, as described by Dillion (2010), is "when students highly rate their preparation procedures through the program, when potential employers search for graduates of the program to hire and when graduates also have good track of establishing strong learning programs in their classrooms during their early years of teaching." The effectiveness

of teacher education programs can also be measured in terms of how satisfied stakeholders are with the quality of teachers produced, given the expectations and experiences. Effectiveness in teaching can be assessed by surveying stakeholders' (the society, parents, policy makers, students, employers, etc.) perceptions using rating scales on level of skill acquisition, knowledge of subject matter content and attitudes displayed as they teach.

Russel and Wineburg (2007) identified strategies to measure the effectiveness of educational programs. These include strengthening policies and the development of standards. According to Jenkins, Kitcheland Hains (2010), in the United States of America (USA), when students complete their pre-service academic preparation for teaching they are tested for their pedagogical knowledge and subject content mastery to demonstrate their fitness to teach in the classroom. This kind of a test exercise is conducted to respond to the requirements of the national education policy called "No Child Left Behind." The policy requires potential teacher candidates to be well prepared so as to demonstrate quality teaching (Malone, 2002). Among other factors, the teacher preparation vigorously trains them to be role models in society as it guarantees security and economic prosperity by playing a significant and integral function in the improvement of the education system. According to the Consortium for Citizens with Disability, "Highly qualified general and special education teachers must have both skills and knowledge necessary for teaching grade-level content and skill and knowledge necessary for teaching diverse learners" (Consortium for Citizens with Disability, 2006).

In several countries today, standards have become popular in education as one of the tools for measuring the effectiveness of teacher education programs. For example, the National Board for Professional Teaching Standards (NBPTS) was established for the improvement of teaching and certification of teachers. The Inter-state New Teacher Assessment and Support Consortium (INTASC) and the National Council for Accreditation of Teachers (NCATE) emphasize content knowledge in teacher education to ensure quality teaching. Standards for curriculum and classroom assessment also exist in education (Tieken and Wilson, 2001). Subject standards are important as they provide guidance on what should be taught and how it should be taught to students (National Science Teachers Association, 2003). The NBPTS's principles ensure professional teaching certification, while INTASC standards are used to guide new teachers as professionals in their teaching career (Luft, 2004). The State of Iowa is a member of the INTASC group; therefore new teachers, including of agriculture, conform to the preparation strategies and other requirements for teaching. The National Council for Accreditation of Teachers (NCATE) standards are used to assess teachers' performance in their job at the national level while in the field.

Standards are one reform strategy being encouraged as an educational transformation effort (Linn, 2001). As described by the Research Advisory Committee of the National Council of Teachers of Mathematics (1988), standards are "recommendations and principles" (p.341) defining outcomes to be accomplished in educational settings (Harman, 2001; Oregon Department of Education, 2006). The introduction of standards in education requires potential teachers to demonstrate "knowledge, skills and disposition related to subject matter content and pedagogy" (Luft, 2004). Today, different states have their own standards (Talbert, Vaughn, and Croom, 2005). In Iowa, eight standards and 42 criteria have been implemented since 2001 to improve teacher education programs (Colbert, 2006). According to the Iowa State University 2006/7 catalog, the eight standards demanded that teachers demonstrate the ability to enhance students' academic

performance, possess the ability to plan and prepare for instruction, and show “competence in classroom management.” Educational standards also encourage teachers to be prepared to vary methods of teaching, learning and assessment, hold on to “professional growth” and satisfy “professional responsibilities established” in their job.

Standards in education are significant as they provide guidance to teachers on “accountability and effectiveness” (Luft, 2004), classroom instruction (Coffey & Pieter, 2004; Porter, 1989) and assessment and standardized tests (Thomas, 2001), thus causal to program effectiveness in teaching. According to Roberts and Dyer (2004), the characteristics of an effective teacher are numerous and are measured in terms of classroom instructional ability, students’ involvement in Future Farmers of America (FFA) and Supervised Agricultural Enterprises (SAE), professional development skills, ability to plan and personality development. Likewise, Borich (1994) described an effective teacher as one who is creating and maintaining a conducive environment allowing interaction between and among learners and instructors; clear lesson presentations; variations of instruction to cater for different learning styles; student reflection of their learning; and higher order thinking, reasoning, and task activities. Teachers’ effectiveness in the classroom can also be demonstrated through teaching relevant subject matter content.

