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Assessing the Technical Expertise and Content Needs of Alabama Agriscience Teachers

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Abstract

The purpose of this study was to assess secondary agriscience teachers' perceptions, expertise, and importance of agriculture content areas in the curriculum. To accomplish this study the following objectives framed the investigation: describe Alabama secondary agriscience teachers by personal characteristics including teacher certification pathway, describe Alabama secondary agriscience teachers by professional development needs, and explore the relationships between Alabama secondary agriscience teachers by professional development needs and personal characteristics. The population was representative of agriculture teachers in Alabama teaching agriscience education in grades 9-12. The data collection instrument included four thematic units: FFA/Leadership Development/SAE, Technical Agriculture, Program Management, and Teaching and Learning. Findings were evaluated using analytical triangulation between statements and individual item analysis. The areas of professional development needs were determined by the mean weighted discrepancy score (MWDS) in the four thematic categories. Alabama agriscience teachers identified competency areas with the highest MWDS as: FFA/Supervised Agricultural/Leadership Development (MWDS = 3.04), Technical Agriculture (MWDS = 2.48), Program Management (MWDS = 2.17), and Teaching and Learning (MWDS = 2.00).

Keywords: Needs Assessment; Professional Development; Technology; SAE; Critical Thinking

Introduction

Improving agricultural education practices requires considering the knowledge and skills needed by students today so teachers may address the challenges of tomorrow (McKim, Pauley, Velez, & Sorensen, 2017). The need for focused professional development is vital to the continued success of secondary agriculture education and teacher growth. This study addresses the needs of Alabama agriscience education teachers through qualitative inquiry and agriculture education through research priority five of the National Research Agenda "lead change or reform in agriculture education very often include some form of professional development" (Thoron, Myers, & Barrick, 2016, p. 43). Continuing education in agriculture education is vital to the success of all practitioners, regardless of the level of instruction. Shulman (1987) described the need for teachers to educate students according to the standards of the day, therefore, teachers need a deep and flexible understanding of content to provide guidance for student development in agricultural content. The acquisition of new teaching skills is accomplished through needs based professional development opportunities. When professional development opportunities do not align with the learning needs of teachers a misalignment of expectations and outcomes can diminish the opportunities for learning. Sharma (2016) stated "many professional development programs [rely]

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on telling people what they should believe and how they should behave; providing them with information in the expectation that they will alter their behavior" (p. 469).

According to Phillip Paramore, former Executive Director for the Alabama FFA Association "there is a definitive gap in the knowledge we use to determine professional development in Alabama". "Limited surveys have been presented asking teachers their needs, however, no investigation has occurred within the past fifteen years" (Personal Communication, April 4, 2017). Therefore, a void was present in the professional development being offered by the university system, professional development opportunities at state conferences, or state sponsored continuing education. A lack of research and assessment of teacher needs created a vacuum of assumed educational needs and the willingness of the agriscience teachers to participate for the continuing education credit being offered. Agriscience researchers at Auburn University initiated the competency and needs survey using the Borich Needs Assessment Model to correctly identify the professional development teachers were requesting.

Theoretical Framework

The theoretical framework for this study was based on Borich's (1980) "Needs Assessment Model" and bound by the four areas of Pre-Service/Inservice need as reported by Duncan, Ricketts, Peake, and Uesseler, (2006): Technical Agriculture, FFA/Leadership Development/SAE, Teaching and Learning, and Program Management. The theoretical construct, as reported by Borich (1980) was the need for trainers to identify if a discrepancy exists between competency and importance of the lesson being taught. Borich (1980) further defined this polarization of needs as "what is and what should be" (p. 39) regarding training opportunities. Borich (1980) reported that trainings, or professional development opportunities can measure the discrepancy between competency and importance to determine effectiveness. The distance between competency and importance is an ideal measure when assessing the four areas of Pre-Service/In-service needs: technical agriculture, FFA/leadership development/SAE, teaching and learning, and program management.

