Journal of Agricultural Education, 61(3), 86-100
https://doi.org/10.5032/jae.2020.03086

Identifying Agriscience Teachers' Instructional Practice Professional Development Needs by Certification Type

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Abstract

A nationwide teacher shortage is evident in the United States. Due to the teacher shortage, those with alternative teaching certifications are being utilized to fulfill the teacher shortfall. Current literature indicates diverse needs between traditionally and alternatively certified agriscience teachers. Further examination of the needs of traditionally and alternatively certified agriscience teachers is a necessary step toward providing support that could lead to less teacher attrition. The purpose of this study was to describe the self-perceived, professional development needs of agriscience teachers in Florida based upon their initial certification type. All three types of certified agriscience teachers reported determining content to be taught in specific courses and assessing student learning in the classroom and laboratory among their highest needs. However, alternatively certified agriscience teachers indicated a greater need in every selected competency of instructional practices. It is recommended agricultural education departments and others who are interested in agriscience teacher professional development consider teacher certification types when implementing professional development workshops. Future research should include the examination of the five additional needs areas determined by the researchers.

Keywords: agricultural education; agriscience teachers; certification; competencies; instructional practices; needs assessment; professional development

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Introduction

A nationwide teacher shortage is evident with multiple factors contributing to the issue (Castro et al., 2018; Cowan et al., 2016; Sutcher et al., 2016). In a research brief, Sutcher et al. (2016) predicted a shortage of more than 100,000 teachers annually. Within school-based agricultural education (SBAE), there was a reported 1,834 new hires in 2017 and only 540 of said hires were college graduates licensed to teach agriculture (Smith et al., 2018). To add to this issue, less than 50% of all pre-service teachers prepared by traditional certification programs accept teaching positions immediately after graduation (Cowan et al., 2016), and teacher turnover is high among those who do enter the classroom (Castro et al., 2018). As a result of this teacher shortage issue, those with temporary or alternative certifications

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are being utilized to fulfill the need for teachers. In the 2015-16 school year, an average of 18% of U.S. teachers claimed to have entered the profession via an alternative certification route (National Center for Education Statistics [NCES], 2018). Of those who entered the profession through an alternative route, 37% were in the content area of career and technical education (CTE). This ranked CTE as the content area with the highest percentage of those entering the profession with an alternative certification (NCES, 2018). According to the National Teach Ag Campaign (2018), 74 teaching positions in agriculture went unfilled and 462 positions were filled by alternatively certified or non-certified individuals. Thus, the national teacher shortage is not an issue that teacher educators should ignore.

Because of the teacher shortage, more and more individuals are entering the classroom with little to no pedagogical skills and knowledge (Bowling & Ball, 2018; Hoerst & Whittington, 2009; Porter, 2011; Roberts & Dyer, 2004; Stair et al., 2018; Touchstone, 2015). Therefore, it is important to consider the developmental needs of such teachers (Bowling & Ball, 2018). One avenue to address this issue is through faculty member and teacher-led professional development opportunities. Darling-Hammond and Bransford (2005) purported all teachers need professional development regardless of certification type. The authors emphasized honing teachers' skills related to organizing content and curriculum. University faculty have the responsibility to provide their stakeholders with the skills and knowledge to be successful as teachers (Campbell, 1998; Hillison, 2010).

Touchstone (2015) revealed alternatively certified agriculture teachers have higher needs for skills in FFA, SAE, classroom management, and curriculum development. In a study of high school and middle school agriculture teachers in Florida, Roberts and Dyer (2004) found traditionally certified agriculture teachers had higher perceived needs than those of alternatively certified agriculture teachers. Further, the authors reported alternatively certified agriculture teachers indicated the largest need for assistance in writing grant proposals. The authors also reported alternatively certified agriculture teachers have a lower perceived need of pedagogical related items. Duncan and Ricketts (2008) found alternatively certified agriculture teachers felt most efficacious in their teacher pedagogy. While these two findings are consistent, it is possible alternatively certified agriculture teachers lack the knowledge to recognize the importance of effective pedagogical practices and identify their actual needs (Roberts & Dyer, 2004).

