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TEACHER PREPARATION AND IN-SERVICE NEEDS OF GEORGIA AGRICULTURE TEACHERS

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Abstract

The continuing trend toward increasing the diversity of curriculum offered within secondary agricultural education programs is driving a change in pre-service and in-service preparation for agriculture teachers. This study analyzed Georgia agriculture teachers' perceived importance of, and competence in, a variety of professional agricultural teaching competencies to identify their in-service needs. A revised version of Joerger's (2002) needs assessment instrument was used to gather data from existing Georgia agriculture teachers, with this data providing the means to prioritize competencies where agriculture teachers need supplemental preparation. The findings of this study indicate that teachers need additional preparation in technical areas such as biotechnology, aquaculture, and veterinary technology. Teachers also need support in developing pedagogical skills that will assist them in motivating their students to learn and increase their students' ability to think critically and creatively. Further, teachers indicated a need for preparation in managing student behavior. Finally, teachers identified the need for assistance when advising students who have an interest in post-secondary education, preparing various FFA applications, and developing an effective public relations program. Therefore, it was recommended that a number of pre-service/in-service preparation needs should be addressed by university faculty and state agricultural education staff.

Introduction

Improving university agricultural teacher education curricula and statewide continuing education programs calls for assessing the needs of current practitioners of the "agriculture teaching" craft. As students, teachers, schools, curricula, legislation, and times change, providers of teacher education preparation must also re-evaluate the content they distribute to pre-service and current agriculture teachers. In fact, the Committee on Agricultural Education in Secondary Schools Board on Agriculture of the National Research Council (1988) stated, "Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers, … in and about agriculture" (p. 7). Determining what and how to revise and expand for teacher preparation and in-service education is the challenge. Fortunately, some researchers (Dormody & Torres, 2002; Layfield & Dobbins, 2002; Garton & Chung, 1996, 1997) have been successful in determining teacher preparation and in-service needs in their respective states.

Researchers have investigated a cadre of constructs related to pre-service and in-service needs of agriculture teachers. Dobbins and Camp (2000) indicated a needed understanding in curriculum development, learning styles, technical areas, teaching methods, teaching techniques, and academic integration methods. Edwards and Briers (1999) evaluated the competencies of facilitating student learning in classroom and laboratory settings, facilitating student learning in leadership and personal growth, facilitating student learning in student agricultural

experiences, and facilitating teacher competencies related to student services, program management, personal roles and relationships, and planning and managing educational tools. Joerger's (2002) categories of professional teaching competencies needed for success and survival were classroom management, leadership and SAE development, technical agriculture, and program design and maintenance. Roberts and Dyer (2002) conducted a Delphi study of agricultural education experts to determine the characteristics of an effective agriculture teacher. The Roberts and Dyer study categorized effective teaching characteristics into instruction, FFA, SAE, community relations, marketing, professionalism/ professional growth, program planning/ management, and personal qualities.

Theoretical/Conceptual Framework

Teaching agriculture involves skill and mastery in agriculture content, pedagogical processes, and other competencies associated with managing the total program of agricultural education. As researchers sought to determine Georgia agriculture teachers' pre-service/in-service preparation needs in technical agriculture, teaching and learning skills, and skills associated with managing the "total program" of agricultural education, the conceptual framework for this study specifically is derived from the pre-service/in-service needs work of Borich (1980), Garton and Chung (1996, 1997), and Joerger (2002). The theoretical framework for this study is based on the theory espoused by Baker and Trussell (1981) as cited in Findlay (1992, p. 28) that the gap between theory and practice could be eliminated by reducing theory to what was needed to perfect the practice (teaching). The prospective teacher would then be trained (prepared) to reach competence in each of the tasks in order to cope with whatever situation may be encountered in the school.

