Journal of Agricultural Education, 55(1), 38-50.
doi: 10.5032/jae.2014.01038

Developing Attitudinal Metrics for Induction-Year Agricultural Education Teachers

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Abstract

This study was part of a larger regional study of induction-year agricultural education teachers in three Western states. Studies have purported that attitude toward teaching is important for understanding and helping induction-year teachers. Thus, developing an instrument to assess induction-year agricultural education teachers' attitudes toward their job aligns with the National Research Agenda for Agricultural Education (Doerfert, 2011); specifically, "Define the characteristics of effective agricultural education programs and teachers and the means to correctly access the current state of these characteristics" (p. 10). Moir (1999) theorized that induction-year teachers experience Anticipation, Survival, Disillusionment, Rejuvenation, and Reflection, which provided the basis for initial instrument development. Induction-year agricultural education teachers employed in three Western states were randomly assigned to three of six repeated measures during the 2011–2012 academic year, which yielded 375 useable responses. Based on the useable responses, Principal Component Analysis (PCA) with varimax rotation resulted in nine constructs: Professional Efficacy, Balanced Reflection, Professional Commitment, Professional Confidence, Anticipated Change, Work-Life Balance, Strategic Renewal, Problem Solving, and Professional Resolve.

Keywords: Induction-year teachers, agricultural education teacher attitudes, attitudinal metrics

High teacher turnover rates are costly and have been noted to undermine the efforts to provide high-quality instruction to each child (Fulton, Yoon, & Lee, 2005). Further, teacher shortages are a critical issue for education, and agricultural education has not been exempt from this trend (Boone & Boone, 2007; Wolf, 2011). As noted in 2012 by the practitioner-focused website *Teach Ag*, there is a shortage of secondary agricultural educators in the United States, because there are not sufficient quantities of college students pursuing careers as agriculture teachers, which results in hundreds of unfilled positions. Unfortunately, this is not a new trend. In 2001, there were more open agricultural education teaching positions than qualified teachers (Camp, Broyles, & Skelton, 2002), which was reiterated in 2005 by Myers, Dyer, and Washburn, who suggested the shortage of qualified secondary agricultural education teachers was one of the most pressing issues facing agricultural education. Numerous factors, many of which are related to teachers' attitudes, may contribute to the lack of qualified teachers, among them, retention practices, stress factors, and job satisfaction (Boone & Boone, 2007; Greiman, Walker, & Birkenholz, 2005; Moore & Swan, 2008; Mundt, 1991; Nesbit & Mundt, 1993; Peiter, Terry, & Cartmell, 2005; Walker, Garton & Kitchel, 2004).

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Literature Review

Factors Suggested to Influence Induction Year Teachers

According to Brewer and McMahan-Landers (2003), stress occurs when there is a difference between the person's perceptions of work and the reality of the work. These stressors can be especially challenging to new teachers who may not have a realistic understanding of the work involved in managing the total agricultural education program. Scott (1988) suggested that providing induction programs that adequately support new teachers in agricultural education is critical; however, it is also challenging because a program must identify and address normal stressors, including classroom management and content development, and it must assist with the management of the entire agricultural education program. Several studies have attempted to identify some of the problems faced by new teachers as they begin their career in agricultural education. Brock and Grady (1998) noted the five greatest problems faced by new teachers included classroom management, working with mainstreamed discipline, identifying appropriate expectations for students, dealing with stress, and handling angry parents. Mundt and Connors (1997) identified several problems associated with running the total agricultural education program, including managing the overall activities of the local FFA chapter, balancing professional and personal responsibilities, maintaining personal motivation, time management, and building the support of school faculty and administration.