Hoerst and Whittington (2009) reported secondary agriculture teachers have needs in managing inclusive classrooms. Specifically, writing educational goals, developing behavioral objectives, and providing assistive technology for learners with special needs are skillsets needed by secondary agriculture teachers (Hoerst & Whittington, 2009). In a study of Louisiana agriculture teachers, Stair et al. (2018) found the need for professional development in the areas of using instructional technologies and developing online teaching resources among traditionally and alternatively certified teachers alike. Additionally, alternatively certified teachers identified professional development needs in motivating students and managing instructional facilities (Stair et al., 2018). The authors also found those who were traditionally certified identified needs in the areas of teaching problem solving skills, motivating students, and teaching in laboratory settings (Stair et al., 2018). Addressing the specific needs of alternatively certified teachers could increase retention of such teachers. Peer support, group learning, and professional development are suggested practices for supporting alternatively certified teachers (Porter, 2011).

Throughout the literature, there is evidence of diverse needs between traditionally and alternatively certified agriculture teachers (Duncan & Ricketts, 2008; Hoerst & Whittington, 2009; Porter, 2011; Roberts & Dyer, 2004; Stair et al., 2018; Touchstone, 2015). Effective professional development is fundamental for teachers to refine their pedagogies, and conducting regular needs assessments to collect data which guides professional learning is crucial (Darling-Hammond et al., 2017). Further examination of the needs of traditionally and alternatively certified agriculture teachers is a necessary step toward providing support which could lead to less teacher attrition. This purpose of this study was to describe the self-perceived, professional development needs of Florida agriculture

teachers based on their initial certification type. The most recent assessment of agriculture teacher needs in Florida was conducted over 10 years ago (Roberts & Dyer, 2004). In the state of Florida, there are a large number of non-traditionally certified agriculture teachers. Therefore, there is a significant need for new information which will aid in guiding the professional development of Florida agriculture teachers and may provide implications for other states as well.

Conceptual Framework

The overarching theory which guided this study was the theory of human capital (Schultz, 1971; Becker, 1964) along with the teacher human capital framework (Myung et al., 2013). Schultz (1971) referred to human capital as the acquisition of skills and knowledge. From an economic perspective, investing skills and knowledge into employees leads to increased productivity and national income. Schultz (1971) contended investments in education and human capital would reap larger returns than investments in non-human capital. The case is made that on-the-job training and experiences, especially for those who have limited skills, can lead to increased skills and employability.

When analyzing human capital theory (HCT) and education, Becker (1964) placed emphasis on higher education and its relationship to higher salaries. Increases in economic development do not happen without investment in the skills and education of the workforce (Becker, 1964). While it is noted the return of investments to human capital and education can be difficult to measure, these investments lead to the economic growth of the individual and the overall community (Sweetland, 1996). Knowing the importance and value of building human capital, how can schools invest in their diversely skilled teachers to ultimately achieve the goals of the institution?

The U.S. Department of Education (2017) recommended building human capital by investing in three specific areas to increase educational productivity: (a) the organization of the teaching workforce, (b) teacher professional and career development, and (c) teacher compensation. To develop a stronger teacher workforce, the Carnegie Foundation reported a plan framed with HCT to address teacher needs (Myung et al., 2013). Within this plan, there were four prominent systems outlined that school districts should employ to achieve a stronger teacher workforce (a) acquire, (b) develop, (c) sustain, and (d) evaluate (Myung et al., 2013). This study primarily considers the acquire, develop, and sustain systems of the teacher human capital framework.

The first system of the teacher human capital framework this study considers, *acquire*, focuses on recruiting and hiring educators with appropriate skill sets (Myung et al., 2013). This starts with establishing a large candidate pool in which to hire from. Developing positive partnerships with effective, pre-service, teacher preparation programs is suggested as one way to do so. The word partnership is not one to be taken lightly and involves contributing to teacher preparation programs through sharing resources, strengths, and responsibilities. However, establishing a candidate pool can be easier said than done with a looming nationwide teacher shortage (Myung et al., 2013, Sutcher et al., 2016). With an increasing demand for prepared teachers and a decreasing supply, schools are left with few options for hiring (Castro et al., 2018). This shortage can lead to hiring alternatively certified teachers to bridge the gap (Bowling & Ball, 2018).

The second system of the teacher human capital framework to analyze is *develop*. Much aligned with Schultz's (1971) and Becker's (1964) previously mentioned thoughts on human capital, the develop system of this framework centered around investing experiences, skills, relationships, and trainings for teachers. Mentorship between those who are more and less skilled is a suggested way of developing teachers. Embedding on-the-job professional development is central to the develop system and to further teachers' professional learning (Darling-Hammond et al., 2017; Myung et al., 2013). As for alternatively certified teachers, the above-mentioned, self-perceived needs for professional development are found in numerous areas of the profession (Duncan & Ricketts, 2008; Roberts & Dyer, 2004; Touchstone, 2015). With alternatively certified teachers being hired as a way to fulfill the teacher shortage, focus on teacher development needs could be fundamental for their overall effectiveness.