In education, emphasis has been placed on the efficiency of the program input, or how inputs support teaching and learning (Allen, Ramaekers & Van der Velden, 2003). In the era of outcome-based education, competency-based education has become popular and it provides greater opportunities for developing accountability skills for educators and teachers-in-training. There are many women in teaching as a whole but few are in agricultural education and other sciences (Kesley, 2006). Myers and Dyer (2004) stated that demographics in agricultural education were changing, and the demand for competent teachers was also growing. Therefore the focus is to build on teachers’ professional ethics and abilities through the use of standards (Luft, 2004). Policy documents specify the requirements for licensure, teachers’ level of education, necessary skills and subject content (Administrative Code of Iowa 282, Ch.14.123) (2001).

Standards are performance-oriented, therefore requiring people to demonstrate relevant competencies of what they are expected to do in the classroom (Iowa State University catalog, 2007; Porter, 1989). For example, the eight Iowa State teacher education standards specify among other factors the outcomes expected of teachers upon completion of their undergraduate program with regard to what concepts of agriculture to teach using appropriate instructional methods (Iowa State University Catalog, 2008). Thus, there is an association between what teachers learn at college and during professional workshops and the way they teach in the classroom and what they teach (Mizell, 2010). Programs of education play an important role in preparing teachers for their teaching careers (Osmond and Hoover, 1995; Randavay, 1990; McGhee and Cheek, 1990). Therefore, perceptions of teachers become important to evaluate their program effectiveness (Darling-Hammond and Wise, 1985).

The focus of this paper was on the effectiveness of education programs, explained in terms of the degree or extent to which agriculture teachers in secondary schools perceive their preparedness to teach the agriculture subject matter content guided by standards and criteria in the State of Iowa, USA. This is measured in terms of teacher perceptions of the extent to which the standards and criteria were addressed during teacher preparation.

Purpose and Objectives

The purpose of the study was to describe the perceptions of secondary school teachers of agriculture in the State of Iowa regarding the effectiveness of teacher education programs in addressing standards and subject content during teacher preparation. Specifically, the study was designed to address the following objectives:

1. to describe the demographic characteristics of Iowa secondary school agriculture teachers who began teaching between 1995 and 2006
2. to describe the perceptions of teachers of agricultural education regarding:
 - a) the effectiveness of teacher education programs in addressing 8 Iowa State standards, criteria and subject matter
 - b) the importance of teaching standards, criteria and subject matter in their teaching career

Methods and Procedures

This study was conducted in the State of Iowa, USA. A survey of 96 secondary school teachers of agriculture, who started teaching between 1995 and 2006, was carried out focusing on their perceptions regarding the effectiveness of teacher education programs in preparing them to teach. The respondent must have a valid e-mail address, have accessed the survey online, have graduated with a bachelor's degree from an accredited university and have been teaching agriculture in secondary schools in the state of Iowa at the time of the study. The frame for the target population was obtained from the Department of Education, Iowa State, and no random sampling was conducted.

We used an online Survey Monkey® instrument to gather data about the perceptions of teachers of agriculture in secondary schools in the state of Iowa. The instrument was a modified version of one used by Dormody and Torres (2002). The revised instrument had four parts, as shown in Table 1.

Table 1: Parts of the survey instruments

Part	Categories of the instrument
Part 1	7 teaching overall standard items anchored with a 5-point Likert-type scale to measure; <ul style="list-style-type: none"> • Perceived effectiveness of the undergraduate teacher programs • Perceived importance of teacher education
Part 2	16 criteria items anchored with a 4 point Likert-type scale to measure; <ul style="list-style-type: none"> • Perceptions of teachers of effectiveness of teacher education programs to address them • Perceptions of teachers of their importance in teaching
Part 3	7 subject matter content anchored with a 5-point Likert type scale to measure <ul style="list-style-type: none"> • Perceptions of teachers of effectiveness • Importance of teacher education
Part 4	Asked for demographic characteristics of respondents including their gender, teaching experience, year of teacher certification, year of graduation, final college GPA, high school FFA membership, highest FFA degree attained, and participation in SAE

A panel of two Professors and one Assistant Professor of Agricultural Education and one Professor of Curriculum and Instructional Technology reviewed the content validity of the

instrument. The panel was chosen for their knowledge of and involvement with teacher education at Iowa State University, where the study was conducted.

The survey instrument was pilot tested with ten senior undergraduate and graduate students in the department of Agricultural Education and Studies at Iowa State University. These students completed the online questionnaire and did not participate in the final study survey. Cronbach's Alpha coefficient values were computed (see Table 2) and the results for three parts of the survey instrument were as shown in Table 2.