Although many agricultural education programs have moved from traditional to non-traditional curriculum, Alabama teachers indicated a strong connection to foundational agriculture education content. As the educational content of agricultural education evolves, the need for traditional agriculture instruction and the FFA continues to be a vital component for students to develop a fundamental knowledge of the industry in Alabama. Martin and Enns (2017) reported this shift in curriculum is a reflection of conventional and non-conventional agriculturalists attitudes and these divergent viewpoints have challenged agricultural education students. Through shifts in traditional curriculum, FFA has maintained a model of applying learned skills, traditional or otherwise, for student growth and success. Shoulders and Toland (2017) emphasized the three-part model of agriculture education as a vital component of successful programs. As a component of the model, Talbert, Vaughn, Croom, and Lee (2007) stated that agriculture teachers operate programs with a relatively high degree of autonomy compared to teachers of academic subjects. It is the autonomy and control of subject matter and instruction which reflects Alabama teacher needs. In the absence of a rigid curricular framework, FFA instruction and organization of the program was identified as major component of need. The FFA is a vital component for application of student learning. Advisors and teachers should be skilled in the promotion of opportunities for the agricultural student. With the lack of a rigid curriculum structure in agriculture classrooms (Talbert, et al., 2007) instructional delivery models in the agriculture classroom should be developed and improved through professional development opportunities. The profession of agricultural education requires students to move beyond the basic skills and content knowledge. Instead, future agriculturalists must develop critical thinking and problem solving skills. (Van Beek, De Jong, Minnaert, & Wubbels, 2014).

Rubenstein and Thoron (2015) reported the importance of SAE in the high school classroom and postulated that the agriculture teacher was the most important influencer in the engagement of students in the SAE. Sorensen, Lambert, and McKim (2014), and Layfield and Dobbins (2002), in-service and needs study also reinforces the need for developing SAE needs for students and teacher support in South Carolina. Environmental, Technology, and Agriscience content are a common denominator between school districts. As curriculum needs and delivery models continue to evolve to meet the needs of 21st century learners, so will the concepts and lessons taught in the secondary agriculture classroom. Shumacher, Fuhrman, and Duncan (2012), reported environmental education should be proactive in the curriculum. Therefore, the continuing education of secondary teachers must possess components to meet these needs. The importance of teaching environmental and agriscience concepts is underscored by Wilson, Kirby, and Flowers (2002) wrote that biotechnology education should be integrated within the agriscience curriculum. Vallera and Bodzin (2016) reported that although agriculture has in most part been removed from the secondary curriculum, science and environmental education is being reincorporated for greater student development in science education. The reintegration of environmental science content is supported by teachers, parents, and administration through open curriculum exploration, collaboration, and integration within existing content areas (Shumacher, et al., 2012). The efforts to reincorporate environmental science as a component of agricultural education will require specialized technical training for secondary agricultural education students.

Technical skills are important beyond just topical use in the classroom and support student learning. Before students can gain appropriate technology skills for educational endeavors, teachers should be provided instruction and application of technology opportunities. Williams, Warner, Flowers, and Croom (2014) support the need for in-service opportunities focused on educator use of technology in agriculture classrooms. In relation to the specific content and technical needs of pre-service and early career agriscience teachers, need for classroom management and effectively managing student behavior strategies were sought through professional development. These needs are supported by previous research by Edwards and Briers (1999), Garton and Chung (1996), and Mundt and Conners (1999). Duncan, et al., (2006) reported professional development was needed for teachers working with special needs students. Stair, Warner, and Moore (2012) reported that professional development in special education is not always being addressed adequately within all educational programs. Duncan, et al., (2006) reported Georgia agriculture teachers demonstrated specific needs related to competencies for the inclusion of technology in the agriculture education course pathways. This outcome was supported by Davis and Jayaratne (2015) whose findings indicated the use of multimedia and the incorporation of the internet for curriculum development and delivery was an important training need for professional development and preparation. Saucier and McKim (2011) reported the need for additional or sometimes foundational training in the instruction of agriculture mechanics was often needed through improved coursework and professional development opportunities.

Purpose and Objectives

The purpose of this study was to identify the professional development needs of secondary agriscience teachers in Alabama and to determine factors influencing their professional learning needs. To accomplish this study the following objectives were used to frame the investigation:

1. Describe Alabama secondary agriscience teachers by personal characteristics including teacher certification pathway.
2. Describe Alabama secondary agriscience teachers by professional development needs.
3. Explore the relationships between Alabama secondary agriscience teachers by professional development needs and personal characteristics.