The teacher human capital framework places its third emphasis on the *sustain* system (Myung et al., 2013). To reduce teacher turnover, sustaining existing, high-performing teachers can occur through compensation, recognition, improved working conditions, improved instructional features (i.e. curricula, testing), and increased opportunities for learning and growth in their career. Teachers' retention can be heightened when provided opportunities to advance their career, knowledge, and attain higher job levels or status (Myung et al., 2013). When retaining a teacher workforce, increased results could occur when professional development is delivered in a sustained and intensive method over shortened professional developments (Garet et al., 2001).

Purpose and Objectives

The purpose of this study was to describe the self-perceived, professional development needs of agriscience teachers in Florida based upon their initial certification type. To achieve this purpose, four objectives guided this study:

1. Identify the self-perceived professional development needs of traditionally certified agriscience teachers, and;
2. Identify the self-perceived professional development needs of traditionally certified teachers in other subject areas who later became certified to teach agriscience, and;
3. Identify the self-perceived professional development needs of alternatively certified agriscience teachers, and;
4. Identify the shared, highest-ranked, self-perceived professional development needs between the three types of certified agriscience teachers based on mean weighted discrepancy scores (MWDS).

Methods

Population and Sampling

In Florida, the total population of agriscience teachers is 465. The sampling frame for this study was all agriscience teachers ($N = 366$) who registered for Chapter Officer Leadership Training (COLT) Conferences in Florida. This sampling frame was selected for the sake of non-probability, convenience sampling (Dooley, 2001). In Florida, each area hosts a COLT conference. As such, data were conveniently collected at six different points in time. The data were collected face-to-face via a hardcopy questionnaire during the teacher professional development session at each area location. In all, the sample analyzed in this study consisted of completed questionnaires that were collected from 269 teachers for a 73% response rate. The researchers did not attempt to collect data from non-respondents, or agriscience teachers who did not register for the conference. This practice, congruent with judgement sampling, is acceptable as the agriscience teacher population is well-known by the researchers and no egregious sampling abnormalities were present (Israel, 1992; O'Leary & Israel, 2013). However, as an added precaution, this study does not attempt to erroneously generalize to the entire population of Florida agriscience teachers. Rather, the results reported can only be generalized to the respondents (O'Leary & Israel, 2013; Israel, 1992). As a result of judgement sampling (Israel, 1992; O'Leary & Israel, 2013), non-response data was not collected because 58% of the total Florida teacher agriscience population ($N = 465$) responded. Of the teachers who responded to the questionnaire, 61% were originally certified temporarily/alternatively or certified in another content area other than agriscience. This demographic reflects the state's estimate that 45-50% of agriscience teachers are originally certified temporarily/alternatively or certified in another content area other than agriscience, approximately. Thus, the researchers caution readers against generalizing findings outside of this sample.

The majority of the agriscience teachers who participated in this study were white ($f = 243$; 90.3%), female ($f = 177$; 65.8%), held a bachelor's degree ($f = 198$; 73.6%), and taught an average of 8.8 years ($SD = 9.0$; Min. = 1.0; Max. 42.0). A plurality of respondents indicated they taught in a single

teacher program (*f* = 149; 55.4%) and a majority at the high school level (*f* = 147; 54.6%). Regarding teacher certification, 102 (37.9%) were traditionally certified to teach in agriculture, 69 (25.7%) were traditionally certified in *another* subject area *outside* of agriculture, 96 (35.7%) did not complete a traditional university-based teacher education program, and 2 (.01%) did not respond to the certification type question.

For the purposes of this study, traditionally certified agriscience teachers are teachers who student taught and were certified through a university-based agriscience teacher preparation program. Agriscience teachers who are traditionally certified in *another* subject area are teachers who student taught and certified through a university-based teacher preparation program *outside* of agriculture, then tested to earn an agriculture teaching certification. Finally, temporarily/alternatively certified agriscience teachers are teachers who *did not* student teach or complete a traditional university-based teacher education program. These teachers have three years to complete selected coursework and certification exams to meet Florida state teaching certification requirements.