Table 2: Coefficient values for 3 components of the instrument

Parts	Components of the survey instrument	Alpha
Part 1	Perceived effectiveness to address 7 Iowa standards	0.92
	Perceived importance of 7 Iowa standards	0.87
Part 2	Perceived effectiveness to address teaching criteria	0.97
	Perceived importance of teaching criteria	0.83
Part 3	Perceived effectiveness of agriculture subject matter	0.92
	Perceived importance of agriculture subject matter	0.89

The Cronbach's alpha value for perceived importance of Iowa teaching standards = 0.90. The alpha values computed ranged between 0.83 and 0.97, judged to be high enough and thus denoting the instrument to be consistent in measuring perceptions of teachers regarding standards, criteria and subject matter contents (McMillan and Schumacher, 2001).

We collected the data for this study by e-mailing the questionnaire to teachers of agriculture using Dilman's method. Statements pertaining to three categories of the survey instrument were self-administered. The teacher respondents were asked to indicate their level of agreement by checking the appropriate number on a five-point and four-point Likert-type scale for effectiveness of teacher preparation and importance of teaching standards and criteria, respectively. Teacher respondents were also asked to indicate the effectiveness of teacher programs to address agriculture subject matter content during training and its importance for teachers. They also responded to items requesting their personal characteristics.

The study utilized descriptive statistics to analyze the data to answer the study objectives. For the first objective on demographic information, frequencies and percentages were utilized. Means and standard deviations were used to answer objective two of the study on perceived effectiveness of the teacher education programs and perceived importance of standards and agriculture subject matter.

Results

Demographic characteristics of respondents

The proportion of male to female teacher respondents surveyed was almost equal, 49.2% and 47.5%, respectively. Approximately 28% were certified to teach agriculture prior to the introduction of standards in education, and two-thirds (67.0%) became certified to teach agriculture in schools

between 2001 and 2006. More than three-quarters (77.0%) of the respondents were Iowa State University alumni, 16.4% graduated from other universities and less than 10% did not indicate their former universities. One third of the respondents obtained their Bachelor's degree before the year 2000, while almost two-thirds (64%) graduated with a Bachelor's degree qualifications between 2001 and 2006 (see Table 3).

At least 36.1% of the respondents indicated that they had been teaching for a period of one to three years; a similar proportion had taught in the state of Iowa between four to seven years, with approximately one quarter (24.6%) having taught for eight years or more. Of the respondents, 21% graduated with a final Grade Point Average (GPA) ranging from 2.75 to 3.00, more than 40% graduated with a GPA between 3.10 and 3.50, and 23% graduated with a GPA between 3.5 and 4.00. On average, the respondents had a GPA of 3.3 out of 4.00. The results also show that a majority (89%) were members of Future Farmers of America (FFA) during their high school education; only 5% were not FFA members, and 10% indicated that they had no FFA degree. Of the types of FFA degree earned, 23% earned the American FFA degree, 27% earned the Chapter degree and 38% a state degree. The vast majority (87%) of the respondents in this study indicated that the subject content offered at the college level during their preparation for teaching was important; only less than five percent (5%) indicated that the subject matter offered in teacher education programs was not important.

Table 3: Demographic characteristics

Table1. Demographic characteristics of the respondents

Characteristics	Frequency	%
Gender		
Male	30	49.2
Female	29	47.5
Missing	2	3.3
Year of certification		
Before / equal 2000	17	27.9
After / equal 2001	41	67.2
Missing	3	4.9
University obtained BS degree		
ISU	47	77.0
Other Universities	10	16.4
Missing	4	6.6
Year graduated with BS degree		
Before & including 2000	18	29.5
From 2001 - 2006	39	63.9
Missing	4	6.6
Years of teaching experience		
1 - 3 years	22	36.1
4 - 7 years	22	36.1
8 and more years	15	24.6
Missing data	..2	3.3
GPA at graduation		
2.75-3.00	13	21.3
3.10 -3.50	27	44.3
3.51- 4.00	14	23.0
Missing	7	11.5
Membership in FFA inhigh school		
Yes	54	88.5
No	3	4.9
Missing	4	6.6
Highest degree in FFA		
None	6	9.8
Chapter degree	16	26.8
State degree	23	37.7
American degree	14	23.0
Missing	2	3.3
Issubject content offered important?		
Yes	53	86.9
No	3	4.9
Missing	5	8.2

Source: Field survey

Table 4 depicts a plurality of 40% of teachers' perceived programs to be *effective* in addressing the seven overall teaching standards which were studied. The overall mean for 7 teaching standards studied (of 8), based on the cut points created on a 5-point Likert-type scale, was perceived to be *effective* in preparing teachers on variables addressing standards ($M = 3.45$; $SD = .83$). Teachers of agriculture science, therefore, perceived the program to be effective in addressing overall standards. The teaching standard which stated that teachers "*engage in professional growth*" had the highest mean ($M = 3.72$; $SD = .79$), and the teaching standard which reads that teachers "*demonstrate competences in classroom management*" had the lowest statistical mean ($M = 3.12$; $SD = .98$) out of the seven. Thus, teachers of agriculture in the State of Iowa perceived the teacher education program to be effective.