One of the top-rated pre-service/in-service needs to be considered is the integration of current technological advances in agriculture into the curriculum. The following researchers found that the highest rated pre-service/In-service preparation need in technical agriculture was integrating current advances in agriculture technology into the curriculum (Birkenholz & Harbstriet, 1987; Dormody & Torres, 2002; Edwards & Briers, 1999; Joerger, 2002; Garton & Chung, 1996, 1997; Layfield & Dobbins, 2002; Peiter, Terry, & Cartmell, 2003; Washburn, King, Garton & Harbstriet, 2001).

Layfield and Dobbins (2002) and Washburn et al. (2001) reported that experienced teachers need in-service preparation in using computers and other multi-media equipment. Additionally, Dormody and Torres (2002), who examined teachers with 10 years of teaching experience or less, reported that the competency needing the most in-service preparation for both beginning and tenured teachers was using computer technology in the classroom. Edwards and Briers (1999) and Peiter et al. (2003), who specifically studied newer teachers, also believed preparation was needed in computer-assisted instruction and implementing other new technologies.

Joerger's (2002) assessment of two consecutive years of agricultural education graduates listed teaching about technological advancements in agriculture as an important in-service need, and Kotrlik, Redmann, Harrison, and Handley (2000) reported agriculture teacher inadequacies in general and software specific knowledge and skills. In addition to integrating agricultural technology, researchers have reported other technical agriculture competencies needed by agriculture teachers, such as teaching agricultural mechanics, soil science (Baker & Malle, 1995), and biotechnology (Washburn et al., 2001).

Technical skills are important, but teaching and learning competencies such as motivating students to learn and managing student behavior is also a concern for many teachers. For instance, motivating students to learn consistently appears as an important teacher-preparation need as identified by the teachers themselves and state staff and faculty who supervise new teachers (Garton & Chung, 1996; Joerger, 2002; Mundt & Connors, 1999; Peiter et al., 2003). In addition to motivation, teaching students to

be critical and creative thinkers has also become an important competency to add to the teaching and learning repertoire (Ricketts, 2003). Managing student behavior is also a concern for some teachers (Fritz & Miller, 2003; Joerger, 2002; Mundt & Connors, 1999).

Understanding student evaluation is another documented teacher preparation need (Layfield & Dobbins, 2002; Roberts & Dyer, 2002). In fact, South Carolina beginning teachers needed in-service help with developing performance-based assessments of their students (Layfield & Dobbins), and Roberts and Dyer reported that competency in all types of student evaluation was an imperative skill for future teachers.

Understanding student differences (Dormody & Torres, 2002; Peiter et al., 2003), especially special populations (Elbert & Baggett, 2003) of students, are also important teaching and learning competencies for the successful agricultural education teacher. Whether teachers need help with understanding the learning styles of their students, making sense of Individual Vocational Education Plans, or learning about the laws that affect teaching students with special needs, understanding student differences are of great importance.

Teachers receive little program management assistance in many areas related to agricultural education from their respective school districts (Greiman, Walker, & Birkenholz, 2002). According to a Delphi study of outstanding teachers, managing the overall activities of the local FFA chapter was the top preparation need, and thus should be addressed (Mundt & Connors, 1999). Edwards and Briers (1999), Joerger (2002), and Peiter et al. (2003) found that planning and managing the work of an FFA program is a major in-service need.

Preparing students for participation in Career Development Events (CDEs) is another area in which teachers perceive they need more preparation. From organizing and planning for FFA officer elections to preparation for the next floriculture contest, Edwards and Briers (1999) and Peiter et al. (2003) reported that preparing students for participation in CDEs was a major in-service need. The effective teacher Delphi of Roberts and Dyer (2002) concurred; they believed that the ability to prepare students to be successful in CDEs was also important.

Preparing FFA degree applications has been reported to be a highly rated in-service need of beginning teachers (Garton & Chung, 1996; Layfield & Dobbins, 2002; Peiter et al., 2003). Additionally, preparing FFA proficiency awards was reported as a need area and major concern for beginning teachers in Missouri (Garton & Chung, 1996), Minnesota (Joerger, 2002), South Carolina (Layfield & Dobbins, 2002), and Oklahoma (Peiter et al., 2003).