Instrumentation

The questionnaire used in this study was originally created by Roberts and Dyer (2004). The instrument was further modified by Saucier et al. (2010) and Figland et al. (2018). The instrument was further modified to fit the needs of this study. The purpose of the instrument was to inquire about the professional development needs of agriscience teachers in their respective states. Face and content validity were established by a panel of experts consisting of five agricultural education faculty and six doctoral students of which five were former agriscience teachers. As a result of the review, three items were deleted and several items were reworded to make the instrument items relevant for Florida agriscience teachers. The instrument included seven sections which measured agriscience teacher needs in the areas of (a) instructional practices (19 items), (b) industry certifications (13 items), (c) technical agriculture (8 pathways; 58 items), (d) laboratory settings (16 items), (e) teacher development (5 items), (f) program management (21 items), and (g) personal and professional characteristics (16 items). Sections (a) though (f) utilized two Likert-type scales (1 = *Low*; 5 = *High*) designed to measure teacher perceived current knowledge and perceived job relevance. Section (g) *personal and professional characteristics* included teacher demographics (i.e. age, certification type, years of experience, educational background, etc.) and allowed for space to write any additional perceived professional development needs that were not included within sections (a) through (f). For the purpose of this study, section (a) instructional practices, was analyzed.

Data Analysis

To address missing data, the data were analyzed for the distribution of missingness (Schafer & Graham, 2002). It was determined some data were missing at random, and single imputation was used. Single imputation was used because the proportion of missing values was considered to be small (Schafer, 1999). The data were analyzed using SPSS version 25 for PC. Descriptive statistics, including mean, standard deviation, frequency, and percentage were used to describe the population of agriscience teachers who attended the COLT conferences. Mean weighted discrepancy scores (MWDS) were used to meet the needs of objectives one through four. According to Borich (1980), discrepancy scores are usable for ranking and prioritizing competencies of needs assessments. Per Borich's (1980) model, the MWDS was calculated by subtracting the perceived content knowledge score from the perceived job relevance score to obtain the difference. The difference was then multiplied by the mean job relevance score which equaled the individual discrepancy score. The mean of all individual discrepancy scores was then taken to obtain the MWDS for each competency. A Microsoft Excel template was used to conduct these calculations.

Limitations of the Study

While this study assessed a critical issue in agricultural education, there are some limitations to be discussed. First, the instrument used for this study, created by Roberts and Dyer (2004) and modified by Saucier et al. (2010), Figland et al. (2018), and the researchers of this study, addressed seven sections of agriscience teacher needs. This study only considered the data from section (a) instructional practices, which is a limitation. There is more knowledge to be gained about the needs of these teachers by analyzing the other sections of the questionnaire, but this is outside the scope of this study. The second limitation of this study is its sampling frame. As previously discussed in the methodology section, data were only collected from agriscience teachers who attended the COLT conferences, and a non-response follow-up was not conducted. This decision was made because a majority (58%) of all Florida agriscience teachers attended the conference and responded to the questionnaire. Even so, the results of this study can only be generalized to those who responded.

Results

Objective 1: Identify the self-perceived professional development needs of traditionally certified agriscience teachers.

The six competencies identified with the greatest need by traditionally certified agriscience teachers, based on MWDS, included *modifying instruction for students with special needs* (MWDS = 3.71), *motivating students* (MWDS = 3.08), *determining content to be taught in specific courses* (MWDS = 2.97), *using experiments in teaching* (MWDS = 2.96), *managing student behavior* (MWDS = 2.94), and *assessing student learning in the classroom and lab* (MWDS = 2.84). The three competencies identified with the least need were *developing lesson plans* (MWDS = 1.51), *teaching for different learning styles* (MWDS = 1.24), and *planning for teaching in a block schedule* (MWDS = -1.59; see Table 1).

Table 1
Instructional Practice Needs of Traditionally Certified Agriscience Teachers (n=102)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Modifying instruction for students with special needs	3.71	3.37	1.03	4.25	0.92
2	Motivating students	3.08	3.88	0.84	4.56	0.68
3	Determining content to be taught in specific courses	2.97	4.10	0.90	4.73	0.57
4	Using experiments in teaching	2.96	3.41	0.92	4.13	0.86
5	Managing student behavior	2.94	4.06	0.87	4.69	0.63
6	Assessing student learning in the classroom and lab	2.84	3.97	0.78	4.59	0.68
7	Teaching critical thinking skills	2.72	3.64	0.81	4.27	0.81
8	Teaching problem solving skills	2.63	3.79	0.83	4.39	0.81
9	Teaching for different learning styles	2.37	3.76	0.85	4.31	0.81
10	Identifying resources for curricula	2.33	3.71	0.94	4.25	0.88
11	Sequencing lessons and units of instruction	2.29	3.98	0.91	4.49	0.70
12	Teaching decision making skills	2.13	3.85	0.83	4.34	0.81

