Pre-Service Teachers Self-Perceived Training Needs Associated with Program Design and Management and Leadership and SAE Development

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Abstract

Teacher educators face the perpetual challenge of providing pre-service teachers with the most pertinent pedagogical and content-related knowledge and skills to ensure their success in the field of education. Using a modified version of a Borich needs assessment instrument, we assessed the agricultural education training needs of agricultural education pre-service teachers (n = 69) at Iowa State University related to program design and management and leadership and Supervised Agricultural Experiences (SAE) development. The General Program Standards for Agricultural Education, developed by the Iowa Council on Agricultural Education, served as a guide for assessing the areas of pre-service teachers' training needs. Mean weighted discrepancy scores (MWDS) were calculated for needs assessment items which served as a means to rank the areas of needs expressed by the Iowa State University agricultural education pre-service teachers. The areas of training needs were assessed as a whole and by grade classification. Overall, all 25 items included in the instrument were indicated as an area of need and the calculated MWDS ranged from 2.29 – 9.05, and variance of training needs was discovered between pre-service teachers of various grade classifications. Implications for agricultural education teacher educators and recommendations were discussed.

Keywords: pre-service; professional development needs; program design; SAE development

Introduction

A continual challenge presented to teacher educators is providing pre-service teachers with the necessary skill set needed to be successful when entering the classroom. In order for teacher educators to focus on the needs of pre-service students, we must understand the specific worries and concerns of the students (Stair et al., 2012). This notion of addressing early career teacher concerns is not new. In fact, Veenman (1984) indicated beginning teachers most frequently struggle with motivation of students, management, accommodating differences in students, parent teacher relationship, lack of resources, high teaching loads, and limited preparation time. In addition, King et al. (2013) concluded the responsibilities of FFA and SAE create the most stress, with 60% of responses identifying preparing proficiency applications as the leading stressor.

Additional studies have reported finding levels of concerns among beginning teachers (Edwards & Briers, 1999; Myers et al. 2005; Warnick et al. 2007). Two concerns of beginning agricultural education teachers were appropriate use of classroom management and lack of subject matter expertise (Stair et al., 2012). Similar to the challenges faced by beginning teachers, previous

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research has also indicated pre-service teachers face a variety of struggles before entering the profession (Hillison, 1977).

Other studies have been conducted focusing on the professional and learning needs of teachers. Saucier and McKim (2011) focused on student teachers' learning needs associated with laboratory management. This study goes beyond the content taught in agricultural education classroom and suggests the severity of accidents in a laboratory can be reduced when the educators managing the facilities are competent in laboratory safety and facility management. Duncan et al. (2006) conducted a study focused on a variety of professional agricultural teaching competencies. The study highlights teachers' needs associated with technical areas such as veterinary technology, aquaculture and biotechnology. The study indicated additional support was needed in pedagogical skills which focused on motivating student and managing student behavior.

Additional studies have focused on training needs of pre-service teachers focusing around SAE development. Wolf (2011) indicated teachers had self-efficacy issues regarding SAE's when compared to teachers reporting self-efficacy on FFA or instruction domains. Professional development was recommended for novice teachers regarding SAE development. Wilson and Moore (2007) noted the importance of educating teachers on types of SAE programs rather than trying to convince teachers on the value of SAE. Joerger (2002) sought to identify the needs of two cohorts of beginning agricultural education teachers and found the program design, management and teaching, and classroom management categories of professional competencies were the highest need for both groups. The areas in the professional teaching competencies which were identified by the teachers as being needed for success and survival included classroom management, leadership and SAE development, technical agriculture and program design and maintenance.

As individuals progress through teacher preparation programs and into the classroom setting, pre-service students encounter various attitude phases and concerns associated with teaching. Previous research focused on evaluating teachers' attitudes towards teaching serves as an important means for understanding and assisting novice teachers and assessing the effectiveness of teacher preparation programs (Greiman et al., 2005; Moir, 1999; Rayfield, et al., 2014). Moir (1990, 2011) suggested beginning teachers go through a series of six stages during the first year of teaching: anticipation, survival, disillusionment, rejuvenation, reflection, and anticipation. Within the six stages the attitudes of the teachers change throughout the school year.

When individuals are engaged in pre-service preparation programs, they are not as concerned about teaching as they are about their personal progress as learners (Pigge & Marso, 1997). Conway and Clark (2003) asserted the inward focus of pre-service teachers is "necessary, valuable, and reflects a move toward reflective practice as a professional self is constructed over time" (p. 475). Early field-based experiences serve as a catalyst to transition a pre-service teacher from being concerned about surviving as a teacher to focus on their teacher preparation program (e.g., student teaching). As their concerns begin to transition a focus can be placed on their teaching performance (Pigge & Marso, 1997).

Stair et al.'s (2012) findings indicated pre-service teachers in an introduction to teaching agricultural education course (mostly sophomores) had 87% self-concerns, senior-level students' self-concerns in the methods class dropped down to 60%, and by the time they were in their first year of teaching, their concerns were 48% self, 7% task, and 45% impact concerns. Pigge and Marso (1997) noted as a teacher matures and encounters successful teaching experiences, the more the teacher will focus their concerns toward having a positive and meaningful influence on their students (i.e., impact concerns). To accommodate pre-service teachers and assist them in transitioning through a teacher preparation programs they are tasked with providing a personalized education which accommodates individual learners' varied capabilities and feelings to holistically facilitate development (Pigge & Marso, 1997).

Framework

Along with the various phases of teacher attitudes toward teaching, the nature of teachers' concerns associated with teaching have the propensity to change. The need for personalized education aligns with the general tenets of andragogy, which served as the framework for this study. Andragogy is the art and science of adult learning (Knowles, 1980). One of the four main assumptions of andragogy indicated that as learners mature, "their self-concept moves from one of being a dependent personality toward being a self-directed human being" (Knowles, 1980, p. 44). Based on the self-directed concept of andragogy, an important factor in determining the training needs of pre-service teachers, is pre-service teachers themselves. Merriam et al. (2007) added credence to this sentiment by noting adult learners should "participate in the diagnosis of their learning needs, the planning and implementation of learning experiences, and the evaluation of those experiences" (p. 85). Moreover, Waters and Haskell (1989) argued the involvement of clientele (i.e., pre-service teachers) in the identification of future educational programs enhances the likelihood of providing relevant training.

