KNOWLEDGE, SKILLS, AND ABILITIES FOR AGRICULTURAL SCIENCE TEACHERS: A FOCUS GROUP APPROACH

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Abstract

The purpose of this study was to determine the competencies (knowledge, skills, and abilities) required of effective Agricultural Science teachers both inside and outside the classroom as perceived by preservice and inservice teachers and to suggest ways that preservice teachers can gain those competencies prior to entering the teaching profession. Focus groups were conducted with preservice and inservice teachers. Results indicated that specific competencies are required across the domains of learning (cognitive, psychomotor, and affective). Methods for attaining these competencies and skills ranged from example and non-example role models, course content, and field-based experiences including student teaching and involvement in student organizations.

Introduction/Conceptual Framework

It is an understatement to say that the skills required of Agricultural Science teachers exceed those of "regular" secondary classroom teachers. Much is known about the "classroom" skills required to be considered an effective teacher in a general sense, but how much do we really understand the attributes required to be an effective Agricultural Science teacher both inside and outside of the classroom? This study sought to explore the unique characteristics required of beginning Agricultural Science teachers, and ways of preparing preservice teachers for their ultimate role as competent and effective Agricultural Science teachers both inside and outside the classroom. Agricultural Science teachers rely on a unique bundle of knowledge, skills, and abilities that are acquired and strengthened through preservice education and experiential learning once on the job. Undergraduate preparation is an opportunity to gain not only new knowledge, but also acquire and strengthen skills and abilities needed to be professionally successful.

To operationalize, *knowledge* is a body of information, supported by professionally acceptable theory and research that individuals use to perform effectively and successfully in a given setting. *Skill* is a present, observable competence to perform a learned psychomotor act. Effective performance of skills requires application of related knowledge and facilitates acquisition of new knowledge. *Ability* is a present competence to perform an observable behavior or a behavior that results in observable outcomes (Lindner & Dooley, 2002). Collectively, *knowledge, skills, and abilities* are referred to as competencies. Competencies are behavioral dimensions that help to identify effective from ineffective performance (Maxine, 1997).

In agricultural education, numerous studies have been conducted to look at competencies (Dyer & Osborne, 1996; Goecker, 1992; McCormick & Whittington, 2000; Place & Jacob, 2001). Fewer studies have focused on the compilation of knowledge, skills, and abilities that influence professional success (Lindner, Dooley, & Murphy, 2001). Drawbaugh (1972) asserted that individuals must be made aware of their unique

competencies and subsequently provided opportunities for growth as they progress in their education.

Newcomb (1974) noted that there are numerous lists of competencies in agricultural education, but that little is known regarding which competencies are related to success. Limited research has focused on how competencies needed by Agricultural Science teachers should and can be acquired. Lack of such information may subsequently inhibit preservice teacher preparation in terms of curriculum revision, course offerings, or other essential activities.

One way to classify learning and competencies across settings is Bloom's Taxonomy (Bloom, 1956). Most noted for classification of classroom learning objectives, Bloom provides one mechanism for classifying learning and competencies into one of three domains: cognitive (Bloom), psychomotor (Harrow, 1972), and affective (Krathwohl, Bloom, & Masia, 1964). The cognitive domain focuses on thinking and knowledge; the psychomotor domain focuses on physical skills and tasks; and the affective domain focuses on feelings and emotions. It is the latter, the affective domain, that is the most difficult to classify and measure. Researchers note that it is the interplay among the domains that is most important, yet categorizing learning and competencies in this manner can help us identify those competencies that are important (Bloom; Harrow, 1972; Krathwohl et al.).

Countless studies state specific characteristics of effective classroom teachers. Probably the most noted of these is the landmark study by Rosenshine and Furst (1971). These researchers reviewed 51 previous studies on teacher effectiveness in an attempt to identify the most significant characteristics impacting good teaching. Their efforts produced a list of items taught in most preservice teacher courses today: clarity, variability, enthusiasm, student opportunity to learn material, and task oriented/business-like behavior. Young (1990) also identified additional characteristics such as the ability to plan and execute lessons, monitor student learning, conduct lessons based on a variety of methods, and maintain rapport with students.