Table 1
Instructional Practice Needs of Traditionally Certified Agriscience Teachers (n=102), Continued…

13	Highlighting reading strategies in agriculture courses	2.03	3.65	0.92	4.14	0.73
14	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	1.8	3.74	1.05	4.17	1.04
15	Highlighting math in agriculture courses	1.79	3.43	0.96	3.89	0.93
16	Evaluating teaching resources	1.61	3.71	0.89	4.10	0.96
17	Developing lesson plans	1.51	3.93	0.93	4.28	1.08
18	Highlighting science in agriculture courses	1.24	4.25	0.69	4.53	0.64
19	Planning for teaching in a block schedule	-1.59	3.28	1.53	2.70	1.69

Objective 2: Identify the self-perceived, professional development needs of traditionally certified teachers in other subject areas who later became certified to teach agriculture.

The six competencies identified with the greatest need by agriscience teachers traditionally certified in another subject area outside of agriculture, based on MWDS, included *determining content to be taught in specific courses* (MWDS = 3.83), *sequencing lessons and units of instruction* (MWDS = 3.31), *identifying resources for curricula* (MWDS = 3.04), *using experiments in teaching* (MWDS = 2.82), *evaluating teaching resources* (MWDS = 2.77), and *assessing student learning in the classroom and lab* (MWDS = 2.77). The three competencies identified with the least need were *highlighting science in agriculture courses* (MWDS = 1.21), *using instructional technology* (MWDS = 0.7), and *planning for teaching in a block schedule* (MWDS = -1.63; see Table 2).

Table 2
Instructional Practice Needs of Agriscience Teachers Traditionally Certified in Another Subject Area (n=69)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Determining content to be taught in specific courses	3.83	3.62	1.13	4.48	0.82
2	Sequencing lessons and units of instruction	3.31	3.64	0.92	4.39	0.90
3	Identifying resources for curricula	3.04	3.28	0.97	4.03	0.92
4	Using experiments in teaching	2.82	3.36	1.00	4.06	0.87
5	Evaluating teaching resources	2.77	3.39	1.06	4.07	0.93
6	Assessing student learning in the classroom and lab	2.77	3.83	0.79	4.45	0.72
7	Teaching for different learning styles	2.14	3.71	0.88	4.22	0.82
8	Developing lesson plans	2.05	3.80	0.90	4.28	1.07
9	Teaching problem solving skills	1.85	3.83	0.86	4.26	0.80
10	Modifying instruction for students with special needs	1.81	3.74	1.00	4.17	0.99

Table 2
Instructional Practice Needs of Agriscience Teachers Traditionally Certified in Another Subject Area (n=69), Continued…

11	Teaching critical thinking skills	1.71	3.65	0.94	4.07	1.02
12	Motivating students	1.61	4.07	0.81	4.43	0.78
13	Teaching decision making skills	1.53	3.87	0.87	4.23	0.89
14	Highlighting math in agriculture courses	1.33	3.30	1.05	3.67	0.95
15	Managing student behavior	1.33	4.29	0.71	4.58	0.76
16	Highlighting reading strategies in agriculture courses	1.24	3.57	1.02	3.88	0.98
17	Highlighting science in agriculture courses	1.21	4.12	0.88	4.39	0.75
18	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	0.7	3.84	1.02	4.01	1.01
19	Planning for teaching in a block schedule	-1.63	3.00	1.35	2.29	1.54

Objective 3: Identify the self-perceived, professional development needs of alternatively certified agriscience teachers.

The six competencies identified with the greatest need by alternatively certified agriscience teachers, based on MWDS, included *modifying instruction for students with special needs* (MWDS = 5.62*), teaching for different learning styles* (MWDS = 4.68), *determining content to be taught in specific courses* (MWDS = 4.59), *assessing student learning in the classroom and lab* (MWDS = 4.57), *developing lesson plans* (MWDS = 4.41), and *sequencing lessons and units of instruction* (MWDS = 4.13). The three competencies identified with the least need were *using instructional technology* (MWDS = 2.71), *highlighting science in agriculture courses* (MWDS = 1.82), and *planning for teaching in a block schedule* (MWDS = 0.15; see Table 3).