Agriculture teachers also have to promote their total program of agricultural education. Developing an effective public relations program was a highly rated in-service need of both beginning and experienced teachers, according to Garton and Chung (1996) and Layfield and Dobbins (2002). State agricultural education staff also believed that preparation to help teachers develop an effective public relations program was an important need (Garton & Chung, 1996).

Advisory committees help agriculture teachers plan their program, but teachers rarely receive preparation in managing those committees. Unlike teachers, state agricultural education staff in Missouri believed preparation, which taught prospective and future teachers how to utilize an advisory committee, was also one of the top in-service needs of agricultural education teachers (Garton & Chung, 1996). Still, teachers in other states identified in-service preparation in advisory committee management as an important need (Joerger, 2002; Layfield & Dobbins, 2002).

According to the literature, adult education was another area needing more preparation (Garton & Chung, 1996; Layfield & Dobbins, 2002). State staff in Missouri listed management of the adult program as an important in-service need (Garton & Chung, 1996), and researchers in Alabama, Florida, Georgia, and South Carolina found that agriculture teachers had a competency deficiency in managing the adult program (Layfield & Dobbins, 2002).

Agricultural education faculty and state directors continue to tout the importance of agriculture teachers maintaining a SAE program for all students, but teachers persist in their struggle with this competency. Layfield and Dobbins (2002) determined that beginning teachers perceived that they needed help becoming acquainted with strategies for developing SAE opportunities for students. South Carolina teachers (Layfield & Dobbins, 2002) also felt they needed in-service assistance with learning how to supervise SAE programs. Peiter et al. (2003) listed selection of SAE projects, supervision of projects, and livestock show procedures as areas where new teachers could use help.

Purpose and Objectives

The purpose of this descriptive study was to identify the teacher preparation and in-service needs of Georgia agricultural education teachers. To accomplish the purpose the following research objectives were used to guide this study:

1. Identify the technical agriculture pre-service/in-service preparation needs of Georgia agriculture teachers;
2. Identify the teaching and learning pre-service/in-service preparation needs of Georgia agriculture teachers; and
3. Identify the program management pre-service/in-service preparation needs of Georgia agriculture teachers.

Methods and Procedures

The population for this descriptive census study included all middle and high school agricultural education teachers in Georgia (N = 348) employed during the 2004-2005 school year. Surveys were distributed and collected at the Georgia Vocational Agriculture Teachers Conference and regional agriculture teacher meetings. Teachers not in attendance at either meeting were able to complete the survey via a university web site.

A modified version of the *Minnesota Beginning Agricultural Education Teacher In-service Programming Needs Assessment* (Joerger, 2002) was used to survey the teachers. This Joerger instrument was modeled after the 1996/1997 Garton and Chung instrument, which was based on the Borich Needs Assessment Model (Borich, 1980). A panel of experts consisting of university faculty, graduate students, regional coordinators of agricultural education, and agriculture teachers was used to determine the face and content validity of the instrument. The 63 items of the instrument were constructed with two Likert-type scales ranging from one to five.

Collected data were entered into SPSS 12.0™. Cronbach's alpha was calculated to determine the reliability of importance (α = 0.91, 0.88 & 0.94) and competence (α = 0.88, 0.90 & 0.94) scales for the technical agriculture preparation needs, teaching and learning, and program management preparation needs respectively. The importance and competence scores were used to calculate the teacher pre-service/in-service preparation needs by calculating a mean weighted discrepancy score (MWDS) for each item. The MWDS score was calculated by subtracting the competency score from the importance score and by multiplying that number times the mean importance rating for each competency (Borich, 1980; Joerger, 2002). Edwards and Briers (1999) sought to compare the ranking of in-service needs as determined by direct assessment to a ranking based on a mean weighted discrepancy score (MWDS), i.e., the Borich model. Consequently, they determined that the discrepancy method, like the Borich Model or a version of it, is more effective than a direct assessment.