While we know much about the "classroom" competencies needed by beginning Agricultural Science teachers, what other skills are important? Shippy (1981) identified 246 competencies in ten categories needed by agricultural education graduates including program planning, development, and evaluation; planning of instruction; execution of instruction; evaluation of instruction; student vocational organization; supervised occupational experience; management; guidance; school-community relations; and professional role and development. Other studies have focused on a compilation of competencies needed by agricultural teachers to be successful (Cook, 1963; Stewart, Lighari, Gott, 1983). Roberts and Dyer (2004) utilized a Delphi approach to generate a list of 40 competencies needed by Agricultural Science teachers that were categorized into eight areas: instruction, FFA, SAE, building community partnerships, marketing, professional growth/professionalism, program planning, and personal qualities.

How can we ensure that students leave teacher preparation programs with a comprehensive set of knowledge, skills, and abilities necessary to be effective? Most students are exposed to the gamut of competencies particularly unique to Agricultural Science teachers through preservice classes. However, intuitively, we know that mere "exposure" simply doesn't result in effective learning and transfer of the appropriate competencies required. Student teaching has been relied upon as the primary experiential means for preservice teachers to develop most of the skills required outside of class (Fritz & Miller, 2003).

Though most teachers will not debate the importance of student teaching, it is possible that this means of exposure is not totally effective in providing all of the experiences necessary for preservice teachers to fully develop into competent teachers in all areas. Findlay (1992) found Agricultural Science teachers acquired high levels of competencies through formal education, on-the-job experience, and self-directed study, but lower levels of competency acquisition

were achieved through student teaching and laboratory experiences. Further, the quantity and quality of student teachers' non-classroom experiences (i.e. contests and livestock shows) varies greatly depending on time of year, location, and the individual cooperating teacher. This is further demonstrated by the difficulty in the first year of teaching expressed by new teachers in the Agricultural Science profession (Fritz & Miller, 2003; Talbert, Camp, & Heath-Camp, 1994). Though students may have been at the top of the class in their preservice experience, research findings show that the first year of teaching is marked with much difficulty, regardless of the quality of preservice preparation (Joerger, 2002; Mundt, 1991).

Many researchers propose inservice education as the primary method for educating beginning teachers after they have begun their teaching career (Birkenholz & Harbstreit, 1987; Garton & Chung, 1997; Joerger, 2002). Though inservice education may be the primary method to impart changes and updates, should it also serve as the vehicle to remediate competencies that could have been learned during preservice preparation? Are there other avenues that might allow preservice teachers to develop in all areas, both inside and outside of the classroom, prior to even student teaching? While previous studies have identified characteristics and competencies of teachers from the perspective of the experienced teacher, limited studies have explored this question from the perspective of both the preservice and inservice teacher.

Purpose

The purpose of this study was twofold. First, to determine the competencies (knowledge, skills, and abilities) required of effective Agricultural Science teachers both inside and outside the classroom as perceived by preservice and inservice teachers; and second, to suggest ways preservice teachers can gain thecompetencies needed to be effective prior to entering the teaching profession.

Research Questions

1. What are the knowledge, skills, and abilities (competencies) needed to be a successful Agricultural Science teacher as perceived by preservice and inservice teachers?
2. How do preservice and inservice teacher perceptions compare (similarities and differences) in terms of knowledge, skills, and abilities (competencies) needed to be a successful Agricultural Science teacher?
3. How do preservice and inservice teachers acquire these knowledge, skills, and abilities?

Methods

The qualitative method of focus groups was determined to be the most appropriate technique to address the research questions. "Focus groups are carefully planned group meetings designed to collect perceptions and information on a defined area of interest" (Chalofsky, 1999, p. 1). Focus groups are different from group interviews in that the facilitator encourages participants to interact and share ideas related to one another's comments (Chalofsky). Focus groups were originally used to gather market data, but recently have been used for program development and evaluation, planning, and needs assessment (Krueger & Casey, 2000).

This study used focus groups with preservice and inservice Agricultural Science teachers regarding the competencies of the profession and possible ways preservice teachers gain these competencies before entering the profession. Current students (preservice teachers) enrolled in an agricultural education program at Texas A&M University and recent graduates of the same program, currently working as high school Agricultural Science teachers (inservice teachers), were solicited for participation.

Purposive Samples

The coordinators of the agricultural education program served as the gatekeepers to identify the two purposive samples (preservice and inservice teachers). The first sample consisted of exemplary teachers that had graduated from the program within the last five years. There were a total of eight inservice teachers who participated in two focus group sessions and through a telephone interview.