Table 3
Instructional Practice Needs of Alternatively Certified Agriscience Teachers (n=96)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Modifying instruction for students with special needs	5.62	3.06	0.99	4.35	0.82
2	Teaching for different learning styles	4.68	3.40	0.89	4.45	0.72
3	Determining content to be taught in specific courses	4.59	3.71	0.95	4.69	0.55
4	Assessing student learning in the classroom and lab	4.57	3.57	1.00	4.57	0.63
5	Developing lesson plans	4.41	3.47	1.11	4.46	0.82
6	Sequencing lessons and units of instruction	4.13	3.52	1.11	4.45	0.74
7	Identifying resources for curricula	4.03	3.43	1.04	4.35	0.85
8	Using experiments in teaching	3.93	3.38	1.00	4.29	0.82

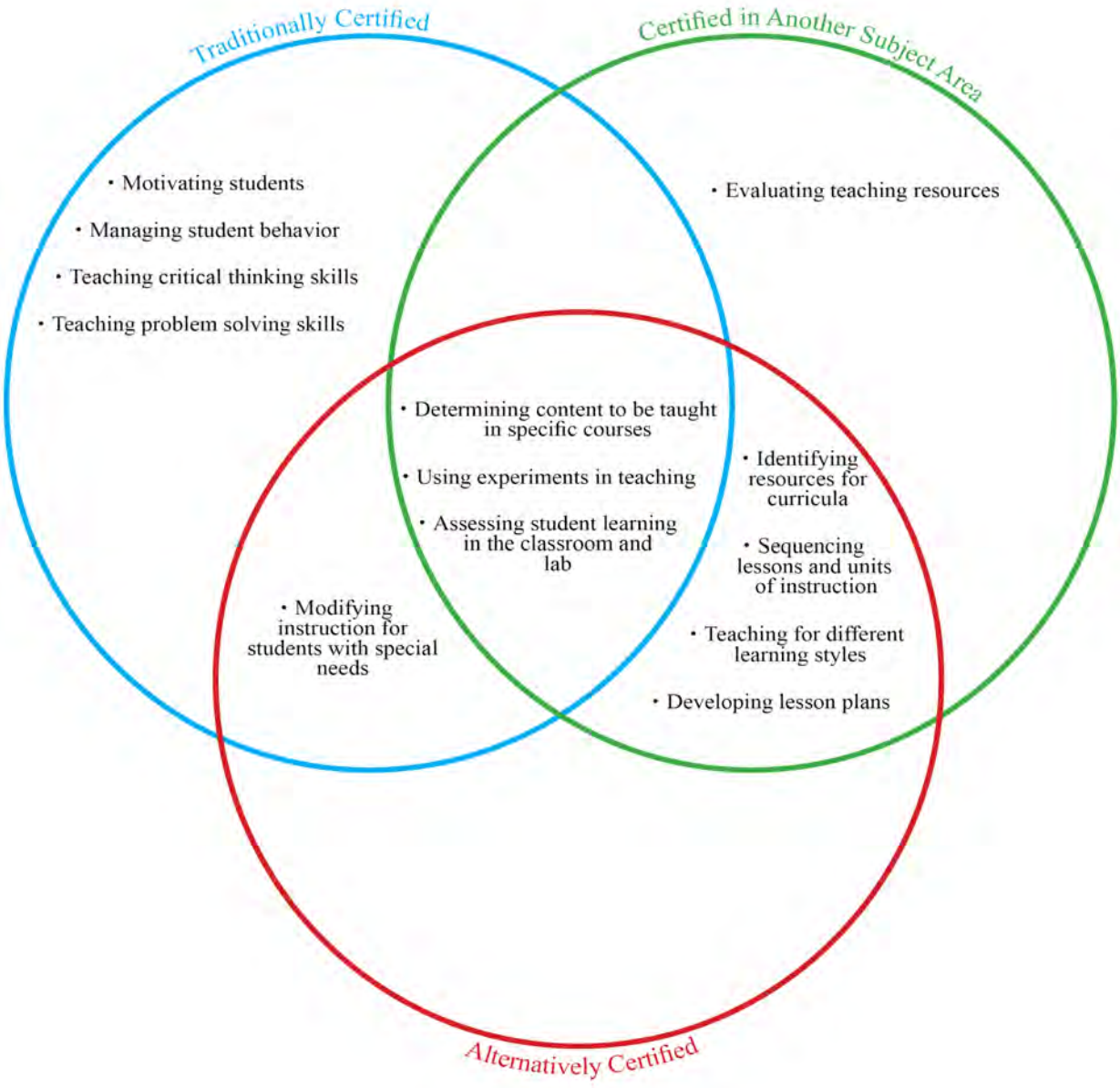
Table 3
Instructional Practice Needs of Alternatively Certified Agriscience Teachers (n=96), Continued…