Methods

The population for this descriptive and correlational research study included all secondary agriscience teachers in Alabama ($N = 309$) instructing grades 9-12 during the 2016-2017 school year. A sample ($n = 145$) of the population was selecting using the Cochran's (1977) formula for continuous variables. The instrument was designed to assess participant's perceptions of competence and importance of listed items. A pilot study was conducted with a representative group of the participants of the study that were not part of the investigation. The pilot panel consisted of 15 secondary agriscience teachers in Alabama which were representative of the population being investigated but were not included in the final analysis. The pilot study addressed the following variables: level of difficult in syntax and sentence structure, time of completion, the level of appropriateness of the statements/questions, and organization and ease of use in the Qualtrics software program to account for content and face validity.

Participants were notified of the study through Qualtrics one week before the distribution of the study explaining the purpose, informed consent for participation, and the dates of the investigation. An invitation email was provided to participants which contained a web-based link for the survey and four email reminders to stimulate an increased response rate: 104 participants started the questionnaire, 87 participants completed components of the questionnaire and 45 participants finished the entire instrument. The results of the study account for statements and questions not answered within the sample population. According to Dillman, Smyth, and Christian (2014) questionnaire length, complexity, and legitimacy may negatively affect response rates. A combination of these characteristics may have led to reluctance to start or complete this questionnaire. Caution is warranted against generalizing the findings of this study beyond those participating.

The "Minnesota Beginning Agricultural Education Teacher In-Service Programming Needs Assessment" (Joerger, 2002) was used as the foundation for the questionnaire to collect data from participants. Duncan, et al., (2006) reported Joergers' (2002) instrument was modified to include current trends in educational methodology, pedagogy, SAE record book programs, and critical thinking skills. The instrument for this study was designed using influences from Duncan, et. al (2006) and Borich's Needs Assessment Model (1980). The instrument consisted of four professional development need areas that were established by Duncan et. al. (2006): FFA/Leadership Development/SAE, Technical Agriculture, Program Management, and Teaching and Learning. Borich's Model (1980) is designed to measure a subjects' perception of importance of a skill or task and framed in the level of competence the subject possesses in carrying out the skill or task. The qualifiers for the scale used were 1) Not Important, 2) Of Little Importance, 3) Somewhat Important, 4) Important, or 5) Very Important and the competence qualifiers were 1) Not Competent, 2) Little Competence, 3) Somewhat Competent, 4) Competent, 5) Very Competent. According to Borich's Model (1980) mean weighted discrepancy scores are an indicator of professional development need. MWDS are calculated by subtracting the competency score from the importance score and multiplying that number times the mean importance rating for each competency (Borich, 1980). The instrument contained five points of confidence where the true limits of the MWDS were -20 to 20. This process was the focus for the determination of applicable outcomes to best meet the needs of secondary agriscience teachers in Alabama.

Discrepancies with the greatest positive rank difference had the highest priority for teacher professional development (Borich, 1980). The importance and competence scores were used to calculate teacher competencies and levels of importance related to technical agriculture, FFA/leadership development/SAE, teaching and learning, and program management Mean

weighted discrepancy scores (MWDS) were calculated for individual competencies and for overall competency areas (Saucier, et. al., 2011).

Findings

The findings of this study identified four thematic units of professional development for practicing agricultural education teachers in Alabama. Participants indicated their level of need in the four thematic units consisting of specific needs statements: FFA/Leadership Development/SAE, Technical Agriculture, Program Management, and Teaching and learning. Professional development needs were determined using the Mean Weighted Discrepancy Score (MWDS) with true limits ranging from -20 to 20. Personal characteristics of participants were collected to better define the demographics of the study respondents. Participants ages (M = 40.74, SD = 10.48) in years ranged from 24 to 62. Participants years of teaching (M = 11.56, SD = 10.94) ranged from 1-37. Approximately 39% of participants from the north region; 36% from the central region; and 25% from the south region of Alabama. Analysis of the study participant's 58% percent received certification as an agriscience education teacher through an undergraduate agriscience education program and 42% were certified by completing a master's degree in agriscience education with Alabama certification.

The areas of professional development needs were determined by the mean weighted discrepancy score (*MWDS*) in the four thematic categories. The *MWDS* score of each area were FFA/Leadership Development/Supervised Agricultural Experience Programs (*MWDS* = 3.04); Technical Agriculture (*MWDS* = 2.48); Program Management (*MWDS* = 2.17); and Teaching and Learning (*MWDS* = 2.00).