It is not clear how many agricultural education teachers leave or never enter the profession before retirement age; however, some evidence has suggested the percentage is high (Franklin & Molina, 2012; Kelsey, 2006; Kantrovich, 2010). Peiter, Terry, and Cartmell (2005) suggested that teacher shortages and attrition could be addressed through more successful induction programs that provide a transition to help new teachers succeed. Induction programs can address problems, contribute to teacher success, and encourage teachers to stay in the profession (Nesbitt & Mundt, 1993). Many educational institutions have implemented induction programs to help new and/or inexperienced teachers be more successful in the teaching profession (McCandless & Sauer, 2010). In agricultural education, Franklin and Molina (2012) found that 65% of American Association for Agricultural Education (AAAE) affiliated teacher preparation institutions provided beginning teacher assistance at some level. However, a review of the related literature did not yield an obvious explanation of how induction programs were being assessed and what, if any, measures of induction-year teachers were being employed.

Walker, Garton, and Kitchel (2004) suggested first-year agriculture teachers were generally satisfied with their careers regardless of whether or not they chose to stay in their position. Similarly, other studies found agricultural education teachers were generally satisfied with their positions (Bennett et. al., 2002, Berns, 1990; Cano & Miller, 1992; Croom, 2003). Understanding how new teachers develop stress and learning how to overcome these problems could allow pre-service and first year teachers to handle problems and increase overall job satisfaction (Boone & Boone, 2007).

Attitude toward teaching has been suggested to be important for understanding and helping induction-year teachers (Greiman, Walker, & Birkenholz, 2005; Moir, 1999) and has logical linkages to measuring the success of induction-year programs. Schipor and Bujor (2011) evaluated students' attitudes toward becoming a teacher and believed that attitude toward teaching was a "complex of attitudes" (p. 281) rather than one construct; essentially, multiple concepts. Further, an instrument to quantitatively measure agricultural education teachers' attitudes toward teaching during the induction-year was not obvious in the literature. Therefore, developing metrics tailored to agricultural education could help induction-year and teacher education programs monitor and evaluate their programs. Perhaps more importantly, induction-year metrics could contribute to quantitative impact statements regarding their success.

Framework

First Year Teachers' Attitudes toward Teaching

Many of the fore noted factors that were suggested to influence induction-year teachers' attitudes toward teaching were also noted by Moir in 1999. Moir (1999) analyzed excerpts from the journals and program evaluations of more than 1,500 new teachers in California to understand the experiences of new teachers during their first academic year. Based on her analyses, Moir (1999) proposed six distinct phases of teacher attitudes toward teaching, progressing from Anticipation, Survival, Disillusionment, Rejuvenation, Reflection, and then back to Anticipation (see Figure 1). Moir (1999) suggested that not every teacher progresses through the phases in the same order; however, most new teachers will experience each stage during their first year. Moir's (1999) model of first-year teachers' attitudes toward teaching contributed the initial items used to the development metrics in this study.

Figure 1. Phases of First-Year Teacher's Attitudes Toward Teaching (1999). Reprinted with permission, Ellen Moir, 2012.

Psychometric Theory

Psychometric theory (Nunnally, 1967) guided the metric development processes of this study. Psychometrics allows researchers to measure concepts indirectly rather than through physical characteristics (Nunnally, 1967). Conceptually, psychometric measures assign numbers to objects or in some cases statements that represent quantities of attributes "…to objectify the recording of impressions (e.g., rating scales) and to objectify the analysis of the results" (Nunnally, 1967, p. 486). Therefore, it is important to note when proposing new measures, the numbers (e.g., rating scales) must have associated rules to clearly qualify and quantify the properties of the concept. The rules of the summated measurements provide the mechanism to establish validity and reliability. Rules of the measure, i.e., legitimate or standardized measure of a concept or unitary attribute, are created through empirical analyses (Nunnally, 1967). The measures of the attributes, acquired via rating scales, are then summed to form an overall objective appraisal (Nunnally, 1967). Essentially, a high score indicates *X*; whereas, a low score indicates *Y*. Thus, psychometric theory (Nunnally, 1967) provided procedural and analytical guidance for this study.

