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Classroom and Laboratory Instructional Tasks Associated with Teaching School-Based Agricultural Education

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Abstract

Expectations placed on School-Based Agricultural Education (SBAE) teachers are wide and varied as they fill an array of roles and responsibilities. Tasks associated with teaching SBAE can be inferred from literature related to the needs, challenges, and characteristics of these teachers. As an integral component of SBAE, classroom and laboratory instruction is a significant area in which teachers are expected to complete tasks. Therefore, identifying the specific tasks associated with teaching SBAE could provide insight regarding the workloads of SBAE teachers. As such, we sought to identify the specific tasks expected of SBAE teachers regarding the classroom and laboratory instructional component. A modified Delphi method consisting of three rounds was used to address the study's purpose. The panel of experts consisted of 23 doctoral students in agricultural education with at least three years of SBAE teaching experience. Seventy-four tasks comprising 14 themes achieved consensus among the Delphi panelists. Our findings indicated that tasks related to classroom and laboratory instruction are essential to the success of SBAE teachers. Taken together, the tasks describe SBAE teachers as relational, competency-driven, and quality-focused instructors.

Introduction

Confidence in U.S. public schools is near an all-time low (Saad, 2022). As public education navigates increased political, socioeconomic, and Covid-19 pandemic-related issues (United States Department of Education, 2021), Americans' confidence in public education stood at 28% approval, only 2% higher than the lowest approval rating recorded since Gallup began conducting the poll in 1973 (Saad, 2022). Much of the decline in public opinion about schools can be attributed to the Covid-19 pandemic such as school closures, health and safety policies, and availability of resources (Saad, 2022). This fallout has had a profound impact on the perception of public schools in the United States (Dorn et al., 2021). Although popular opinion of public schools was adversely impacted by the pandemic, a more substantial

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consequence occurred regarding student learning (Dorn et al., 2021). At the end of the 2020-2021 school year, students in the United States were, on average, five months behind in math skills and four months regressed in their reading skills compared to similar cohorts prior to the pandemic (Dorn et al., 2021). As a result, teacher workload increased due to remediation efforts and the desire to help students achieve academically (Jones et al., 2022). This increased workload taxed teachers to the point that many left their teaching positions, creating gaping vacancies in the teaching profession (Goldhaber & Theobald, 2022).

It is estimated that more than 100,000 teaching positions go unfilled in the United States each year (Sutcher et al., 2019). Factors influencing the shortfall include availability of new teachers, salaries, working conditions, and attrition (Sutcher et al., 2019). According to Carver-Thomas and Darling-Hammond (2019), the nationwide annual teacher attrition rate in the United States is 8%, accounting for the loss of approximately 125,000 teachers each year. Working conditions are also closely related to teacher attrition rates (Bascia & Rottmann, 2011; Suchter et al., 2019; Toropova et al., 2021). Examples of working conditions that influence teachers' decisions to vacate the profession include high pupil-teacher ratios, lack of competent and supportive school leadership, and the undesirability of schools' testing and accountability environments (Sutcher et al., 2019). As such, many teachers leave the profession due to their overall dissatisfaction with the job (Toropova et al., 2021).

The general level of job satisfaction of teachers has declined in recent years (Skaalvik & Skaalvik, 2020). Teaching is a stressful profession with educators susceptible to burnout due to the overwhelming demands of their jobs (Chan, 2002; Hakanen et al., 2006; Skaalvik & Skaalvik, 2011, 2020). Work conditions at schools, such as administrative support, student behavior, school resources, autonomy, and teacher cooperation, greatly influence the satisfaction teachers feel regarding their profession (Bascia & Rottmann, 2011; Toropova et al., 2021). In addition, factors such as student performance levels, demographics, and discipline have an adverse effect on teacher retention (Ingersoll, 2017). Moreover, the perceptions teachers have regarding their workloads also play an important role in their overall levels of job satisfaction (Skaalvik & Skaalvik, 2016; Toropova et al., 2021). Toropova et al. (2021) found that "excessive workload was directly significantly related to emotional exhaustion and motivation to quit teaching" (p. 90), which may be the experiences and views shared by many SBAE teachers.

Expectations placed on SBAE teachers are wide and varied (Traini et al., 2021). They are expected to fill an array of roles and responsibilities (Phipps et al., 2008; Talbert et al., 2014; Terry & Briers, 2010). Needs of teachers (DiBenedetto et al., 2018; Roberts et al., 2020), challenges faced by teachers (Boone & Boone, 2007, 2009), and characteristics of effective teachers (Eck et al., 2019; Roberts & Dyer, 2004) provide insight into the nature of teaching SBAE and the roles expected of these instructors. Administrative support, student behavior, school resources, and professional relationships have long played a role in the job satisfaction of SBAE teachers (Cano & Miller, 1992; Castillo & Cano, 1999; Grady & Burnett, 1985; Torres et al., 2008). Moreover, Hurrell et al. (1998) identified Person-Environment fit, workload, autonomy, and work pace as indicators of teacher job satisfaction. Although research has indicated SBAE teachers are generally satisfied with their jobs (Castillo & Cano, 1999; McKibben et al., 2022; Walker et al., 2004), the roles they are expected to fill are often emotionally heavy, burdensome, and difficult (Murray et al., 2011; Traini et al., 2020). The combination of professional needs, challenges, and expected professional characteristics creates a complex space for SBAE teachers to navigate (Haddad et al., 2023; Traini et al., 2021).