There were 212 respondents out of 348 middle school and/or high school agriculture teachers in the population, yielding a response rate of 61%. To address non-response, early respondents (n = 121) were compared to late respondents (n = 91) using an independent samples t-test. Lindner, Murphy, and Briers (2001) and Miller and Smith (1983) reported that responses of late respondents are often similar to non-respondents, and reasoned that if there is not a difference between early respondents and late respondents, then there is little need to pursue additional efforts to increase

responses from non-respondents. With the exception of one item on the competence scale, no other significant differences were found between early and late respondents. The item "Utilizes alumni and/or young farmer affiliate" was significantly different when early (M = 3.27, SD = 1.16) respondents were compared to late (M = 3.61, SD = 0.984) respondents, t (206) = -2.21, $p < 0.05$, $d = 0.35$.

Findings

Pre-Service/In-Service Needs of Georgia Agriculture Teachers in Specific Technical Areas

Pre-service/in-service need is represented by the mean weighted discrepancy score (MWDS). The five highest rated pre-service/in-service preparation needs as revealed in Table 1 included: integrating current advances in agriculture technology into the curriculum, teaching skills and concepts in electricity, teaching skills and concepts in small animal care and veterinary technology, teaching skills and concepts in animal biotechnology, and teaching skills and concepts in aquaculture. Teaching skills and concepts in soils and soil management, and animal science were the lowest ranked pre-service/in-service needs as perceived by the teachers.

Table 1
Technical Agriculture Pre-service and In-service Preparation Needs of Agriculture Teachers

Competency	MWDS[a]
Integrating current advances in agriculture technology into the curriculum	3.61
Teaching skills and concepts in electricity	2.97
Teaching skills and concepts in small animal care and veterinary technology	2.87
Teaching skills and concepts in animal biotechnology	2.71
Teaching skills and concepts in aquaculture	2.63
Teaching skills and concepts in landscape design and maintenance	2.55
Teaching agribusiness skills and concepts	2.53
Teaching skills and concepts in forestry	2.50
Teaching agriscience (integrating science and agriculture)	2.33
Teaching about agriculture's relationship with the environment	2.33
Teaching plant biotechnology skills and concepts	2.32
Teaching skills and concepts in marketing agricultural products	2.26
Teaching skills and concepts in welding	2.25
Teaching skills and concepts in construction management	2.24
Teaching skills and concepts in relationship to small engine systems	2.19
Using multimedia equipment in teaching	2.08
Using computers in classroom teaching	1.95
Teaching skills and concepts in wildlife management	1.93
Teaching skills and concepts in equine science	1.93
Teaching skills and concepts in crop production	1.75
Teaching skills and concepts in food processing, operations, and management	1.60
Teaching skills and concepts in the plant sciences	1.60
Teaching skills and concepts in soils and soil management	1.46
Teaching skills and concepts in the animal sciences	1.44

[a] Mean Weighted Discrepancy Score

Pre-Service/In-Service Needs of Georgia Agriculture Teachers in Teaching and Learning

Table 2 reveals the four highest ranking pre-service/in-service needs, as determined by the mean weighted discrepancy scores (MWDS) - motivating students to learn, teaching students to think critically and creatively, managing student behavior problems, and teaching learning disabled students. Planning and conducting fieldtrips, and conducting an adult program were the lowest ranked pre-service/in-service needs as perceived by the teachers.