Purpose and Objectives

Priority 5 of the *National Research Agenda for Agricultural Education* (Doerfert, 2011) called for efficient, effective programs. Thus, developing metrics to assess the attitudes of induction-year agricultural education teachers toward their job contributes to "defining the characteristics of effective agricultural education programs and teachers and the means to correctly access the current state of these characteristics" (Doefert, 2011, p. 2).

Moir's (1999) proposed induction-year stages were based on extensive and prolonged observations and provided numerous descriptors of teachers' behaviors. However, Moir's (1999) proposed induction-year stages lacked empirical testing and standardized quantifiable metrics. Therefore, the first purpose of this study was to develop attitudinal metrics for induction-year agriculture teachers using Moir (1999) as a framework. The second purpose of this study was to describe the perceptions of an induction-year teacher cohort's attitudes toward teaching based on the fore noted metrics; thereby, providing a limited baseline for further comparison. The following research objectives guided this study:

1. Assess the principle-component-analytic and psychometric properties of attitude toward teaching, based on the perceptions of induction-year secondary agricultural education teachers in three Western states during the 2011–2012 academic year.
2. Using the metric outcome of research objective one, describe induction-year teachers' attitudes toward teaching.

Methods

Design

This study was part of a larger study of a cohort of induction-year agricultural education teachers in three Western states during the 2011-2012 academic year. This part of the larger study was developmental and descriptive in nature. The developmental procedures used principle-component-analysis to develop attitudinal metrics to serve as the dependent variable in the subsequent analyses. Descriptive statistics were used to describe the multiple measures of induction-year agricultural education teachers during the 2011-2012 academic year.

Population and Samples

Teachers identified as entering their first year of teaching agriculture in three Western states served as the population for this study and included 126 individuals. The first-year teacher population was identified with the assistance of the state teacher education program(s), state career and technical education supervisors, and the agricultural education teacher associations. One-hundred-twenty-one teachers self-identified as teaching high school agriculture programs and four teachers self-identified as teaching middle school agricultural education programs. One-hundred-twenty-five teachers were randomly assigned to three of six observation groups; one observation per trimester (see Table 1). The schedule of observations closely corresponded with Moir's (1999) model of first-year teachers' attitudes toward teaching. Of the 325 invitations to participate that were sent, 197 useable responses (observations) were received, yielding an overall 52.5% response rate.

Table 1

Sample Distribution and Responses per Trimester and Observation Group

	Trimester 1				Trimester 2				Trimester 3			
	O_1		O_2		O_3		O_4		O_5		O_6	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Invited	62	100.0	63	100.0	62	100.0	63	100.0	62	100.0	63	100.0
Useable responses	31	50.0	35	55.5	26	41.9	35	55.5	38	61.3	32	50.8

Note. Initial invitations were sent on or about the 15th day of each month: O_1 = August 2011; O_2 = October 2011; O_3 = December 2011; O_4 = January 2012; O_5 = March 2012; O_6 = May 2012

Data Collection Procedures

Data were collected using a mixed-mode design and followed Dillman, Smyth, and Christian's (2009) *Tailored Design Method*. A minimum of five compatible points of contact were used for each round: 1) pre-notification postcard; 2) cover letter, questionnaire, and a business-reply return envelope; 3) an email invitation with an electronic cover letter and URL link to the electronic version of the questionnaire; 4) one reminder; and 5) one follow-up "thank you."

Non-response error was addressed following Method 2 as described by Lindner, Murphy, and Briers (2001). Due to the limited sample size of each round, days to respond was used as the independent variable in regression equations, where the primary variables of interest—construct scores—were regressed on the variable days to respond, which yielded no significant results (p = .566). Lindner, Murphy, and Briers (2001) noted, "if the regression model does not yield statistically significant results, it is assumed the non-respondents do not differ from respondents" (p.52). However, the relatively low response rate indicated that these results should be approached with caution.