Table 1 shows professional development need by content area and *MWDS* ranking. FFA, Leadership Development, and Supervised Agricultural Education need (*MWDS*=3.04) was the highest *MWDS* ranked need. The content area in which participant had the lowest need was Teaching and Leaning (*MWDS*=2.00). Individual items with highest overall needs were: Integrating current advances in agriculture technology into the curriculum; teaching students to think critically and creatively; teaching students to think critically and creatively; preparing SAE proficiency award applications; developing SAE opportunities for students; motivating students to learn; motivating students to learn; and conducting activities that support awards. Individual items that participants indicated that they had little to no professional development needs were: Evaluating the effectiveness of BIC meeting its intended purpose; conducting an adult program; conducting parent/teacher conferences; the use of computers in the classroom; planning and conducting student field trips; and planning FFA events and banquets

Table 1

Overall Professional Development Need Statements by MWDS

Content Areas	*MWDS*[a]
FFA/Leadership Development/SAE	3.04
Technical Agriculture	2.48
Program Management	2.17
Teaching and Learning	2.00

Note. MWDS[a]=Mean Weighted Discrepancy Score (True limits range from -20 to 20)

As shown in Table 2, *MWDS* ranking of specific items with the content area of FFA, Leadership Development, and SAE showed the items with greatest need were: Preparing SAE proficiency award applications; developing SAE opportunities for students; and conducting activities that support the awards. Items that ranked lowest in this content area included: Planning FFA events and banquets; using FFA alumni chapters; and using agricultural education advisory councils.

Table 2

FFA, Leadership Development, and Supervised Agricultural Education Need by MWDS

Content Areas	MI[a]	MC[b]	MWDS[c]
FFA/Leadership Development/SAE			3.04
Preparing SAE proficiency award applications	4.13	3.07	4.41
Developing SAE opportunities for students	4.42	3.47	4.23
Conducting activities which support the National Chapter Award Program in Student, Chapter, and Community award areas	4.07	3.07	4.07
Preparing State and American FFA Degree award applications	4.02	3.09	3.75
Teaching electronic record book skills for SAEP (AET)	3.87	2.91	3.69
Providing career exploration in agriculture and related industries	4.47	3.64	3.67
Preparing Agriculture/FFA Career Development Event teams	4.44	3.64	3.56
Supervising students' SAE program	4.36	3.56	3.48
Planning and executing successful fundraising programs	4.53	3.96	2.62
Coordinating activities with local agriculture organizations (Young Farmers, 4-H)	4.02	3.44	2.32
Developing an effective social media program for program information	3.69	3.11	2.13
Using an Agriculture Education Advisory Council	4.16	3.64	2.12
Using an FFA Alumni Chapter	3.49	3.07	1.47
Planning FFA events and banquets	4.07	3.82	0.99

Note. MI[a]=Importance (1=Not important, 2=Of little Importance, 3=Somewhat important, 4=Important, 5=Very Important); MC[b]=Competence (1=Not competent, 2=Little competence, 3=Somewhat competent, 4=Competent, 5=Very competence; MWDS[c]=Mean Weighted Discrepancy Score (True limits range from -20 to 20)

As shown in Table 3, *MWDS* ranking of specific items with the content area of Technical Agriculture showed the items with greatest need were: Integrating current advances in agricultural technology into the curriculum; teaching skills and concepts in aquaculture; teaching skills and concepts in unmanned aerial vehicles and systems; teaching skill and concepts in construction management; and teaching skills and concepts in food products processing, operations, and management. Items that ranked lowest in this content area included; Using computers in the classroom; using multimedia equipment in teaching; and teaching agribusiness skills and concepts.

Table 3

Technical Agriculture Need by MWDS

Content Areas	MI[a]	MC[b]	MWDS[c]
Technical Agriculture			2.48
Integrating current advances in agriculture technology into the curriculum.	4.27	3.16	4.74
Teaching skills and concepts in aquaculture	3.73	2.76	3.65
Teaching skills and concepts in unmanned aerial vehicles and systems	2.98	1.84	3.37
Teaching skills and concepts in construction management	4.29	3.51	3.34
Teaching skills and concepts in food products processing, operations, and management.	3.93	3.09	3.32
Teaching skills and concepts in the animal sciences	4.40	3.76	2.84
Teaching skills and concepts in soils and soil management	4.40	3.80	2.64
Teaching agriscience (integrating science and agriculture)	4.47	3.91	2.48
Teaching skills and concepts in the animal sciences	4.38	3.84	2.33
Teaching skills and concepts in relationship to small engine systems	3.62	2.98	2.33
Teaching skills and concepts in landscape maintenance and design	4.02	3.49	2.15
Teaching skills and concepts in marketing agricultural products	3.93	3.40	2.10
Teaching skills and concepts in the plant sciences (horticulture, agronomic crops, etc.)	4.31	3.84	2.01
Teaching skills and concepts in environmental sciences (wildlife management, forestry, ecology)	4.18	3.71	1.95
Teaching plant biotechnology skills and concepts	3.73	3.22	1.91
Teaching agribusiness skills and concepts	4.18	3.82	1.49
Using multimedia equipment in teaching	4.09	3.84	1.00
The use of computers in the classroom	4.05	3.91	0.54