9	Motivating students	3.91	3.85	0.91	4.69	0.59
10	Managing student behavior	3.74	3.94	0.95	4.73	0.55
11	Teaching problem solving skills	3.73	3.65	0.88	4.48	0.63
12	Teaching critical thinking skills	3.46	3.65	0.94	4.43	0.71
13	Evaluating teaching resources	3.23	3.35	1.07	4.14	0.98
14	Teaching decision making skills	3.23	3.77	0.95	4.49	0.60
15	Highlighting reading strategies in agriculture courses	2.77	3.49	1.02	4.16	0.85
16	Highlighting math in agriculture courses	2.76	3.25	1.01	3.95	1.00
17	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	2.71	3.64	1.08	4.27	1.03
18	Highlighting science in agriculture courses	1.82	4.08	0.97	4.49	0.68
19	Planning for teaching in a block schedule	0.15	2.79	1.43	2.84	1.69

Objective 4: Identify the shared, highest-ranked, self-perceived professional development needs between the three types of certified agriscience teachers based on mean weighted discrepancy scores (MWDS).

Of the top eight highest-ranked needs of the three groups of agriscience teachers, alternatively certified agriscience teachers and agriscience teachers who were traditionally certified in another subject area shared seven of their self-perceived instructional practice needs. Alternatively certified agriscience teachers shared the same highest-ranked, self-perceived, instructional practice need as traditionally certified agriscience teachers. The three groups collectively shared three of their highest eight self-perceived instructional practice needs (See Figure 1).

Figure 1
Similarities of the Top Eight Self-Perceived Professional Development Needs by Certification Type



Conclusions

The purpose of this study was to describe the professional development needs of Florida agriscience teachers with consideration of their initial certification type. Examination of the data suggested numerous implications for the professional development of agricultural educators. Only 38% of teachers in this study were traditionally certified agriscience teachers. This conclusion is congruent with Castro et al. (2018) who stated school administrators are left with few hiring options due to supply and demand gaps. As such, 61% of the teachers in this study were hired without having completed a traditional agricultural teacher preparation program (i.e. temporary/alternative certification or traditional certification in another subject area). When examining these two groups, each ranked

teaching for different learning styles, *determining content to be taught in specific courses*, *assessing student learning in the classroom and lab*, *developing lesson plans*, *sequencing lessons and units of instruction*, *identifying resources for curricula*, and *using experiments in teaching* within their highest professional development needs. Because many of these needs fit under the curriculum development realm, this conclusion is consistent with Touchstone (2015) who stated alternatively certified agriculture teachers have higher needs for curriculum development.

However, when comparing the ranked professional development needs of alternatively certified agriscience teachers to those of traditionally certified agriscience teachers, these two groups shared the same highest ranked professional development need of *modifying instruction for students with special needs*. This finding supports Hoerst and Whittington (2009) who reported agriculture teachers' need for more knowledge regarding inclusion of students with special needs. Perhaps, traditionally certified teachers in another subject area did not highly rank a need in this area because they may have received more pre-service coursework in teaching students with special needs. Traditionally certified agriscience teachers highly ranked a need in the area of *motivating students* which aligns with the findings of Stair et al. (2018). Based on MWDS, alternatively certified agriscience teachers indicated a greater need in every selected competency of instructional practices than traditionally certified agriscience teachers and traditionally certified teachers in another subject area. This research refutes the findings of Roberts and Dyer (2004) and Duncan and Ricketts (2008) which reported alternatively certified teachers have a less perceived need for pedagogical items.

Finally, all three groups (alternatively certified, traditionally certified, and traditionally certified in another subject area) ranked *determining content to be taught in specific courses*, *using experiments in teaching*, and *assessing student learning in the classroom and lab* within their highest eight needs. This is consistent with Darling-Hammond and Bransford (2005) who purported all teachers need skills in content organization and curriculum design. The findings of this study support Shultz's (1971) and Becker's (1964) theory of human capital and the teacher human capital framework by Myung et al. (2013). The theorists discuss the importance of investing into the workforce via on-the-job training and professional development, and this study's findings reflect that same need among Florida agriscience teachers. Further, this relates directly to the sustain system of the teacher human capital framework (Myung et al., 2013). Sustaining and retaining teachers, at any point in their career, involves fulfilling the need for instructional features such as curricula and assessments.