Instrumentation

Based on the phase descriptions noted in Moir's (1999) model of first-year teachers' attitudes toward teaching, an initial list of items were developed. A list of 66 items, an electronic copy of Moir's (1999) model description, and a brief description of the study were distributed to a panel of 20 experts in the fields of agricultural education teacher preparation, instrumentation, methodology, or metric development. Experts were asked to review and provide feedback regarding the list's completeness and accuracy of interpretation.

A two-section scannable paper questionnaire and a web-based questionnaire were developed following the recommendations of Dillman, Smyth, and Christian (2009). Section one included 66 items with an associated five-point rating scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Strongly Agree. Section two included demographic questions that were used in analyses in the larger study. Before data were collected, the paper and web versions of the questionnaire were distributed to a panel of in-service agriculture teachers, not included in this study, to assess the face validity of the instrument.

Results

Data Analysis

Responses to the induction-year questionnaire variables were analyzed using the Principal Component Analysis (PCA) function in IBM® SPSS® version 21. The 66 original scale items from the questionnaire were included in the PCA with varimax rotation. Ordinarily, rotation is used after extraction to maximize high correlations between factors and minimize low correlations. An infinite number of rotations are available; however, the variance-maximizing procedure, *varimax*, is one of the most commonly used rotations to maximize the variance of factor loadings (Tabachnick & Fidell, 2013). Coefficients with an absolute value less than .45 were suppressed to prevent double loading of factors. The Kaiser-Meyer-Olkin of sampling adequacy was .79. Field (2009) suggested a KMO greater than .5 is considered acceptable for factor analytic procedures. Number of items, Eigenvalues, percentages and cumulative variance levels are reported in Table 2. The nine constructs accounted for 48.4% of the variance in the scores.

Because reliability estimates are determined on a construct basis and the constructs were not known until the data were collected and analyzed, a pilot test was not practical. Thus, post hoc estimates of reliability calculated and yielded Cronbach's alpha coefficients ranging from .63 to .88 (see Table 2).

Table 2

Number of Items, Eigenvalues, Percentages of Variance, Cumulative Percentages for Constructs, and Estimates of Reliability

Construct	Items	Eigenvalue	% of variance	Cumulative %	*n*	α level
Construct 1	6	4.678	7.088	7.088	188	.88
Construct 2	6	3.964	6.007	13.095	187	.82
Construct 3	6	3.914	5.931	19.025	183	.80
Construct 4	5	3.718	5.633	24.659	182	.80
Construct 5	4	3.584	5.430	30.089	182	.84
Construct 6	7	3.572	5.412	35.501	179	.82
Construct 7	4	2.868	4.345	39.846	187	.77
Construct 8	3	2.843	4.308	44.154	180	.63
Construct 9	4	2.782	4.216	48.370	176	.65

A list of the PCA results (scale items listed by factor loading) were emailed to a panel of experts in the fields of agricultural education teacher preparation, instrumentation, methodology, or metric development. The experts were asked to review the proposed items in each construct and identify what the items collectively measured, essentially providing names for each construct. The results of the PCA and corresponding construct names are listed in Table 3.

Table 3

Construct Loadings from Principal Component Analysis with Varimax Rotation

Item	Loading
Construct 1: Professional Efficacy	
I am bombarded with a variety of situations I didn't anticipate. [R]	.811
I am bombarded with a variety of problems I didn't anticipate. [R]	.809
My work is always stressful. [R]	.699
I am overwhelmed by my teaching job. [R]	.653
Things are not going as smoothly as I would like. [R]	.590
I can barely keep my "head above water." [R]	.559
Construct 2: Balanced Reflection	
I often think about those events that were not successful because of my teaching strategy.	.764
I often think about those events that were not successful because of my management.	.748
I often think about those events that were not successful because of my curriculum.	.724
I often think about those events that were successful because of my teaching strategy.	.664
I often think about those events that were successful because of my curriculum.	.579
I often think about those events that were successful because of my management.	.560
Construct 3: Professional Commitment	
I sometimes question if I want to be a teacher. [R]	.824
I am excited about being a teacher.	.728
I am very committed to being a teacher.	.620
My morale is sometimes low. [R]	.575
The end of the semester/school year is a beacon of hope for me. [R]	.574
I often have a sense of accomplishment.	.491
Construct 4: Professional Confidence	
Communication with parents is sometimes awkward. [R]	.856
Communication with parents is sometimes difficult. [R]	.768
Parents sometimes intimidate me. [R]	.731
School events, such as "back-to-school night" and parent conferences stress me out. [R]	.500
I spend a lot of time teaching unfamiliar content. [R]	.498
Construct 5: Anticipated Change	
I often think about how I want to change my curriculum for the next school year.	.831
I often think about how I want to change my teaching strategy for the next school year.	.764
I often think about how I want to change my management strategy for the next school year.	.755
I often think of how next school year will be different.	.717