Table 4: Perceived Effectiveness of Programs to Address Overall Standards.

The undergraduate agricultural education program enabled me to	Level of effectiveness					Total	Mis	M ²	SD
	1	2	3	4	5				
• Engage in professional growth	0	4.9	33.1	44.3	14.8	95.1	4.9	3.7	0.79
• Demonstrate competence in content knowledge appropriate to the teaching position	1.6	1.6	34.4	47.5	11.5	96.7	3.3	3.7	0.78
• Fulfill professional responsibilities established by the school district	0	11.5	34.4	39.3	11.5	96.7	3.3	3.5	0.86
• Demonstrate the ability to enhance academic profession and support for the implementation of the school district student achievement goals	0	13.1	44.3	34.4	6.6	98.4	1.6	3.4	0.79
• Use strategies to deliver instruction that meets multiple learning needs of students	0	16.4	19.3	36.1	6.6	98.4	1.6	3.3	0.84
• Use a variety of methods to monitor student learning	0	9.8	44.3	39.3	4.9	98.4	1.6	3.4	0.74
• Demonstrate competence in classroom management	6.6	18.0	32.8	36.1	3.3	96.7	3.3	3.1	0.98
Overall previewed effectiveness	1.17	10.76	37.23	39.57	8.46	97.19	2.8	3.5	0.83

*0.00-1.66 = Ineffective; 1.67- 3.33 = Moderately effective; 3.34-5.00 = Effective;
 †0.00 -1.67 = Ineffective; 1.67 -3.33. = Moderately effective; 3.35- 5.00= Effective

In addition, teachers' perceptions were also surveyed with regard to whether the programs that prepared them to teach were effective or not effective using the questionnaire for 16 criteria selected out of 42 criteria. The results showed that 43% of the respondents perceived the program to be moderately effective, followed by 35.2% of the teachers who indicated that the program was effective in addressing the 16 criteria. On a 5-point Likert-type scale, the results showed a mean of $M=3.35$, standard deviation ($SD= 0.57$), depicting that teachers perceived the program to be moderately effective in addressing teaching criteria. The teaching criterion that stated that teachers "*demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy*" had the highest mean. The lowest mean score among the 16 criteria was obtained on the criterion which stated that teachers should be able to "*use student achievement data, local standards, and the district curriculum in planning for instruction*" ($M = 3.03$; $SD = 0.89$).

We also surveyed teachers' perceptions regarding the importance of agriculture subject content offered to student teachers prior to their teaching. The results in Table 5 depict teachers' perceptions regarding the importance of subject course content taught in the teacher education program. The results show a plurality (31%) of respondents perceived their college or university to be effectively preparing teachers on subject content, followed by approximately 23% who indicated that the programs were moderately effective in addressing the agriculture subject matter. The overall mean computed for the seven agricultural subject course content statements on a 5-point Likert-type effectiveness scale was $M= 3.02$, $SD=1.0$, showing that the programs were moderately effective in addressing the subject during teacher training. The statement with the highest mean stated that teachers were prepared "to teach animal science" ($M= 3.80$; $SD = 1.0$). The lowest mean ($M= 1.87$; $SD = 1.2$) was in answer to whether teachers were prepared "to teach agricultural mechanics." These results tend to suggest that teacher respondents perceive teacher education programs to have been less effective in preparing them to teach agricultural mechanics (Table 3).