Recommendations

Recommendations for Practice

The agriscience teacher population has a growing number of individuals who are not traditionally certified to teach agriculture and will likely continue to grow until a greater solution to the teacher shortage is found (Bowling & Ball, 2018; National Teach Ag Campaign, 2018; Smith et al., 2018). As such, the results of this study should be shared with state agricultural education staff, university faculty, the Florida Association of Agricultural Educators, and all others who have a vested interest in providing agriscience teacher professional development. It is recommended agricultural education departments consider teacher certification types when implementing professional development workshops. First, for those who are not traditionally certified in agriculture, professional development topics should largely center around agricultural curricula development and curricula resources. A series of workshops could focus on designing curricula and developing unit and daily plans. In addition, time could be spent on aligning state and national standards. After teachers are proficient with standards and planning techniques, time could be spent on finding quality curriculum resources to meet their planning needs (Wiggins & McTighe, 2001).

Additional topics for teachers not traditionally certified in agriculture should include modifying instruction for diverse learning styles and methods of assessing student learning. Those conducting professional development events could introduce agriscience teachers to modifying instruction based

on learning styles. Kolb (2017) encourages educators to consider the strengths and challenges of various learning styles. Teachers could be instructed on developing agriscience curricula resources which engage multiple learning styles and teaching methods. Professional development topics for traditionally certified agriscience teachers could include teaching students with special needs and student motivation. A workshop series for agriscience teachers on including students with special needs should begin with how to operate an inclusion classroom and then focus on identifying resources for accommodating students with special needs (Hoerst & Whittington, 2009).

When delivering professional development, it is likely an audience will consist of teachers from each of the certification types. It is possible dividing the groups by certification type may not always be feasible and could cause feelings of exclusivity. As such, providing professional development on topics which were shared needs of all three groups (organizing agricultural content into courses and assessing student learning) is recommended. However, when appropriate, groups can be divided to address very specific needs.

Lastly, it is noted alternatively certified agriscience teachers displayed higher MWDS, and a more immediate need for professional development in the area of instructional practices than other (alternatively certified or traditionally certified in another content area other than agriscience) agriscience teachers in this study. Agriscience teacher educators, and others who deliver teacher professional development, should consider trainings and programs to support these individuals. Once such program could be an alternatively certified teacher induction program. During this program, teacher educators and alternatively certified teachers could meet both face-to-face and virtually throughout the first year of employment. The meetings could be divided by region in the state to ensure a better teacher educator to teacher ratio. The other advantage of regional meetings would be to create a close in proximity network for everyday communication among teachers. As part of the meetings, topics and concerns identified by the teachers could be discussed, and action plans developed regarding best instructional practices. Fostering an agricultural education community with shared principals of peer mentorship and lifelong learning should be central to teacher preparation. This recommendation aligns with the suggested practices shared by Porter (2011) and Myung et al. (2013) who emphasized peer support, group learning, and professional development for alternatively certified teachers. Lastly, all of the aforementioned professional development recommendations are rooted in the notion by Garet et al. (2001) that delivery should take place in a sustained and intensive method, rather than a one-time workshop approach.

Recommendations for Future Research

As previously stated, this study only identified the needs of agriscience teachers regarding instructional practices needs based on their certification type. Future work should include the examination of the five additional needs areas which were determined by the researchers (a) industry certifications, (b) technical agriculture, (c) laboratory settings, (d) teacher development, and (e) program management. There is a wealth of knowledge to be gathered from these additional areas which could guide future professional development opportunities for agriscience teachers.

The findings of this study generated numerous additional questions. Why do traditionally and alternatively certified agriculture teachers have a higher perceived need for modifying instruction for students with special needs over traditionally certified teachers in another subject area? An exploration of how these two groups were prepared by university teacher education programs may vary, and could provide considerations for agricultural education departments. Additional questions for future research include 1) Why are university prepared pre-service teachers not accepting teaching positions? A study which explores the perceived unattractiveness of education as a career choice to university prepared pre-service teachers who do not accept teaching positions could be very informative for all who have interest in the agricultural education workforce. 2) Why are alternatively certified teachers and teachers initially certified in another subject area seeking agricultural education as a career? A study can be

conducted to explore the perceived attractiveness of agricultural education based on the individual's background. For this study, data can be collected to identify teachers' reasons for entering agricultural education, and provide an in-depth analysis into this phenomenon. Answers to both of these questions could offer further understanding of the national teacher shortage and specific implications for agricultural education and teacher professional development. Future needs assessments should periodically be conducted to gather current data on agriscience teachers' needs. With agriculture and agricultural education everchanging, providing relevant professional development which meets the specific needs of agriscience teachers will be imperative in years to come.

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