Note. MI[a]=Importance (1=Not important, 2=Of little Importance, 3=Somewhat important, 4=Important, 5=Very Important); MC[b]=Competence (1=Not competent, 2=Little competence, 3=Somewhat competent, 4=Competent, 5=Very competence; MWDS[c]=Mean Weighted Discrepancy Score (True limits range from -20 to 20)

As shown in Table 4, *MWDS* ranking of specific items with the content area of Program Management showed the items with greatest need were: Evaluating the local program; incorporating electronic record book programs such as AET; and CTE Directors having a strong understanding of the BIC process. Participants indicated that they had no professional development needs related to evaluating the effectiveness of BIC meeting its intended purpose.

Table 4

Program Management Need by MWDS

Content Areas	MI[a]	MC[b]	MWDS[c]
Program Management			2.17
Evaluating the local program	4.40	3.58	3.62
Incorporating electronic record book programs such as AET	3.76	2.82	3.51
CTE Directors having a strong understanding of the BIC process	4.04	3.36	2.79
Conducting needs assessment surveys to determine the courses that should be taught in the curricula	3.96	3.49	1.85
Integrating Business and Industry Certification in the agriculture curriculum	3.89	3.49	1.56
Evaluating the effectiveness of BIC meeting its intended purpose	3.20	3.29	-0.28

Note. MI[a]=Importance (1=Not important, 2=Of little Importance, 3=Somewhat important, 4=Important, 5=Very Important); MC[b]=Competence (1=Not competent, 2=Little competence, 3=Somewhat competent, 4=Competent, 5=Very competence; MWDS[c]=Mean Weighted Discrepancy Score (True limits range from -20 to 20)

As shown in Table 5, *MWDS* ranking of specific items with the content area of Teaching and Learning showed the items with greatest need were: Teaching students to think critically and creatively; motivating students to learn; managing student/classroom discipline; and teaching students with individualized education plans. Participants indicated that they had no professional development needs related to conducting parent/teacher conferences and conducting an adult program.

Statements and questions were organized in four areas established by Duncan et. al. (2006): FFA/Leadership Development/SAE, Technical Agriculture, Program Management, and Teaching and Learning. Alabama agriscience teachers identified competency areas with the highest *MWDS* as: FFA/Supervised Agricultural/Leadership Development (MWDS = 3.04), Technical Agriculture (*MWDS* = 2.48), Program Management (*MWDS* = 2.17), and Teaching and Learning (*MWDS* = 2.00). Specific items with the content area of FFA, Leadership Development, and SAE were preparing SAE proficiency award applications (*MWDS* = 4.41), developing SAE opportunities for students (*MWDS* = 4.23), and conducting activities which support the National Chapter Award. Participants identified items of greatest need in Technical Agriculture as integrating current advances in agriculture technology into the curriculum (*MWDS* = 4.74), teaching skills and concepts in aquaculture (*MWDS* = 3.65), and teachings skills and concepts in unmanned aerial vehicles and system (*MWDS* = 3.37). Areas of specific need within the content area of Program Management included evaluating the local program (*MWDS* = 3.62), incorporating electronic record book programs such as AET (*MWDS* = 3.51), and CTE directors having a strong understanding of the BIC process (*MWDS* = 2.79). Participants identified teaching students to think critically and creatively (*MWDS* = 4.69), motivating students to learn (*MWDS* = 4.19), and managing student/classroom discipline (*MWDS* = 2.72) as specific needs in the content area of Teaching and Learning.