The purposive sample of preservice teachers was identified by their enrollment in a required agricultural education course. All members of this sample were scheduled to student teach during upcoming semesters. Sources disagree on appropriate focus group sample size, but they generally range from 6-15 participants (Larson, Grudens-Schuck, & Allen, 2004; Krueger & Casey, 2000; Berg, 2001). The 33 preservice teachers were therefore divided into two focus groups to ensure active discussion and facilitation by a moderator. Participation was voluntary and informed consent forms were completed by all participants.

Data Gathering Procedures

Two focus group sessions were held with preservice teachers and two focus group sessions were held with inservice teachers. Each session lasted approximately one hour. Due to scheduling conflicts, an additional inservice teacher was interviewed via telephone. All respondents were coded with a letter (T = inservice teachers; S = preservice teacher) and numbered in the order that they first spoke for confidentiality. Dialog was encouraged and participants could speak as often as they felt they had something to contribute.

A four-member research team was utilized to complete this research project. Two faculty members were directly involved with preservice teacher preparation, thus possessing preconceived opinions about this inquiry. The other two members were not involved in the preservice teacher preparation program. Data was collected and initially analyzed without bias by the team members with no previous teacher education experience. Following initial data analysis, the entire research team met and examined the findings to refine the inquiry process, clarify the findings, and establish the credibility of the conclusions.

The focus group sessions with preservice teachers were held during their normally scheduled class time. Focus group data with inservice teachers was collected using an online conferencing system (Centra™ --A Live Online Classroom). Discussion facilitators and participants logged onto the online conferencing system through computers with microphones. During online sessions, feedback mechanisms such as "hand raising," "smiley faces," and "applause" were used to support audio interaction. During all sessions, facilitators assured participants that the information they shared would not be associated with them individually. In addition, effort was made to gain input from all participants by providing multiple opportunities for contribution. Focus group sessions were audio recorded and notes were taken regarding student reactions to one another's comments. Detailed field notes were transcribed and compared with recordings for verification and elaboration.

Data Analysis

Data collected from the focus groups and interview was analyzed using the constant comparative method (Lincoln & Guba, 1985). The constant comparative method is also referred to as grounded theory methodology. Using this methodology, theory may be generated from the data, or, if existing (grounded) theories are appropriate, then these can be compared and elaborated, called theoretical elaboration (Strauss & Corbin, 1994). "Certain other general procedures have made this methodology effective and influential. Besides the constant making of comparisons, these include the systematic asking of generative and concept-relating questions, theoretical sampling, systematic coding procedures…and conceptual integration" (Strauss & Corbin, p. 275). The domains of learning were used as the existing theoretical constructs for comparison and elaboration.

The moderator and transcriber used colored markers to highlight emerging themes. A peer debriefing was held with the gatekeepers to check initial category formulation. Themes were compiled and re-

titled based upon the input from the peer debriefing. The researchers summarized the findings into a Venn diagram to provide a snapshot of both preservice and inservice teacher perspectives. An audit trail was kept to ensure trustworthiness. For this study, researchers ensured credibility with triangulation, referential adequacy materials, and peer debriefing. Observations, personal communications with program leaders, and content analysis provided different sources and methods to triangulate the data.

Findings

In order to determine transferability of the data from this study, it is important to provide background on the respondents. It was found that 27 out of the 33 preservice teachers in the sample had been involved in FFA or 4-H. The majority had shown animals and many had served in leadership positions. This involvement negatively impacted their participation in college organizations, indicated by comments from several preservice teachers that they were "burned out" and needed a break from participation in organizations. Backgrounds of the preservice teachers varied; some grew up on a farm or ranch, others in urban areas, and one had been home-schooled.

All inservice teachers had been teaching for less than five years as was indicated in the methods section. Participants had been involved in FFA or 4-H in high school and some had served as officers in these organizations. The majority of the inservice teachers had shown animals while in high school and two teachers reported that their father had also been an Agricultural Science teacher.

Similarities and differences of preservice and inservice teachers regarding the competencies needed to be a successful Agricultural Science teacher will be described in text and illustrated with a Venn diagram (Research Questions #1 and #2). The knowledge, skills, and abilities (competencies) perceived by both respondent groups will be reported first. The overlap in the Venn diagram illustrates competencies expressed by both preservice and inservice teachers.

Competencies reported can be divided into the three domains of learning: knowledge (cognitive domain); skills (psychomotor domain); and attitudes, attributes, or abilities (affective domain). It is obvious that although the domains of learning provide a useful way to separate the competencies, it is the interplay of the domains, or how they are combined, that helps individuals be successful in a given profession (Krathwohl et al., 1964).