Fuller's model of early career development (Fuller & Brown, 1975) is a linear conceptualization of the concern theory which is commonly used in various fields of education (Gordon, 2016; Heikonen et al., 2017; Tas et al., 2018; Watzke, 2007) to describe the types of concerns pre-service and in-service internalize throughout their careers. Specifically, the fuller model of early career development encompasses three stages of concerns: (stage one) concerns about self, (stage two) concerns about tasks / situations, and (stage three) concerns about impact on students. Conway and Clark (2003) emphasized pre-service and novice teachers' developmental patterns of concerns move in an outward fashion—starting with concerns about themselves and transitioning to concerns associated with task and impact on students. In contrast to the linear orientation of the fuller model of early career development, research indicated teachers' concerns can be cyclic in their first years in the profession.

The conceptual underpinnings of andragogy and the fuller model of early career development served as a means to determine the pre-service training needs and concerns of Iowa State University agricultural education pre-service teachers. The areas of identified training needs will serve as a guide to assessing the relevance of current teacher preparation coursework and field-based experiences and augment current preparation practices to provide a more personalized education for all students.

Purpose and Objectives

The purpose of this study was to evaluate the agricultural education training needs of pre-service teachers at Iowa State University, based on the state General Program Standards for Agricultural Education predicated by the Iowa Council on Agricultural Education. This study addresses Research Priority Area Five: Efficient and Effective Agricultural Education Program within the American Association for Agricultural Education's National Research Agenda (Thoron et al., 2016). The following research objectives were used to guide this study:

1. Describe the background characteristics (i.e., involvement in secondary-based agricultural education, participation CASE-based courses at the secondary level, and obtained CASE certifications) of the Iowa State University agricultural education pre-service teachers.
2. Determine the pre-service training needs of agricultural education pre-service teachers at Iowa State University related to program design and management, by academic classification.
3. Determine the pre-service training needs of agricultural education pre-service teachers at Iowa State University related to leadership and SAE development, by academic classification.

Method

Population

The target population ($N = 97$) for this study was agricultural education pre-service teachers currently enrolled in the Iowa State University teacher preparation program. Of the 97 pre-service teachers which were recruited for this study, a total of 69 pre-service teachers responded to the instrument. A *t*-test was conducted to assess non-response error by comparing the scale responses of early to late respondents (Lindner et al., 2001). The analysis of non-response error indicated there were no significant differences between the two groups ($t(67) = .16$, $p = .87$). The pre-service teachers consisted of undergraduate (Freshman, $n = 9$, 13.05%; Sophomore, $n = 8$, 11.59%; Junior, $n = 26$, 37.68%; Senior, $n = 21$, 30.43%) and graduate students ($n = 5$, 7.25%). The average pre-service teacher was female ($n = 50$, 70.4%) and had an average age of 20.70 ($SD = 2.77$).

Instrumentation

The training needs of the Iowa State University agricultural education pre-service teachers were assessed using a modified version of the Borich Needs Assessment Model (Borich, 1980). The survey instrument was modeled after previous needs assessments conducted in the field of agricultural education (Duncan et al., 2006; Garton & Chung, 1997; Joerger, 2002). As in previous studies, the model provided the needs constructs of school-based agricultural education (SBAE) teachers. The items on the instrument were augmented to reflect the Iowa Council on Agricultural Education General Program Standards for Agricultural Education associated with program design and management, leadership and SAE development. Moreover, the items on the instrument were modified to align with the local context of Iowa agricultural education. For example, the instruments used in the previous studies (Duncan et al., 2006; Joerger, 2002), included the item "Preparing FFA CDE Teams", but failed to include an item addressing Leadership Development Events (LDE). Therefore, the item "Preparing students for Leadership Development Events (LDE)", was added to address the current classification of FFA leadership events. The item "Developing SAE opportunities for students" was divided into five different items to determine pre-service teachers' specific needs with the different types of immersion SAEs (i.e., entrepreneurship/ ownership, placement/internships, research [experimental, analytical, invention], school business enterprises, and service learning) predicated by SAE for All: Teacher Guide (National Council for Agricultural Education, 2017).

The final instrument contained a total of 32 items. The first 25 items were Likert-type scale items which sought to identify the training needs of the pre-service teachers. The pre-service teachers were asked to indicate the importance they associated with each agricultural education topic on a five-point Likert-type scale (1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*). The pre-service teachers were also asked to indicate their perceived level of knowledge of each topic on a five-point Likert-type scale (1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*). To enhance the readability of the instrument, the 25 agricultural education topics were organized in two categories: program design and management (12 items) and leadership and SAE development (13 items). According to Dillman et al. (2009) "grouping related questions makes it easier for respondents to answer and more closely approximates an actual conversation" (p. 157).

The instrument included four short-answer and multiple-choice items pertaining to the demographic and background characteristics of the teachers. Specifically, the pre-service teachers were asked to indicate their biological sex, age, academic classification, and years of involvement in secondary-based agricultural education. Three multiple-selection items inquired about the pre-service teachers' previous enrollment in secondary CASE-based courses, obtainment of CASE certifications, and interest in teaching the various AFNR career pathways.