Table 2
Teaching and Learning Pre-service and In-service Preparation Needs of Agriculture Teachers

Competency	MWDS[a]
Motivating students to learn	4.53
Teaching students to think critically and creatively	4.21
Managing student behavior problems	3.60
Teaching learning disabled students	3.32
Teaching students problem-solving and decision making skills	2.89
Organizing and supervising teaching laboratories	2.68
Teaching using experiments	2.56
Assessing and evaluating student performance	2.37
Developing performance based assessment instruments	2.28
Conducting parent/teacher conferences	1.93
Planning and conducting student field trips	.60
Conducting an adult program	.50

[a] Mean Weighted Discrepancy Score

Pre-Service/In-Service Needs of Georgia Agriculture Teachers in Program Management

The highest rated pre-service/in-service preparation need, as determined by the mean weighted discrepancy scores (MWDS) in Table 3 was providing guidance to students interested in post-secondary education in the field of agriculture. The second highest need was preparation in preparing FFA proficiency awards, followed by FFA degree applications, developing an effective public relations program, and developing SAE opportunities for students was the fifth highest need. Planning banquets was the lowest ranked pre-service/in-service need as perceived by the teachers.

Table 3
Program Management Pre-service and In-service Preparation Needs of Agriculture Teachers

Competency	MWDS[a]
Providing guidance to students interested in post-secondary education in the food, fiber, and natural resource industries	4.40
Preparing FFA proficiency award applications	4.21
Preparing FFA degree applications	4.21
Developing an effective public relations program	4.13
Developing SAE opportunities for students	4.10
Using the local advisory committee	3.67
Embedding graduation standards in the agriculture curriculum	3.49
Utilizing a local alumni or young farmer affiliate	3.41
Establishing and organizing an agricultural co-op/internship	3.39
Teaching record keeping skills	3.36
Developing a variety of curriculum-based School-to-Work activities	3.34
Providing career exploration in the food, fiber, and natural resource industries	3.20
Teaching about public issues related to agriculture	2.97
Preparing FFA CDE teams	2.89
Evaluating the local agriculture program	2.88
Supervising students' SAE programs	2.85
Coordinating activities with local agricultural organizations/agencies	2.84
Organizing fundraising activities for the local FFA chapter	2.75
Conducting needs assessments to determine the courses that should be taught	2.55
Integrating life skills into curriculum	2.55
Establishing a program advisory committee	2.52
Conducting local FFA chapter activities	2.48
Determining the content that should be taught in specific courses	2.41
Locating and selecting student references and materials	2.35
Developing relationships with fellow teachers and administrators	1.80
Completing reports for local and state administrators	1.72
Planning banquets	1.57

[a] Mean Weighted Discrepancy Score

Conclusions

The purpose of this study was to determine Georgia agriculture teachers' perceived pre-service and in-service needs associated with 63 competencies. The teacher pre/in-service needs were determined by the mean weighted discrepancy scores for each of the teaching and learning competencies.

According to the Georgia agriculture teachers in this study, the most important pre-service and in-service preparation needs in the competency area of technical agriculture, is their ability to integrate current advances in agricultural technology into the curriculum. Joerger's (2002) assessment of two consecutive years of agricultural education graduates listed teaching about technological advancements in agriculture as an important in-service need. Additionally, Kotrlik et al. (2000) reported agriculture teacher inadequacies in general and software specific knowledge and skills. Georgia teachers also identified preparation needs in electricity, small animal/veterinary care, animal biotechnology, and aquaculture. Researchers could find no other research identifying this specific combination of preparation needs in other states, however, Layfield and Dobbins (2002), Joerger (2002), Edward and Briers (1999), and Garton and Chung (1997) found trends in preparation needs that suggest teachers need help with integrating science and other emerging technologies into agricultural education classes.

The competency with the greatest need for in-service education, as perceived by the teachers in the area of teaching and learning, was motivating students to learn. This conclusion is supported with previous research by Garton and Chung (1996), Edwards and Briers (1999), Mundt and Conners (1999), Joerger (2002), and Roberts and Dyer (2002). Managing student behavior problems was also identified as an area of in-service need, as perceived by the teachers. This result coincides with earlier research by Garton and Chung (1996), Mundt and Connors (1999), Joerger (2002), and Fritz and Miller (2003). In addition, the findings of this study give further support to previous research (Garton & Chung, 1996; Elbert & Baggett, 2003) that identifies the need for in-service education for teachers working with special needs students.