Table 3 Continues

Table 3 Continued

Item	Loading
Construct 6: Work-Life Balance	
My family members and/or friends sometimes complain about the requirements of my job. [R]	.676
I have very little time to get things done. [R]	.641
I am often overworked. [R]	.622
My work requires an extensive commitment of my time. [R]	.601
My work is nonstop. [R]	.585
I have an opportunity to lead a normal life.	.539
I have little time to reflect on my experiences. [R]	.530
Construct 7: Strategic Renewal	
I take a break to organize teaching materials.	.763
I take a break to prepare curricular materials.	.704
I take time to gain perspective on my teaching.	.571
I take time to reflect on my teaching.	.559
Construct 8: Problem Solving	
I am confident I that I can prevent problems.	.793
I am confident that I can manage problems.	.747
I understand the process by which I am evaluated.	.511
Construct 9: Professional Resolve	
I will make a difference.	.695
I am committed to making a difference.	.663
I sometimes question why classroom management takes so much time. [R]	.570
I will accomplish my goals.	.537

Note. [R] items were reversed coded.

Research objective two sought to describe induction-year agriculture teachers' self-perceived attitude toward teaching. Table 4 illustrates the mean scores for the proposed constructs that resulted from objective one. These data represent mean scores and standard deviations for the respondents' scores on each construct. The two constructs with the highest scores were Anticipated Change (M = 4.13, SD = .64) and Professional Resolve (M = 4.07, SD = .52). The two constructs with the lowest scores overall were Professional Efficacy (M = 2.73, SD = .91) and Work-Life Balance (M = 2.44, SD = .72). Low scores on these constructs indicate the teachers did not have overall positive scores for efficacy or work-life balance.

Table 4

Benchmark Scores for Agriculture Teachers' Attitude Components (Overall)

Construct	*M*	*SD*
1. Professional efficacy[1]	2.73	.91
2. Balanced reflection	3.63	.63
3. Professional commitment[1]	3.54	.75
4. Professional confidence[1]	3.02	.89
5. Anticipated change	4.13	.64
6. Work-life balance[1]	2.44	.72
7. Strategic renewal	3.53	.71
8. Problem solving	3.95	.57
9. Professional resolve[1]	4.07	.52

Note. 1 = Strongly Disagree, 5 = Strongly Agree

[1] Contains Reverse Coded Items (1 = Strongly Agree, 5 = Strongly Disagree)

Conclusions, Implications, and Recommendations

This exploratory quantitative study was designed to explore the theory proposed by Moir (1999) about induction-year teacher's attitude toward teaching. Six rounds of data collection from a cohort of induction-year agricultural education teachers resulted in an instrument to measure the attitude of teachers. The instrument was reduced from 66 to 45 items using principal-components-analysis with varimax rotation. The instrument created from this study measured: Professional Efficacy, Balanced Reflection, Professional Commitment, Professional Confidence, Anticipated Change, Work-Life Balance, Strategic Renewal, Problem Solving, and Professional Resolve. The instrument had an overall Cronbach's alpha level of .88.