Cronbach's alpha coefficients were calculated for both the importance ($\alpha = .97$) and knowledge scales ($\alpha = .97$) to assess the reliability of the instrument. Reliabilities were also assessed by category, for items pertaining to Program Design and Management (Importance $\alpha = .90$; Knowledge $\alpha = .88$) and Leadership and SAE Development (Importance $\alpha = .96$; Knowledge $\alpha = .96$). The calculated alpha coefficients were considered to be at a tolerable level for establishing reliability (Ary et al., 2010). The content validity of the items were assessed by way of a panel of experts. The panel (consisting of two agricultural education faculty members) evaluated each item and made recommendations to enhance readability and eliminate double-barreled items. Specifically, based on recommendations from the panel of experts, the item pertaining to SAE development and supervision was divided into separate items to better understand per-service teachers' perceived importance and competence associated with the various types of SAE programs (e.g., Research, School-Based Enterprise, Ownership / Entrepreneurship, Service Learning, Placement / Internship SAE).

Data Collection

Upon receiving IRB approval, the pre-service teachers were sent an initial recruitment email requesting their involvement in this study. The email contained a description of the study, information about the needs assessment instrument, and a link to access the instrument. The online survey instrument was developed and disseminated using the Qualtrics online survey platform. Following the distribution of the initial recruitment email, three subsequent reminder emails were sent to the non-respondents in five-day increments. The stratification of recruitment and reminder emails (i.e., at five-day increments) were based on recommendations posited by Yun and Trumbo (2000).

Data Analysis

The data analysis for this study was two pronged. The items associated with demographic and background characteristics were analyzed by descriptive statistics (i.e., frequencies and percentages). The central tendency and dispersion of the pre-service teachers' perceptions of importance and knowledge associated with program design and management and leadership and SAE development items were evaluated by calculating means and standard deviations. These measures were calculated for the all pre-service teachers and by grade classification. This portion of the analysis was conducted using IBM's Statistical Package for Social Sciences (SPSS$^©$), Version 25.

The pre-service teachers' perceptions of importance and knowledge of the topics were also analyzed by calculating mean weighted discrepancy scores (MWDS). The discrepancy scores (DS) were calculated for each agricultural education topic by subtracting the pre-service teachers' perceived knowledge ratings from their declared importance ratings. The weighted discrepancy scores (WDS) were then calculated for each pre-service teacher by multiplying the mean importance rating by DS for each item. The sum of the WDS were then divided by the total number of observations to calculate the MWDS for each agricultural education topic.

Mean Weighted Discrepancy Score Formula

$$\text{Mean Weighted Discrepancy Score} = \frac{(\text{importance rating} - \text{knowledge rating}) \times \text{importance rating}}{\text{number of observations}}$$

The Borich needs assessment model was operationalized by the calculation of MWDS to determine the training needs of pre-service teachers. According to Borich (1980), "The process of identifying training needs can be conceptualized as a discrepancy analysis that identifies the two polar positions of what is and what should be" (p. 39). The topics which have the greatest average discrepancies between importance and knowledge will serve as the highest priority for training or program revisions (Borich, 1980; Sorensen et al., 2014). Conversely, topics with lower or negative MWDS can be interpreted as areas which are sufficiently covered in the program and current training associated with these topics might not need to be revised.

To expedite the calculation of MWDS, and to control for user error (McKim & Saucier, 2011), the Excel-Based Mean Weighted Discrepancy Score Calculator, developed by McKim and Saucier (2011), was used to analyze the data for the second objective.

Findings

The first research objective sought to determine the background characteristics (i.e., involvement in secondary-based agricultural education, participation CASE-based courses at the secondary level, and obtained CASE certifications) of the agricultural education pre-service teachers at Iowa State University. The majority of pre-service teachers (*n* = 55, 77.5%) reported being involved in four years of secondary-based agricultural education (see Table 1).

Table 1
Background Characteristics of the Iowa State University Agricultural Education Pre-service Teachers (n = 69)

Characteristic	*f*	*%*
Years of involvement in secondary agricultural education		
4	55	79.7
3	6	8.7
1	5	7.2
0	3	4.3
Enrollment in CASE-based courses at the secondary level		
ASA	15	21.1
AFNR	14	19.7
ASP	6	8.5
APB	2	2.8
NRE	2	2.8
APT	1	1.4
FSS	1	1.4
Earned CASE certification		
No	67	97.2
Yes	2	2.8

Note. CASE Curriculum ASA = Principles of Ag Science-Animal, AFNR = Introduction to Agricultural, Food, and Natural Resources, ASP = Principles of Ag Science-Plant, APB = Animal and Plant Biotechnology, NRE = Natural Resources and Ecology, APT = Agricultural Power and Technology, FSS = Food Science and Safety.

The pre-service teachers reported varying levels of enrollment in CASE-based courses at the secondary level. Moreover, the pre-service teachers were enrolled most often in classes which incorporated the Principles of Ag Science-Animal (ASA; *n* = 15, 21.1%), Introduction to Agricultural, Food, and Natural Resources (AFNR; *n* = 14, 19.7%), and Principles of Ag Science-Plant (ASP; *n* = 6, 8.5%) CASE curriculums. Of the 69 pre-service teachers, only two (2.8%) teachers indicated they obtained a CASE certification. The two aforementioned pre-service teachers were certified in the AFNR CASE curriculum.

The second objective was to determine the agricultural education pre-service teachers training needs related to program design and management. In regard to perceptions of importance, the pre-service teachers perceived "developing relations with fellow teachers and administrators" (*M* = 4.62, *SD* = 0.64) "organizing fund raising activities for the local FFA chapter" (*M* = 4.61, *SD* = 0.60), and "coordinating activities with local agricultural organizations/agencies" (*M* = 4.49, *SD* = 0.63) to be the areas with highest importance associated with program design and management. In fact, sophomores (*M* = 4.25, *SD* = 1.04), juniors (*M* = 4.73, *SD* = 0.45), seniors (*M* = 4.57, *SD* = 0.51), and graduate students (*M* = 5.00, *SD* = 0) reported "developing relations with fellow teachers and administrators" as

being the most important topic. In contrast to the aforementioned items of high importance, the pre-service teachers of every academic classification indicated they perceived "evaluating the local program with National Quality Program Standards (NQPS)" (M = 3.77, SD = 1.03) to be the topic with the lowest mean score, but was still considered to be important (see Table 2).