Cognitive Domain

For the knowledge necessary for success in this field, the prominent areas that both preservice and inservice teachers agreed upon were instructional theory (pedagogy), leadership theory, and broad knowledge of the agricultural discipline along with content area specialization. Content area specializations mentioned included agricultural mechanics (S19, T1, T3, T4), animal science (S3, S11, S20, S22, T1, T7), or horticulture (T1, T3, T4, T7) in addition to the broad-based agricultural knowledge (S1, S3, S22). Leadership theory and skills was expressed as something to be both taught and modeled for success (S11, S12).

Preservice teachers expressed a belief that Agricultural Science teachers need to be aware of a variety of agriculture careers in order to provide this information to their students (S1, S3, S4, S5, S22). Students noted that AGSC teachers "need to know the diverse aspects of agriculture, not just farming" (S4) and "know career options" (S5). This knowledge was not mentioned by inservice teachers.

Inservice teachers shared two unique knowledge areas that were based upon their school-based experiences. The first prominent theme involved being knowledgeable about their agriculture programs in order to communicate effectively to a variety of constituent groups (parents, faculty, administrators, and community members). One teacher stated, "We know more than the parents about agriculture and we forget that we need to step back and explain things" (T1). The second area focused on classroom management policies and procedures, especially in regard to gaining and keeping

students' attention when teaching in a block schedule (T3).

Psychomotor Domain

Preservice and inservice teachers expressed several skills that are required to be effective in the profession. Both groups recognized that planning and organizational skills were paramount. Additionally, respondents believed that theoretical areas should be translated into practice. For example, platform skills for presenting information and using a variety of teaching methods were shared as being important. Specifically, "the ability to use different teaching materials well" was seen as an important skill (T3, S20, S22). Furthermore, both groups mentioned time management (S16, T7), training teams (S20, S22, T3, T4, T5, T7), and experience showing/working with animals (S3, S20, T3) as being important skills for an Agricultural Science teacher. Most of the respondents had been involved in 4H or FFA in high school and had shown animals themselves. Therefore, respondents emphasized the need to help young people compete in events involving livestock.

Preservice teachers mentioned a variety of skills that were necessary for success in the profession. Other important skills stated by this respondent group included the integrated skill of working with diverse groups (S22, S28), decision-making (S13), conflict resolution (S13), record book skills (S20), and facilitation skills (S14).

Inservice teachers shared unique perspectives on skills necessary for the profession. Respondents mentioned broad areas including program improvement (T1, T4), people skills (T3, T7), mentoring skills (T3), multitasking skills (T5), and classroom management strategies (T3). One teacher noted that teachers must be able to alter content for different classes and use different approaches with different students (T5). Inservice teachers expressed the importance of employing strategic planning and visioning to allow for program improvements within an agriculture science program. Inservice teachers also expressed a need for skills in regard to keeping records and documentation (T1, T3), special needs paperwork (T1, T2, T3), and the ability to recruit and work with volunteers (T2).

Affective Domain

The most interesting finding from this study focuses on the vast array of affective domain attributes identified as necessary for the profession. The "intangibles" that were perceived as necessary by both groups included patience (S8, T1, T3), being a lifelong learner (S20), caring/understanding (T3), appreciating and recognizing differences among individuals (S22), and a commitment to the profession, seen as a willingness to work hard and long hours (S2, S3, T6). Respondents universally indicated that the "ability to tailor to each student" (S28) was a necessary skill and that teachers needed to be continuous learners and attend professional development activities to stay current on agricultural practices and technologies (S20).

Preservice teachers shared that Agricultural Science teachers must be willing to travel (S12) and be involved in the local community through outreach (S5). Such activities included attendance at the national convention, working with fairs, "Greenhand" workshops, and workdays--which all require outside-of-classroom time (S20). Respondents noted that this dedication requires responsibility (S1), creativity, enthusiasm (S9, S21), and internal motivation (S5). They also indicated that it is essential that teachers be able to motivate and persuade diverse groups. As one preservice teacher stated, the "good ones motivate and persuade students and dedicate time" (S20).

Inservice teachers noted two additional attributes necessary for success: flexibility and open-mindedness. Respondents indicated that teachers must expect the unexpected (T3) and "realize that not all the kids have the same passion" (T4). Respondents shared that these attributes allow teachers to love their work and avoid burn-out due to the long hours and responsibilities required of them by their schools and communities.