Table 5

Teaching and Learning Need by MWDS

Content Areas	MI[a]	MC[b]	MWDS[c]
Teaching and Learning			2.00
Teaching students to think critically and creatively	4.69	3.69	4.69
Motivating students to learn	4.71	3.82	4.19
Managing student/classroom discipline	4.71	4.13	2.72
Teaching students with individualized education plans	4.38	3.76	2.72
Incorporating varied teaching models for student instruction	4.24	3.64	2.55
Developing inquiry-based learning opportunities	4.18	3.64	2.23
Developing inquiry-based learning opportunities	4.07	3.58	1.99
Organizing and supervising teaching laboratories	4.42	4.00	1.87
Developing performance-based assessment instruments	4.02	3.60	1.70
Assessing student performance using formative and summative assessments	3.93	3.64	1.14
Planning and conducting student field trips	4.40	4.20	0.88
Conducting parent/teacher conferences	3.87	3.87	0.00
Conducting an adult program	3.18	3.20	-0.08

Note. MI[a]=Importance (1=Not important, 2=Of little Importance, 3=Somewhat important, 4=Important, 5=Very Important); MC[b]=Competence (1=Not competent, 2=Little competence, 3=Somewhat competent, 4=Competent, 5=Very competence; MWDS[c]=Mean Weighted Discrepancy Score (True limits range from -20 to 20)

Alabama agriscience teacher's professional development needs by content areas were consistent across age, years teaching, region location, and how certified. Professional development needs differed by gender. Technical agriculture needs differed by gender $t(41) = 2.03$, $p < .05$; Females (*MWDS* = 4.21) tended to have higher needs than male (*MWDS* = 2.17). There were no significant differences by: FFA, leadership development, and SAE and gender $t(41) = 1.03$, $p > .05$; program management and gender $t(41) = .67$, $p > .05$; and teaching and learning and gender $t(41) = .79$, $p > .05$.

There were no significant differences by: FFA, leadership development, and SAE and age $t(41) = 1.24$, $p > .05$; technical agriculture and age $t(41) = .87$, $p > .05$; program management and age $t(41) = .25$, $p > .05$; and teaching and learning and age $t(41) = .01$, $p > .05$. There were no significant differences by: FFA, leadership development, and SAE and years teaching $t(41) = .25$, $p > .05$; technical agriculture and years teaching $t(41) = 1.31$, $p > .05$; program management and years teaching $t(41) = 1.57$, $p > .05$; and teaching and learning and years teaching $t(41) = .51$, $p > .05$. There were no significant differences by: FFA, leadership development, and SAE and how certified $t(41) = .92$, $p > .05$; technical agriculture and how certified $t(41) = 1.87$, $p > .05$; program management and how certified $t(41) = 1.09$, $p > .05$; and teaching and learning and how certified $t(41) = 1.54$, $p > .05$. There were no significant differences by: FFA, leadership development, and SAE and region $F(2, 41) = .46$, $p > .05$; technical agriculture and region $F(1, 41) = 2.91$, $p > .05$;

program management and region $F(2, 41) = .03$, $p > .05$; and teaching and learning and region $F(2, 41) = .06$, $p > .05$.

Conclusions, Implications, and Recommendations

The purpose of this study was to identify the professional development needs of secondary agriscience teachers in Alabama and their level of competence and importance related to statements and questions regarding professional development needs. Statements and questions were organized within four thematic units: FFA/Leadership Development/SAE, Technical Agriculture, Program Management, and Teaching and Learning. Alabama agriscience teachers identified competency areas with the highest *MWDS* as: FFA/Supervised Agricultural/Leadership Development (*MWDS* = 3.04), Technical Agriculture (*MWDS* = 2.48), Program Management (*MWDS* = 2.17), and Teaching and Learning (*MWDS* = 2.00). Specific items with the content area of FFA, Leadership Development, and SAE were preparing SAE proficiency award applications (*MWDS* = 4.41), developing SAE opportunities for students (*MWDS* = 4.23), and conducting activities which support the National Chapter Award. Participants identified items of greatest need in Technical Agriculture as integrating current advances in agriculture technology into the curriculum (*MWDS* = 4.74), teach9ing skills and concepts in aquaculture (*MWDS* = 3.65), and teachings skills and concepts in unmanned aerial vehicles and system (*MWDS* = 3.37). Areas of specific need within the content area of Program Management included evaluating the local program (*MWDS* = 3.62), incorporating electronic record book programs such as AET (*MWDS* = 3.51), and CTE directors having a strong understanding of the BIC process (*MWDS* = 2.79). Participants identified teaching students to think critically and creatively (*MWDS* = 4.69), motivating student to learn (*MWDS* = 4.19), and managing student/classroom discipline (*MWDS* = 2.72) as specific needs in the content area of Teaching and Learning. These findings support the need for professional development needs in Alabama and may indicate a national trend for further training may be present. Duncan, Ricketts, et al., (2006) found similar trends in the professional development needs of agriscience teachers in Alabama. Alabama agriscience teachers indicated the need for professional development based on in critical thinking and creativity strategies for classroom and student success as a component of this needs assessment study. Critical thinking, or problem solving has been identified as a best practice in agriculture education because of the numerous proven benefits and supported by existing research in agriculture education. The role of critical thinking instruction allows the agriculture educator to serve as facilitator in group problem solving approaches. Lamm, Shoulders, et al., (2012) recommended that students should work within and among groups. While this approach is ideal, the analysis of this study indicated it is of vital importance for teacher development in Alabama. The results of this study indicate a number of areas which should be addressed through professional development opportunities. Teachers indicated Supervised Agriculture Experience opportunities, agriculture technology, computerized record books, and student motivation as potential areas of focused professional development.