In the competency area of program management, Georgia agriculture teachers identified the greatest need for pre-service and in-service education that focused on advising students about post-secondary education in agriculture. Researchers found no other studies indicating such a high need for preparation to help teachers aid students in making decisions about studying agriculture in college. Teachers also indicated that more pre-service and in-service preparation opportunities might be needed to help them aid students in preparing FFA proficiency award applications and FFA degree applications. Garton and Chung (1996), Layfield and Dobbins (2002), Joerger (2002), and Peiter et al. (2003) also determined that teachers in their respective states needed preparation related to preparing FFA proficiency awards and degree applications. Similar to this study, other agricultural education researchers have also found that developing an effective public relations program (Garton & Chung, 1996; Layfield & Dobbins, 2002) and developing SAE opportunities for students (Layfield & Dobbins, 2002; Peiter, et al., 2003) were important preparation needs.

Recommendations

According to this study, there are a number of pre-service/in-service preparation needs that should be addressed by university faculty and state staff. First, Georgia agricultural education faculty and Georgia agricultural education state staff need to modify curricula to include more integration of current advances in agriculture in teacher pre-service and in-service preparation. Areas of importance include: teaching skills and concepts in electricity, small animal care and veterinary technology, animal biotechnology, and aquaculture. While this study is specific to Georgia, it is recommended that other states examine their current pre-service and in-service preparation in the aforementioned areas of

technology to determine if needs exist in their states.

Second, teacher in-service programs should focus on presenting multiple pedagogical tools for motivating students to learn and think critically at various academic levels. These competencies should be addressed in university teacher preparation curricula in Georgia to meet the needs of pre-service teachers. It is also recommended through this study that Georgia agricultural education faculty modify the current curricula to address the competencies in which the agriculture teachers didn't feel very competent (i.e., managing student behavior, assessing and evaluating student performance, and teaching students problem-solving and decision making skills).

Third, guidance is needed for students interested in post-secondary education in the food, fiber and natural resource industries. This competency should be addressed in university teacher preparation curricula in Georgia. Faculty could invite post-secondary recruiters from all state institutions offering majors related to agriculture to end-of-student teaching seminars and/or other agricultural education courses.

Fourth, Georgia agricultural education faculty must modify curricula to more effectively educate students on how to complete FFA proficiency awards and degree applications. In addition, assistance in the development of SAE opportunities for students (Layfield & Dobbins, 2002; Peiter, et al., 2003) was found to be an important need. Teacher education faculty in Georgia must infuse agricultural education courses with specific strategies and examples of SAE opportunities for students. Distributing specific techniques and examples of SAE opportunities for current teachers may be achieved at the summer teachers' conference, e-mailed ideas over the state agricultural education listserv, or a website, which shares SAE opportunities with teachers, may all be viable options.

And finally, agricultural communications faculty, students, and resources capable of helping pre-service and current agriculture teachers more fully develop their ability to develop a strong public relations program should be accessed. Pre-service courses of study could include an agricultural communications course, which addresses public relations skills and abilities. Conceivably, agricultural communications faculty could assist agricultural education faculty and state staff with professional development opportunities, which address the public relations need.

Garton and Chung (1996, 1997) and Dormody and Torres (2002) recommended other states replicate their research by evaluating the in-service needs of beginning agriculture teachers as perceived by those teachers and state agricultural education staff. Current data related to this recommendation have been collected by Edwards and Briers (1999) in Texas, Joerger (2002) in Minnesota, Peiter et al. (2003) in Oklahoma, and Layfield and Dobbins (2002) in South Carolina. As the number of states with timely and relevant needs assessment data increases, researchers should analyze data to identify national trends in agricultural education. Identifying trends will prove useful in determining the "direction" agricultural education is heading and will help leaders in agricultural education provide better pre-service and in-service preparation.

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