For a synopsis of the similarities and differences of preservice and inservice perceptions of needed competencies for Agricultural Science teachers, see Figure 1.

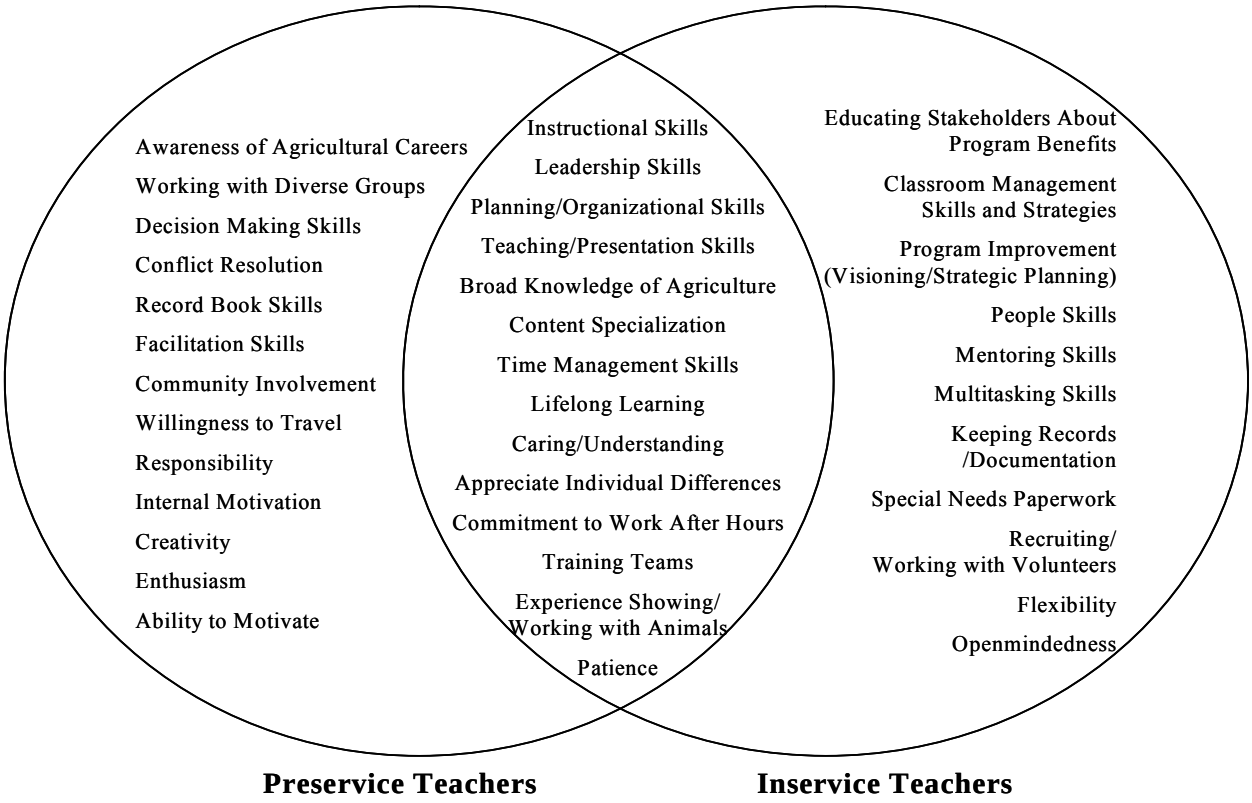

Figure 1. Competencies identified by preservice and inservice teachers.

Acquisition of Competencies Needed

Three major themes emerged from the data in regard to how individuals acquired the knowledge, skills, and abilities required of Agricultural Science teachers (Research Question #3): academic course preparation; field-based experiences; and exposure to role models.

As shared previously, several respondents indicated that quality Agricultural Science teachers possess both a broad knowledge of agriculture and specific content area expertise. Respondents indicated that this knowledge is best gained through academic course preparation. Leadership skills (S11), teaching techniques (S5), learning to show animals (S11), and coaching fundamentals (S14) were specifically mentioned as content knowledge that could be gained through academic courses. Animal science (S 3, S11, S 20, S22, T7, T1), agricultural mechanics (S19, T4, T1, T3), and horticulture (T7, T4, T1, T3) were expressed by both preservice and inservice teachers as areas that were of particular importance and could also be gained though completion of academic courses. One student stated, "…being in classes, especially when you could take something away that you had learned, something purposeful from the class" (S28).