It is important to note the limitations of the instrument. Some constructs had lower Cronbach's alpha levels than what is typically considered acceptable. According to Field (2009), alpha coefficients of .80 or higher are considered to be acceptable. However, constructs 7, 8, and 9 were below that threshold. According to Nunnally (1975), alpha levels of .7 are considered to be adequate for psychometric analysis. Constructs 8 and 9 remained a concern with alpha levels below .70 (Nunnally, 1975). Although the alpha level was between .7 and .6 and considered acceptable by some researchers (Nunally, 1975; Schmitt, 1996), these constructs should be evaluated and perhaps refined to improve reliability in future research. Furthermore, the alpha levels of .63 for construct 8—*Problem Solving*—could be explained by the relatively small number of items that loaded to form the construct. Though two constructs in this study fell below 0.70, the overall reliability was 0.88. More extensive use of the instrument could boost the constructs in question.

Though these findings cannot be generalized beyond this cohort of teachers, it may open a new line of inquiry. This instrument could provide future researchers with insight into what is happening within a cohort of teachers. Also, the instrument could be useful in states that have an organized teacher induction program. Administering the Agricultural Education Induction-Year Attitude Scale (AEIYAS) could help induction-year teachers overcome some of the challenges they face on an individual level through assessment of their attitudes. Such data would be useful to induction-year program coordinators by providing quantifiable measures of teacher attitude throughout the induction year.

Being an agricultural education teacher is demanding and challenging due to the physical, emotional, and intellectual resources needed to be an effective teacher (Croom, 2003; Cano, 1990). An instrument sensitive to multiple components of an induction-year teacher's attitude toward teaching may help induction programs and processes be more effective. The presence of

these new factors could indicate that teaching in general has become more complex than when Moir (1999) posited her theory of induction-year teacher's phases of attitudinal change.
Respondents in this study did report an overall positive attitude toward teaching. This substantiates Walker, Garton, and Kitchel's (2004) research that suggested first-year agriculture teachers are generally satisfied with their careers. Although the respondents were generally positive about being agricultural education teachers, some construct scores that warrant closer investigation. Respondents reported low scores for *Work-Life Balance* and *Professional Efficacy*. These are not new issues facing induction-year agricultural education teachers. As Boone and Boone (2007) stated, understanding how new teachers develop stress and learning how to overcome these problems can allow pre-service and first-year teachers to handle possible problems and increase overall job satisfaction.

Respondents who were less efficacious in the teaching profession may seek employment elsewhere and leave the profession prematurely. Previous studies have shown that agricultural education teachers usually have a greater workload and work longer hours than other secondary education teachers (Torres, Ulmer, & Aschenbrener, 2007). Low scores related to Work-Life Balance and Professional Efficacy could be the result of long hours and a larger workload. Furthermore, according to the NCES (2007), 65% of the teachers who left the profession in 2004–2005 believed that the workload in their new occupation was more manageable and they were better able to balance their personal and work lives. Understanding how new agricultural education teachers develop stress while learning how to overcome these problems may allow first-year teachers to handle possible problems and increase overall job satisfaction (Boone & Boone, 2007). Perhaps using the AEIYAS to benchmark induction year teacher's attitudes at different points in their first year may offer some relief to the ongoing teacher attrition problems in agricultural education.

The following recommendations may apply to practice and research to improve agricultural education and provide support to induction-year teacher agricultural education teachers. Utilize the AEIYAS with cohorts of new agricultural education teachers nationally to refine and improve the instrument. Data collected from a nationally-used instrument could be helpful in addressing teacher retention and attrition. A national study will allow for regional and state comparisons that may be helpful in solving agricultural education teacher shortages across the country. Replication of this study is needed within other areas of career and technical education (CTE). Are CTE teachers different or similar to agricultural education teachers in their attitude toward teaching during their induction year? Do core subject induction-year teachers experience similar attitudinal trends as seen in Moir (1999), or are they more similar to induction-year agricultural education teachers in this study? The answers to these questions lie in future research.

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