The implications of this study indicate knowledge gaps in the skill sets of practicing teachers, specifically SAE instruction and critical thinking skills. To address these gaps, on-going and focused professional development should be provided to the agriscience teachers of Alabama. As a result of meeting these needs for practicing teachers, the outcome of these findings should diminish the SAE and critical thinking development needs associated in these findings thereby enhancing the overall effectiveness of teachers in the classroom. Specific recommendations apply for Auburn Agriscience Education and state staff to articulate these findings through sponsored professional development and required coursework for teacher certification and continuing education development credits for practicing teachers. This study supported Borich's Needs Assessment Theory (1980) by asking teachers to identify areas of competency and importance and defining their needs for continuing education. Professional development needs for Alabama

agriscience teachers by assessing their current competence versus the importance of the particular competence in the performance of their job. With one exception, professional development needs were consistent across all personal characteristics of Alabama agriscience teachers.

Further research should be conducted among states to determine if the results of this study are local or shared in different geographic regions. Similarities and differences exist between states and regions in regards to the FFA, instruction, and training. A comparative study with multiple states would provide stronger validation for national organizations tasked with professional development opportunities at national and regional conferences. Through the analysis of this study and similar investigations, primary trends can be observed, yet, no formal investigation has been initiated. These recommendations will provide insight and focus for teacher development in Alabama for the improvement of agricultural education.

References

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. *Journal of teacher education*, *31*(3), 39-42.

Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). New York: Wiley & Sons.

Davis, R. J., & Jayaratne, K. S. U. (2015). In-service training needs of agriculture teachers for preparing them to be effective in the 21st century. *Journal of Agricultural Education, 56*(4), 47-58. doi: 10.5032/jae.2015.04047

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed mode surveys: The tailored design method (4th ed.)*.Hoboken, NJ, US: John Wiley & Sons Inc.

Duncan, D. W., Ricketts, J. C., Peake, J. B., & Uesseler, J. (2006). Teacher preparation and in-service needs of Georgia agriculture teachers. *Journal of Agricultural Education*, *47*(2), 24-35. doi: 10.5032/jae.2006.02024

Edwards, M. C., & Briers, G. E. (1999). Assessing the inservice needs of entry—phase agriculture teachers in Texas: A discrepancy model versus direct assessment. Journal of Agricultural Education, 40(4), 40-49; doi: 10.5032/jae.1999.03040Facione, P. A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*. Newark: American Philosophical Association.

Garton, B. L., & Chung, N. (1996). The inservice needs of beginning teachers of agriculture as perceived by beginning teachers, teacher educators, and state supervisors. *Journal of Agricultural Education*, *37*(3), 52-58. doi: 10.5032/jae.1996.03052

Joerger, R. M. (2002). A comparison of the inservice education needs of two cohorts of beginning Minnesota agricultural education teachers. *Journal of Agricultural Education*, *43*(3), 11-24. doi: 10.5032/jae.2002.03011

Lamm, A. J., Shoulders, C., Roberts, T. G., Irani, T. A., Snyder, L. J. U., & Brendemuhl, J. (2012). The influence of cognitive diversity on group problem solving strategy. *Journal of Agricultural Education*, *53*(1), 18-30. doi: 10.5032/jae.2012.01018

Layfield, K. D., & Dobbins, T. R. (2002). Inservice needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education*, *43*(4), 46-55. doi: 10.5032/jae.2002.04046