Respondents universally expressed that all necessary knowledge could not be gained from academic course work. "General knowledge is learned in college, but nothing really prepares you for being a teacher… some skills can't be taught in the classroom" (T5). Both groups mentioned the importance of field-based activities such as student teaching and activities structured through a student organization. Attendance and participation with judging events and training teams (S22, S11, T5), observing and evaluating different agriculture programs (S22), and attendance at conventions (S20) were shared as being critical components of

teacher preparation. Both preservice and inservice teachers agreed on the importance of understanding how contests and events work. Inservice teachers specifically stated that "new teachers are completely lost on how to enter contests, the event rules, Career Development Events procedures, speaking events, registration, and more" (T6, T7, T5). As stated by an inservice teacher, "Being on the teacher-side of teams is completely different. New teachers don't know how to train FFA teams. There are so many little things" (T7). Activities such as guest speakers (T6), contest administration (T3), and visits to schools (T6) were expressed as being a means to obtain necessary skills. Inservice teachers indicated that on-the-job training (T3, T6) was a reality and that providing field-based experiences could mitigate the difficulties expressed by beginning teachers.

Exposure to role models was also mentioned as being an important aspect of learning how to be a good Agriculture Science teacher. There was a consensus among preservice teachers that they learned how to be an Agriculture Science teacher by watching their own teachers (S1, S2, S12, S13), both by example and non-example. Some preservice teachers indicated that their teacher was "burned-out" and was unable to be as effective as possible. Respondents indicated that it was important for an Agriculture Science teacher to enjoy what they are doing and exude enthusiasm (S9, S21). Respondents indicated that aspects such as patience, caring, and commitment are learned from observation and exposure to role models.

Conclusions, Recommendations, and Implications

The purpose of this study was first to determine the competencies (knowledge, skills, and abilities) required of effective Agricultural Science teachers both inside and outside the classroom as perceived by preservice and inservice teachers and then to suggest ways preservice teachers can gain the competencies needed to be effective prior to entering the teaching profession. Based on the findings of this study, several conclusions were drawn. It should be noted that this is a qualitative study and conclusions should be carefully considered before transferring to similar groups.

With regard to research question one, preservice and inservice teachers identified competencies across the three domains of learning (knowledge, psychomotor, and affective) as being important. This supports the findings of Rosenshine and Furst (1971) and Young (1990) in terms of the specific teaching skills necessary in the classroom, and the findings of Shippy (1992) and Roberts and Dyer (2004) indicating the broad scope of competencies needed in order to become an effective Agricultural Science teacher.

With regard to research question two, there were both similarities and differences found in the perceptions of preservice and inservice teachers. While both groups agreed upon a number of knowledge and skills, surprisingly, those relating to the affective domain resulted in the most consensus between the two groups. This supports the findings of Roberts and Dyer (2004) where specific personal characteristics were identified as being important to becoming an Agricultural Science teacher. In addition, while inservice teachers mentioned broader, more well rounded skills and abilities, preservice teachers tended to focus on more specific, skills-based abilities.

With regard to research question three, the respondents mentioned several mechanisms for more effectively preparing preservice teachers. These included example and non-example role models, course content, and field based experiences that include student teaching and activities structured through student organizations. This finding concurs with research conducted by Fritz and Miller (2003) where student teaching was identified as an important component of preparation. It also supports Findlay's (1992) findings whereby teachers found higher levels of competence through formal education, on-the-job experience, and self-directed studies.

This study revealed several areas for future research. First, based on the finding that preservice teachers listed factors related to teaching that inservice teachers did not list, is it possible that certain "perceived factors" cause individuals NOT to pursue a

job as an Agricultural Science teacher? Second, the role of diversity in the classroom has certainly changed over time. As illustrated in the points shared by the respondents, is it possible that this area needs further study? For example, how has urbanization impacted the backgrounds of incoming students and new teachers? Third, as beginning teachers struggle with how best to allocate their time, this study saw little mention of SAE. How can beginning teachers continue to manage their many obligations and activities while still maintaining this important part of the total Agricultural Science program? Finally, how can teacher preparation programs better utilize all mechanisms available to best prepare new teachers? The suggestions concerning use of example and non-example role models as well as the use of a student organization certainly warrant further study. Because of the type of methodology utilized, it is also recommended that this study be replicated in other states and institutions to determine if results are similar in other situations.

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