Table 2
Iowa State University Pre-service Techers' Perceived Importance and Knowledge of Program Design and Management Topics in Agricultural Education (n = 69)

Item		M (SD)					
		F	So	J	Sr	Gr	Total
Developing relations with fellow teachers and administrators.	Impt.	4.56 (1.01)	4.25 (1.04)	4.73 (0.45)	4.57 (0.51)	5.00 (0.00)	4.62 (0.64)
	Knwl.	2.89 (1.05)	3.71 (1.50)	3.58 (0.81)	4.05 (0.74)	3.60 (0.55)	3.65 (0.94)
Organizing fund raising activities for the local FFA chapter.	Impt.	4.67 (0.50)	4.00 (0.93)	4.73 (0.45)	4.62 (0.59)	4.80 (0.45)	4.61 (0.60)
	Knwl.	3.44 (1.33)	3.86 (0.90)	3.54 (1.03)	3.67 (1.11)	2.40 (1.14)	3.51 (1.11)
Coordinating activities with local agricultural organizations/agencies.	Impt.	4.44 (0.73)	4.13 (0.99)	4.73 (0.45)	4.38 (0.50)	4.40 (0.89)	4.49 (0.63)
	Knwl.	3.00 (1.50)	3.67 (1.51)	3.38 (0.80)	3.57 (0.60)	3.60 (1.14)	3.43 (0.96)
Repairing and maintaining laboratory equipment.	Impt.	4.11 (.78)	4.13 (0.99)	4.35 (0.85)	4.52 (0.75)	4.40 (0.55)	4.35 (0.80)
	Knwl.	2.11 (0.93)	3.57 (1.13)	2.23 (0.91)	3.14 (1.24)	2.60 (1.34)	2.66 (1.17)
Developing an effective public relations program.	Impt.	4.33 (0.87)	3.88 (0.99)	4.50 (0.65)	4.24 (0.77)	4.40 (0.55)	4.32 (0.76)
	Knwl.	2.44 (1.13)	3.00 (1.29)	3.04 (0.98)	3.33 (0.97)	3.20 (0.84)	3.06 (1.03)
Organizing a local alumni/agricultural booster program.	Impt.	4.33 (1.0)	3.88 (0.99)	4.54 (0.58)	4.38 (0.81)	3.60 (0.89)	4.32 (0.81)
	Knwl.	2.22 (1.20)	3.29 (1.25)	2.58 (0.86)	2.90 (1.04)	2.00 (1.23)	2.66 (1.06)
Utilizing an advisory committee to promote local agricultural program.	Impt.	4.22 (1.39)	3.63 (0.74)	4.46 (0.71)	4.29 (0.78)	4.80 (0.45)	4.30 (0.86)
	Knwl.	2.00 (1.00)	2.71 (1.25)	2.54 (0.99)	2.76 (0.89)	2.40 (0.55)	2.54 (0.97)
Planning banquets.	Impt.	4.11 (0.78)	4.13 (1.13)	4.38 (0.70)	4.29 (0.72)	4.40 (0.89)	4.29 (0.77)
	Knwl.	3.78 (1.48)	4.29 (0.95)	3.38 (0.98)	4.14 (0.91)	3.00 (1.41)	3.74 (1.12)

Item		M (SD)					
		F	So	J	Sr	Gr	Total
Ability to use the local advisory committee to acquire resources.	Impt.	4.00 (1.32)	3.71 (0.95)	4.46 (0.81)	4.38 (0.74)	4.40 (0.89)	4.29 (0.90)
	Knwl.	1.89 (1.17)	2.71 (0.95)	2.69 (0.93)	3.00 (0.95)	2.20 (0.45)	2.65 (0.99)
Completing annual FFA report.	Impt.	4.33 (.71)	3.75 (0.87)	4.56 (0.56)	4.43 (0.68)	4.20 (0.84)	4.14 (0.71)
	Knwl.	2.22 (1.30)	3.43 (1.27)	2.35 (1.16)	2.40 (1.19)	1.60 (0.55)	2.40 (1.21)
Establishing a program advisory committee.	Impt.	3.67 (1.23)	3.50 (0.76)	4.15 (0.97)	4.14 (0.79)	4.20 (0.45)	4.01 (0.92)
	Knwl.	2.00 (1.00)	2.86 (1.07)	2.23 (1.03)	2.71 (0.85)	2.40 (0.89)	2.43 (0.98)
Evaluating the local program with National Quality Program Standards (NQPS).	Impt.	3.33 (1.23)	3.00 (0.93)	4.12 (0.95)	4.00 (0.89)	3.00 (0.71)	3.77 (1.03)
	Knwl.	1.44 (0.53)	2.14 (0.90)	1.69 (1.05)	2.57 (1.08)	2.20 (1.10)	2.01 (1.06)

Note. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. Knowledge Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

In regard to perceived knowledge of program design and management topics, the pre-service teachers ($M = 3.74$, $SD = 1.12$), specifically freshman ($M = 3.78$, $SD = 1.48$), sophomores ($M = 4.29$, $SD = 0.95$), and seniors ($M = 4.14$, $SD = 0.91$) reported having the highest average level of knowledge pertaining to "planning banquets." Conversely, "evaluating the local program with National Quality Program Standards (NQPS)" was the item which pre-service teachers indicated having the lowest levels of knowledge ($M = 2.01$, $SD = 1.06$).

The MWDS were used to represent the training needs for the agricultural education pre-service teachers at Iowa State University. From a broad lens (disregarding differences in grade classification), training needs were indicated for all 25 agricultural education topics included on the survey instrument, with MWDS ranging from 9.05 to 2.29.