Table 5: Perceptions of teacher respondents regarding course content

Undergraduate program effectiveness in preparing you to teach	Level of effectiveness					Total	Mis	M ²	SD
	1	2	3	4	5				
Animal science	3.3	9.8	14.8	45.9	24.6	98.4	1.6	3.8	1.0
Plant science	4.9	9.8	18.0	49.2	16.4	98.4	1.6	3.6	1.0
Soil science	4.9	13.1	32.8	37.7	9.8	98.4	1.6	3.4	1.0
Agricultural business and economics	9.8	13.1	32.8	32.8	8.2	96.7	3.3	3.2	1.1
Natural resources and ecology	14.8	26.2	27.9	23.0	6.6	98.4	1.6	3.8	1.2
Food science	16.4	37.7	26.2	16.4	1.6	98.4	1.6	3.5	1.0
Agricultural mechanics	55.7	19.7	8.2	9.6	4.9	98.4	1.6	1.9	1.2
Overall previewed effectiveness	15.69	18.49	22.9	30.69	10.69			3.1	1.07

^a0.00-1.66 = Ineffective; 167- 3.33 = Moderately effective; 3.34-5.00 = Effective;

Close to two-thirds of the respondents indicated that the 16 teaching criteria were very important and approximately 31% of the teachers indicated that the criteria were moderately important. The overall mean for the 16 selected teaching criteria on a 4-point Likert type scale was $M= 3.53$, $SD = .568$, indicating that the criteria were very important. The teaching criterion with the highest mean was "creating, establishing, communicating, modeling, and maintaining standards of responsible student behaviors" ($M = 3.73$; $SD= 0.49$). The lowest mean score on the importance scale was "using student achievement data, local standards, and the district curriculum in planning for instruction."

Key Results

There were almost equal numbers of men and women who made up the respondents surveyed in this study. According to Beintema and Marcantonio (2009) the number of women in agricultural education is increasing as they become interested in the profession and research. Previous research studies on gender have reported a smaller number of women than men in agricultural education and related sciences (Kantrovich, 2007; Myers and Dyer, 2004; Ulrich *et al.*, 2005). Despite women's traditional prevalence in teaching (Kesley, 2006), there were few of them in higher and decision-making positions. The results of this study therefore suggest that the total

number of female agriculture teachers is on the rise, as we observed no significant difference between the men and women who were surveyed. The result implies an increase in the number of women because previous studies have shown lower proportions of women as compared to males employed in agricultural education.

The ratio of teachers who received their certification in 2000 before the introduction of standards and criteria to teachers who received their teacher certification in 2001 or after was approximately 1:2. This means that the proportion of inexperienced teachers of agriculture in schools was twice that of experienced teachers. This is possibly because choosing a career does not limit a person to that career for a lifetime, and there may be a large number of new teachers still excited about teaching in a way older teachers are not. A chosen career today is often one of multiple prospects, and people can change to a different field from teaching, if needed or desired (Hammerness, 2006). Different people join teaching careers for different reasons (Hammerness, 2006 Swortzel, 1998). According to Swortzel, some people—particularly women—seem to join teaching to obtain an opportunity to advance professionally, while some men join the field of teaching to share their achievements. Generally, as reported by Subair and Mojaphoko (1992), teacher attrition is prevalent. This was also implied by Myers and Dyer (2004), who found that demographic characteristics in agricultural education were changing.

The objective of this study was to describe the perceptions of teachers of agricultural education regarding the effectiveness of teacher education programs in addressing 8 Iowa State standards. The results show that a majority of the teacher respondents perceived the program to be effectively preparing them to teach agriculture. This result is consistent with the literature, such as that suggested by Dillion (2010).

Regarding the criteria, the study found that 43% of teacher respondents perceived the program to be moderately effective, followed by 35.2% of the teachers who indicated that the program was effective in addressing the 16 criteria. The results do not contradict what has been reported in the literature.

Teacher education programs were perceived to be effective in addressing subject content, but not sufficiently effective in addressing agricultural mechanics. Robert and Dyers (2004) talked about teachers' involvement in FFA as one of the indicators of being effective in teaching. The study found that teacher respondents indicated that they were involved in FFA during their training, thus confirming their confidence in their training. Generally, teachers tend to be distributed, favoring working in places where they grew up, where they studied, and where they have established relationships with friends and family members. The results of this study appear to suggest that programs for preparing teachers need Future Farmers of America (FFA) in teacher education. The teachers surveyed responded positively towards a variety of schools curricula and to extracurricular activities that enhance the teaching and learning of agricultural education in schools, including FFA. That said, at least one-third of the respondents received a chapter FFA while they were in high school. This suggests that FFA was a popular component of the schools' agricultural education programs for the respondents.

Conclusions and recommendations

The following conclusions were drawn based on the results:

1. A majority of the teacher respondents perceived the program to be effectively preparing them for the teaching of agriculture.
2. Teacher education programs were perceived to be effectively preparing teachers on standards, criteria and subject matter contents. However, the study revealed that the subject matter content of agricultural engineering was not adequately addressed during pre-service, thus teachers would need to be provided with in-service workshops to address the gap. This means there will be a need to conduct in-service programs for teachers.

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