Martin, M. J., & Enns, K. J. (2017). The conflicts of agriculture: Exploring the agricultural ideologies of university agriculture education students. *Journal of Agricultural Education*, *58*(1), 207-222. doi: 10.5032/jae.2017.01207

McKim, A. J., Pauley, C. M., Velez, J. J. & Sorensen, T. J. (2017). Leadership learning opportunities in agriculture, food, and natural resources education: The role of the teacher. *Journal of Agricultural Education, 58*(3), 84-100. https://doi.org/10.5032/jae.2017.03084

McKim, B. R., & Saucier, P. R. (2011). An excel-based mean weighted discrepancy score calculator. *Journal of Extension, 49(2)*. Retrieved from https://www.joe.org/joe/2011april/tt8.php

Mundt, J. P., & Connors, J. J. (1999). Problems and challenges associated with the first years of teaching agriculture: A framework for preservice and inservice education. *Journal of Agricultural Education*, *40*, 38-48.

Rubenstein, E. D., & Thoron, A. C. (2015). Supervised agricultural experience programs: An examination of committed teachers and student centered programs. *Journal of Agricultural Education*, *56*(4), 75-89. doi: 10.5032/jae.2015.04075

Saucier, P. R., & McKim, B. R. (2011). Assessing the learning needs of student teachers in Texas regarding management of the agricultural mechanics laboratory: Implications for the professional development of early career teachers in agricultural education. *Journal of Agricultural Education, 52*(4), 24-43. doi: 10.5032/jae.2011.04024

Sharma, A. (2016). Professional development of teachers and teacher educators. *Indian Journal of Applied Research*, *6*(4), 466-469. doi: 10.15373/2246555x

Shoulders, C.W., & Toland, H. (2017). Millennial and non-millennial agriculture teachers' current and ideal emphasis on the three components of the agricultural education program. *Journal of Agricultural Education*, *58*(1), 85-101. doi: 10.5032/jae.2017.01085

Shumacher, S.L., Fuhrman, N.E., & Duncan, D. W. (2012). The influence of school culture on environmental education integration: A case study of an urban private school system. *Journal of Agriculture Education*, *53*(4), 141-155. doi: 10.5032/jae.2012.04141

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard educational review*, *57*(1), 1-23. doi: 10.17763/haer.57.1.j463w79r56455411

Sorensen, T. J., Lambert, M. D., & McKim, A. J. (2014). Examining Oregon agriculture teachers' professional development needs by career phase. *Journal of Agricultural Education*, *55*(5), 140-154. doi: 10.5032/jae.2014.05140

Stair, K. S., Warner, W. J., & Moore, G. E. (2012). Identifying concerns of pre-service and in-service teachers in agricultural education. *Journal of Agricultural Education*, *53*(2), 153-164. doi: 10.5032/jae.2012.02153

Talbert, B. A., Vaughn, R., Croom, D. B., & Lee, J. S. (2007). *Foundations of agricultural education.* (2nd ed.). Danville, IL: Professional Educators Publications.

Thoron, A., C., Myers, B.. E., Barrick, K. R. (2016). Efficient and effective agricultural education programs. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 40-49). Gainesville, FL: Department of Agricultural Education and Communication.

Vallera, F. L., & Bodzin, A. M. (2016). Knowledge, skills, or attitudes/beliefs: The contexts of agricultural literacy in upper-eementary science curricula. *Journal of Agricultural Education*, *57*(4). doi.org/10.5032/jae.2016.04101

Van Beek, J. A., De Jong, F. P. C. M., Minnaert, A. E. M. G., & Wubbels, T. (2014). Teacher practice in secondary vocational education: Between teacher-regulated activities of student learning and student self-regulation. *Teaching and Teacher Education*, *40*, 1-9. doi: 10.1016/j.tate.2014.01.005

Williams, M. R., Warner, W. J., Flowers, J. L., & Croom, D. B. (2014). Teaching with technology: North Carolina agriculture teachers' knowledge acquisition, attitudes, and identified barriers. *Journal of Agricultural Education*, *55*(5), 1-15. doi: 10.5032/jae.2014.05001

Wilson, E., Kirby, B., & Flowers, J. (2002). Factors influencing the intent of North Carolina agricultural educators to adopt agricultural biotechnology curriculum. *Journal of Agricultural Education, 43*(1), 69-81. doi: 10.5032/jae.2002.01069