The program design and management items with the highest overall training needs were: completing annual FFA report (MWDS = 9.05), utilizing an advisory committee to promote the local agricultural program (MWDS = 7.61), repairing and maintaining laboratory equipment (MWDS = 7.52). When looking at the training needs from a grade classification standpoint, there were differences and similarities. Freshman indicated the highest training needs associated with utilizing an advisory committee to promote the local agricultural program (MWDS = 9.38) and sophomores reported the highest needs regarding the ability to use the local advisory committee to acquire resources (MWDS = 4.28). Organizing a local alumni/agricultural booster program served as the highest reported area of need for both juniors (MWDS = 10.74) and seniors (MWDS = 9.12). With a MWDS of 11.52, completing annual FFA reports and utilizing an advisory committee were tied for the highest areas of need for graduate students. On the other hand, the item "organizing fund raising activities for the local FFA chapter" was reported as the lowest area of need for freshmen (MWDS = 1.37), sophomores (MWDS = -0.59), juniors (MWDS = 4.38), and seniors (MWDS = 0.61). Moreover, sophomores had a negative MWDS—indicating they have no training needs regarding fundraising. The area which

graduate students indicated the lowest level of training needs was with the item of planning banquets (MWDS = 2.40; see Table 3).

Table 3

Mean Weighted Discrepancy Scores (MWDS) of Program Design and Management Training needs Expressed by Iowa State University Pre-service Teachers (n = 69)

Item	MWDS					
	F	So	J	Sr	Gr	Total
Completing annual FFA report.	5.70	0.57	5.64	4.40	11.52	9.05
Utilizing an advisory committee to promote the local agricultural program.	9.38	3.06	8.58	6.53	11.52	7.61
Repairing and maintaining laboratory equipment.	9.15	2.20	8.90	6.47	5.76	7.52
Organizing a local alumni/agricultural booster program.	9.15	1.06	10.74	9.12	10.92	7.35
Ability to use the local advisory committee to acquire resources.	8.44	4.28	7.89	6.05	9.68	7.20
Evaluating the local program with National Quality Program Standards (NQPS).	8.19	3.31	6.93	3.83	5.28	6.66
Establishing a program advisory committee.	6.11	1.96	7.99	5.92	7.56	6.40
Developing an effective public relations program.	7.59	2.45	5.46	2.39	7.00	5.68
Organizing fund raising activities for the local FFA chapter.	1.37	-0.59	4.38	0.61	6.16	5.09
Coordinating activities with local agricultural organizations/agencies.	8.22	2.37	9.19	6.25	7.92	4.90
Developing relations with fellow teachers and administrators.	6.41	1.33	6.37	3.55	3.52	4.64
Planning banquets.	6.30	2.04	9.97	5.71	2.40	2.29

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. Knowledge Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

       The third objective sought to determine the pre-service training needs of agricultural education pre-service teachers at Iowa State University related to Leadership and SAE Development. The items in the leadership and SAE development category was comprised of items related to the development and supervision of students' SAE projects and items related to advising FFA chapters. The three leadership and SAE development topics which the Iowa State University pre-service teachers perceived to be most important were "teaching record keeping skills" ($M = 4.70$, $SD = 0.49$), "conducting local FFA chapter activities" ($M = 4.63$, $SD = 0.52$), and "planning and conducting student overnight trips" ($M = 4.52$, $SD = 0.61$). Freshman indicated "preparing students for Leadership Development Events" ($M = 4.78$, $SD = 0.44$) to be their most important topic and sophomores reported that "supervising students' SAE programs" ($M = 4.88$, $SD = 0.35$) was the topic with the most importance. In contrast, the pre-service teachers reported the lowest mean score on items associated with preparing proficiency award applications ($M = 4.31$, $SD = 0.70$).

       In regard to perceived knowledge associated with leadership and SAE development topics, pre-service teachers reported being most knowledgeable with "conducting local FFA chapter activities" ($M = 3.48$, $SD = 1.18$) and "teaching record keeping skills" ($M = 3.29$, $SD = 1.01$). When assessing perceived competence by academic classification, sophomores ($M = 4.00$, $SD = 1.16$) and graduate students ($M = 2.60$, $SD = 0.55$) indicated being most knowledgeable on teaching record keeping, juniors

(M = 3.36, SD = 1.08) and seniors (M = 3.90, SD = 0.85) reported their highest levels of knowledge were associated with conducting FFA activities. Freshmen (M = 2.89, SD = 1.54) indicated "preparing students for Career Development Events (CDE)" was the topic they possessed the highest level of knowledgeable (see Table 4).

Table 4

Iowa State University Pre-service Techers' Perceived Importance and Knowledge of Leadership and SAE Development Topics in Agricultural Education (n = 69)

Item		F	So	J	Sr	Gr	Total
				M (SD)			
Teaching record keeping skills.	Impt.	4.56	4.75	4.60	4.85	4.80	4.70
		(0.53)	(0.46)	(0.58)	(0.37)	(0.45)	(0.49)
	Knwl.	2.67	4.00	3.16	3.68	2.60	3.29
		(1.32)	(1.16)	(0.85)	(0.82)	(0.55)	(1.01)
Conducting local FFA chapter activities.	Impt.	4.78	4.75	4.44	4.75	4.60	4.63
		(0.44)	(0.46)	(0.58)	(0.44)	(0.55)	(0.52)
	Knwl.	3.00	4.14	3.36	3.90	2.40	3.48
		(1.66)	(0.90)	(1.08)	(0.85)	(1.34)	(1.18)
Planning and conducting student overnight trips (National Convention).	Impt.	4.78	4.63	4.36	4.60	4.40	4.52
		(0.44)	(0.52)	(0.76)	(0.50)	(0.89)	(0.61)
	Knwl.	2.67	3.29	2.88	3.20	2.20	2.94
		(1.32)	(0.95)	(0.97)	(0.95)	(1.30)	(1.05)
Preparing students for Career Development Events (CDE).	Impt.	4.67	4.75	4.52	4.45	4.00	4.51
		(0.50)	(0.46)	(0.65)	(0.69)	(0.71)	(0.64)
	Knwl.	2.89	3.86	3.24	3.60	2.20	3.29
		(1.54)	(1.22)	(0.97)	(0.82)	(1.30)	(1.12)
Developing Ownership/Entrepreneurship SAE opportunities for students.	Impt.	4.56	4.63	4.44	4.55	4.20	4.49
		(0.53)	(0.52)	(0.65)	(0.61)	(1.10)	(0.64)
Item	Knwl.	2.11	3.71	2.48	2.95	2.00	2.67
		(1.27)	(1.50)	(0.96)	(1.10)	(0.71)	(1.17)
Supervising students' SAE programs.	Impt.	4.44	4.88	4.36	4.60	4.00	4.48
		(0.53)	(0.35)	(0.70)	(0.50)	(1.23)	(0.70)
	Knwl.	2.44	3.86	2.84	3.37	2.20	3.00
		(1.42)	(1.22)	(0.94)	(1.01)	(0.84)	(1.12)
Preparing FFA degree applications.	Impt.	4.67	4.63	4.32	4.60	4.00	4.46
		(0.50)	(0.52)	(0.56)	(0.50)	(0.71)	(0.59)
	Knwl.	2.22	4.00	3.00	3.20	1.20	2.92
		(1.30)	(1.16)	(1.19)	(1.01)	(0.45)	(1.27)
Developing Placement/Internship SAE opportunities for students.	Impt.	4.56	4.75	4.24	4.60	4.40	4.46
		(0.53)	(0.46)	(0.66)	(0.50)	(0.89)	(0.61)

	Knwl.	2.22	3.43	2.60	3.30	2.40	2.83
		(1.30)	(0.98)	(0.91)	(1.13)	(1.14)	(1.12)
Preparing students for Leadership Development Events (LDE).	Impt.	4.78	4.75	4.40	4.50	3.60	4.46
		(0.44)	(0.46)	(0.71)	(0.61)	(0.55)	(0.66)
	Knwl.	2.78	3.57	2.88	3.70	1.80	3.11
		(1.64)	(1.40)	(1.09)	(0.87)	(0.84)	(1.23)
Developing Service Learning SAE opportunities for students.	Impt.	4.56	4.63	4.28	4.55	4.20	4.43
		(0.53)	(0.52)	(0.68)	(0.61)	(1.10)	(0.63)
	Knwl.	2.11	3.14	2.60	2.90	2.00	2.64
		(1.27)	(1.22)	(0.91)	(0.91)	(0.71)	(1.02)
Developing Research SAE opportunities for students.	Impt.	4.56	4.63	4.32	4.55	4.00	4.43
		(0.53)	(0.52)	(0.75)	(0.61)	(1.00)	(0.68)
	Knwl.	2.00	3.14	2.32	2.70	1.80	2.44
		(1.12)	(1.22)	(0.99)	(0.98)	(0.84)	(1.05)
Developing School-Based Enterprise SAE opportunities for students.	Impt.	4.44	4.63	4.24	4.60	3.60	4.37
		(0.53)	(0.52)	(0.78)	(0.50)	(0.89)	(0.69)
	Knwl.	1.89	3.29	2.32	2.75	1.80	2.45
		(1.05)	(1.25)	(1.03)	(0.85)	(0.84)	(1.06)
Preparing proficiency award applications.	Impt.	4.67	4.63	4.24	4.25	3.80	4.31
		(0.50)	(0.52)	(0.66)	(0.85)	(0.45)	(0.70)
	Knwl.	2.11	3.86	2.56	2.75	1.20	2.59
		(1.27)	(1.22)	(1.08)	(0.97)	(0.45)	(1.19)

Note. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = Moderately Important*, 4 = *Important*, 5 = *Very Important. Knowledge* Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = Knowledgeable*, 5 = *Very Knowledgeable*.

The topic pre-service teachers indicated having the lowest overall knowledge was "Developing Research SAE opportunities for students" ($M = 2.44$, $SD = 1.05$). The perceived knowledge of the pre-service teachers of each academic classification varied on each topic, but the lowest knowledge levels were reported with SAE-related items such as developing Service Learning SAE (sophomores M = 3.14, SD = 1.22), Research SAE sophomores $M = 3.14$, $SD = 1.22$; juniors $M = 2.32$, $SD = 0.99$; seniors $M = 2.70$, $SD = 0.98$), and School-Based Enterprise SAE opportunities (freshman $M = 1.89$, $SD = 1.05$; junior $M = 2.32$, $SD = 1.03$).

Overall, the leadership and SAE development items with the highest MWDS were related to the development of Research SAEs (MWDS = 8.79), School-Based Enterprise SAEs (MWDS = 8.34), Ownership/Entrepreneurship SAE (MWDS = 8.09), Service Learning SAEs (MWDS = 7.91), and Placement/Internship SAEs (see Table 5).

Table 5

Mean Weighted Discrepancy Scores (MWDS) of Leadership and SAE Development Training needs Expressed by Iowa State University Pre-service Teachers (n = 69)

Item	MWDS					
	F	So	J	Sr	Gr	Total
Developing Research SAE opportunities for students.	11.64	7.41	8.40	8.42	8.8	8.79
Developing School-Based Enterprise SAE opportunities for students.	11.36	6.73	7.89	8.51	6.48	8.34
Developing Ownership/Entrepreneurship SAE opportunities for students.	11.14	4.71	8.28	7.28	9.24	8.09
Developing Service Learning SAE opportunities for students.	11.14	7.41	6.91	7.51	9.24	7.91
Developing Placement/Internship SAE opportunities for students.	10.63	6.94	6.91	5.98	8.8	7.30
Preparing proficiency award applications.	11.93	4.04	6.66	6.38	9.88	7.29
Planning and conducting student overnight trips (National Convention).	10.09	6.73	6.14	6.44	9.68	7.10
Supervising students' SAE programs.	8.89	5.71	6.56	6.44	7.20	6.84
Preparing FFA degree applications.	11.41	3.37	5.42	6.44	11.20	6.82
Teaching record keeping skills.	8.60	4.16	6.30	5.93	10.56	6.64
Preparing students for Leadership Development Events (LDE).	9.56	6.24	6.63	3.60	6.48	6.06
Preparing students for Career Development Events (CDE).	8.30	4.86	5.44	3.78	7.20	5.41
Conducting local FFA chapter activities.	8.49	3.47	4.64	4.04	10.12	5.29

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. Knowledge Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

Contrariwise, the items with the lowest overall training needs for the pre-service teachers, as a whole, were: preparing students for Leadership Development Events (MWDS = 6.06) and Career Development Events (MWDS = 5.41) and conducting local FFA chapter activities (MWDS = 5.29). When analyzing the training needs by grade classification, the highest indicated training needs associated with leadership and SAE development pertained to the development of research (Sophomore MWDS = 7.41; Junior MWDS = 8.40), service learning (Sophomore MWDS = 7.41), and school-based experience SAEs (Senior MWDS = 8.51) and the preparation of proficiency (Freshmen MWDS = 11.93) and FFA degree (Graduate MWDS = 11.20) applications.

Conclusions

This study evaluated the agricultural education training needs of pre-service teachers, based on the General Program Standards for Agricultural Education predicated by the Iowa Council on Agricultural Education. While this study provides insight on the teacher preparation training needs of pre-service teachers at Iowa State University, the attempted census in this study served as a limitation. Due to the lack of a probabilistic sample, the findings of this study do not support statistical inference and caution should be exercised when attempting to generalize the findings to the population. However, the findings from this study provide baseline data for purposes of comparison for future studies which incorporate generalizable samples. The instrument which was developed for this study builds on

previous agricultural education teacher needs assessments (Duncan et al., 2006; Garton & Chung, 1997; Joerger, 2002) by integrating new updates and nomenclature predicated by the National Council for Agricultural Education (i.e., SAE for All) and cross walked the items with general program standards. While this study provides direct insight on the needs of the students in our program, the needs assessment instrument can be leveraged at other institutions to determine the training needs of their pre-service teachers.

The levels of program design and management training needs expressed by pre-service teachers varied between pre-service teachers of different academic classifications. On average, freshmen and graduate students expressed the highest levels of training needs on the 12 items in the program design and management category. Freshmen students had the highest MWDS for six items and graduate students had the highest MWDS for five items. On the other hand, sophomores reported the lowest level of training needs for all Program Design and Management items.

In regard to reported MWDS for leadership and SAE development items, freshmen students had the highest MWDS on 11 items and graduate students had the highest levels of reported training needs for two items belonging to the category. Similar to the items in the program design and management category, the sophomore pre-service teachers reported among the lowest training needs on leadership and SAE development items. Specifically, the sophomores indicated the lowest MWDS for eight of the thirteen items. The descriptive nature of this study restricts further analysis regarding variance of training needs between pre-service teachers of different classifications. Furthermore, it is recommended that future needs assessments of Iowa State University pre-service teachers' training needs be conducted with a probabilistic sample—providing the opportunity to determine if any significant differences exist regarding the training needs by grade classification. This analysis could provide more insight on how the needs of pre-service teachers vary at different points of the teacher preparation program. Moreover, this could have an impact on sequencing of courses and timeframes of field experiences. When considering the differences in training needs of pre-service teachers by grade classification, it is important to consider how course completion potentially impacted their perceived competence associated with various topics. For example, freshman and sophomores, who had not previously engaged in upperclassmen coursework were assessing their current perceived competency without experiencing all aspects of the teacher preparation program. The failure to account for students' coursework completion serves as a limitation for this study. Future needs assessment studies of pre-service teacher education students should either consider assessing the needs of program completers, or assess students from each grade classification based on the technical and pedagogical content which they had previously taken.

From an omnibus view, the Iowa State University pre-service teachers reported some level of training needs for all items related to program design and management. Pre-service teachers expressed the need for training regarding advisory committees. In fact, all three items pertaining to advisory committees exceeded a MWDS of 6.00. Aside from the development and involvement with local advisory committees, the pre-service teachers indicated the need for more education on other agricultural education program support systems (e.g., booster clubs, advisory councils, agricultural agencies, or school staff). These aspects are important due to the strong influence of local communities and stakeholders on the direction of the agricultural education program (Roberts et al., 2009; Taylor et al., 2017).

Repairing and maintaining laboratory equipment (Overall MWDS = 7.52) was also a high-rated training need in this needs assessment study. Parallel to the need expressed by the pre-service teachers in this study, Saucier and McKim (2011) reported similar findings regarding student teachers learning needs associated with laboratory management. This goes beyond the content taught in agricultural education. Teacher educators at Iowa State University should examine course content related to laboratory management to ensure pre-service teachers are provided a holistic learning experience. This should include general content knowledge on the operation of laboratory equipment

along with training on the maintenance and repair of equipment and tools. For example, the teacher educators should ensure pre-service teachers can safely supervise students when ripping boards on a table saw and teach them how to change a table saw blade or install a saw-stopping apparatus. Furthermore, the relevancy of these additional skills and areas of knowledge should be stressed to pre-service teachers. This will accommodate the adult learners' desire to link the learning activities to the immediacy of application (Knowles, 1980).

The aforementioned needs related to program development and design are strongly tied to another reported area of high training need, which is the evaluation of the local program using the National Quality Program Standards (NQPS; MWDS = 6.66). According to the Council for Agricultural Education (2016), the NQPS serves as a guide for the delivery of high quality SBAE programs. The NQPS can serve as a resource for the Iowa State University pre-service teachers to enhance their understanding on aspects related to program design and management. Specifically, the pre-service teachers should focus on standards one (Program Design and Instruction), four (School and Community Partnerships), five (Marketing), and seven (Program Planning and Evaluation), which align with their reported needs associated with program design and management. Teacher educators should also use the NQPS as a teaching tool in agricultural education courses. This will assist in further familiarizing the pre-service teachers with the content and application of these standards. These standards can also be cross walked with the Education Preparation standards used in the certification process at Iowa State University.

The areas of need expressed by the teachers related to program design and management might be areas of the agricultural education program which the pre-service teachers had no exposure to at the secondary level. Ninety-three percent ($n = 66$) of the pre-service teachers reported previous involvement in secondary agricultural education. Unlike aspects of the agricultural education program (e.g., FFA, SAE development, classroom / laboratory instruction) which they may have experience first-hand as a secondary student, the items related to program design and management (e.g., advisory committees, booster clubs, or NQPS standards) might be unfamiliar based on their previous positions on the other side of the desk.

Overall, the pre-service teachers expressed high levels of training need regarding various aspects of SAE development and FFA advisement. The lowest *Leadership and SAE Development* training need area, conducting local FFA chapter activities, had a MWDS of 5.29—representing a high need for training. The top five items overall of the Leadership and SAE Development items were all regarding developing SAE opportunities for students.

The pre-service teachers' indication of training needs associated with SAE development coincide with findings of Wolf (2011). Specifically, Wolf (2011) reported teachers had lower self-efficacy regarding the SAE domain when compared to the teachers reported self-efficacy in the FFA or Instruction domains. Wolf recommended the need for teacher preparation and professional development for novice teachers regarding SAE program development. Wilson and Moore (2007) called on the profession to stop trying to convince teachers on the value of SAE programs and start spending time on educating teachers on the new types of SAE programs. Based on these recommendations and the high level of training needs expressed by the pre-service teachers, teacher educators at Iowa State University should make SAE development a strong area of focus in the agricultural education teacher preparation program. This effort will assist pre-service teachers in transitioning their concerns about conceptualizing SAE programs to concerns about how to best implement these programs to enrich their students learning (Conway & Clark, 2003; Fuller & Brown, 1975).

As a resource, teacher educators should familiarize pre-service teachers with the SAE for All: Teacher Guide, developed by National Council for Agricultural Education (2017). This SAE resource provides an in-depth explanation of foundational (e.g., career exploration & planning, personal financial planning and management, workplace safety, employability skills for college and career

readiness, agricultural literacy) and immersion (e.g., entrepreneurship/ ownership, placement/internships, research [experimental, analytical, invention], school business enterprises, service learning) SAE programs which will serve as a useful tool for enhancing pre-service teachers' understanding associated with the development and application of each type of SAE.

Currently, the Department of Agricultural Education and Studies offers two undergraduate courses and field experiences which serve to bolster pre-service teachers' understanding of program design and management and leadership and SAE development. The presence of these required courses and field experiences in the Department of Agricultural Education and Studies agricultural education-teacher certification curriculum should not be construed as comprehensive education on these need areas. Furthermore, the high indication of training needs by the pre-service teacher presents a strong need to re-evaluate the current teacher preparation curriculum. These expressed needs should be cross walked to the existing curriculum and teacher educators should determine ways in which all need areas can be further stressed in the program.

A few potential routes can be taken to mitigate the lack of pre-service teachers' knowledge regarding the areas of need. One option is to develop new courses focusing on program design, leadership, and SAE development. Specifically, the current course could be divided in to two independent courses. One course could maintain a focus on issues related to the planning of agricultural education programs (e.g., advisory committees, program of activities, NQPS standards), and the other course could provide an emphasis on leadership and SAE aspects (e.g., SAE development, SAE supervision, proficiency award preparation) associated with the total agricultural education program. Although these important areas of need warrant a stronger focus, the restriction of credit hours in the undergraduate degree program at Iowa State University will potentially serve as a barrier to add additional courses. To overcome this perpetual barrier, teacher educators and state agricultural education staff should explore other options (e.g., summer workshops or periodic seminars) to supplement the Iowa State University pre-service teachers' preparation.

In addition, the Iowa State University teacher educators should refine the field experience selection process for student teaching. A systematic approach should be taken to match students with agricultural education programs which will serve as exemplary examples in the areas of expressed needs (i.e., program development / management and leadership and SAE development). It is recommended teacher educators conduct an evaluation of the state's programs and cooperating teachers, to determine the programs who excel in the areas of need. Along with the field experience placements, teacher educators should implement a stronger field experience log to ensure that the pre-service teachers engage in important aspects related to program management, leadership, and SAE Development. For example, student teachers should be required to develop and oversee a variety of SAE programs during their field-based experiences. This will provide the student teachers with a holistic view of all available SAE programs and will bolster their understanding of each. The expressed needs associated with SAE development and leadership aspects beckons the need for future needs assessments to take a more granular look into various aspects of FFA and SAE development. This will assist teacher educators in refining the agricultural education courses and field experiences.

The expressed needs of the pre-service teachers shed light on their attitudes and concerns associated with teaching, which in turn, provides a formative assessment on various aspects of the Iowa State University teacher preparation program (Greiman et al., 2005; Moir, 1999; Rayfield et al., 2014). This assessment also serves as a guide for teacher educators to make changes to the program to supplement areas of need. As augmentations are made to curriculum requirements, course curriculums, and teacher preparation field experience guidelines, faculty members in the Department of Agricultural Education and Studies should continuously evaluate the needs and concerns of pre-service teachers along with their attitude toward teaching. Due to the perpetually changing concerns and attitudes of the pre-service teachers, periodic needs assessments should be conducted to assess teachers as they progress through the Iowa State University teacher preparation program and enter the teaching

profession. In reference to the concern theory (Fuller & Brown, 1975), the pre-service teachers who were evaluated in this study were most likely expressing stage one concerns associated with their personal progress as learners (Pigge & Marso, 1997). As the pre-service teachers advance through their program, their concerns will most likely transition outwardly where they will have greater concerns regarding teaching tasks (stage two) and their impact on student learning (stage three; Conway & Clark, 2003; Pigge & Marso, 1997). Aside from evaluating the pre-service teachers' stages of concerns, periodic needs assessments will allow teacher educators to assess pre-service teachers' attitudes towards teaching while they are at different stages of Moir's Curve (Moir, 1999).

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