Classroom and laboratory instruction is an area wherein teachers are expected to perform job-specific tasks. Classroom and laboratory instruction in SBAE refers to learning activities that promote the acquisition of attitudes, knowledge, and skills "within the confines of learning facilities" (Croom, 2008, p. 110). Such experiences are developed and delivered by SBAE teachers to emphasize interdisciplinary learning content in the context of agriculture (National FFA Organization, 2023; Phipps et al., 2008; Roberts & Ball, 2009). SBAE is its own content area, but it can be used as a context for learning other subject areas

as well (Roberts & Ball, 2009). According to the National Council for Agricultural Education (2015), eight AFNR career pathways exist on the federal level to guide SBAE classroom and laboratory instruction: Agribusiness Systems; Animal Systems; Biotechnology Systems; Environmental Services Systems; Food Products and Processing; Natural Resource Systems; Plant Systems; and Power, Structural and Technical Systems. These pathways guide the development and delivery of content across all aspects of SBAE and provide benchmarks to measure student learning and achievement (National Council for Agricultural Education, 2015). Additional pathways, such as Agricultural Communications, have been incorporated by some states to address their specific needs (Oklahoma CareerTech, 2023).

SBAE in the United States historically has been "both 'hands-on' and 'minds-on' in intent, design, and delivery" (Parr & Edwards, 2004, p. 107). The use of inquiry-based and problem-solving approaches in classroom instruction provide students a rich learning environment in which skills are acquired through the context of agricultural applications (Parr & Edwards, 2004; Phipps et al., 2008; Roberts & Ball, 2009; Talbert et al., 2014). As such, in-depth planning and preparation are required of SBAE teachers to deliver meaningful and robust lessons (Roberts & Kitchel, 2010; Talbert et al., 2014; Torres et al., 2008). Torres et al. (2008) identified planning and instruction as key workload components of SBAE teachers. They found that student teachers, first-year teachers, and experienced teachers invested 61%, 62%, and 47% of their work time, respectively, to planning and instruction for classroom and laboratory teaching.

Facilities where SBAE classroom and laboratory instruction occurs include classrooms, agricultural mechanics laboratories, greenhouses, land laboratories, and food processing facilities (Twenter & Edwards, 2017), among other learning spaces. For example, formal science laboratories have risen to prominence in some SBAE programs due in part to increased emphasis on cross-disciplinary instruction (Curriculum for Agricultural Science Education, 2023). Wells et al. (2018) posited that teachers are expected to complete a wide range of tasks and roles in their positions, which includes teaching agricultural content. They suggested that one such environment in which teachers accomplish this is in laboratory settings (Wells et al., 2018). Along with these laboratory learning spaces come expectations for how teachers use and interact with them (Wells et al., 2018). This includes managing the learning space, employing project-based instruction, and caring for the facilities (Wells et al., 2018). Moreover, SBAE concepts learned through classroom and laboratory instruction are actively applied through FFA and SAE activities. Thus, SBAE teachers are expected to perform tasks associated with classroom and laboratory instruction throughout a comprehensive SBAE program, i.e., in all three of its components (Croom, 2008).

Theoretical Framework

Human capital theory (HCT) served as the theoretical framework for the study. HCT evaluates the acquisition of education, experiences, knowledge, skills, and training, by individuals (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). An important aspect of HCT involves the explanation of employability in terms of the investment an individual makes in themselves and the attractiveness of their skills to prospective employers (Becker, 1964); therefore, "as people increase their human capital, they become more employable . . ." (Robinson & Baker, 2013, p. 152). As such, Smith (2010) found that individuals tended to acquire specialized skills as they moved toward work they preferred, giving rise to the recognition of "sector-specific" (p. 42) skills, which complement natural talent and occupational abilities. Moreover, Heckman (2000) maintained individuals' job performances were enhanced by the acquisition and development of these skills. Increased job performance due to enhanced human capital is associated with improved results for employers (Lepak & Snell, 1999). As such, HCT also may explain a teacher's value to their school (Smylie, 1996). In addition, HCT can be used to describe job-specific tasks and the value placed on them (Autor & Handel, 2013). Autor et al. (2003) found that jobs can be classified by the main tasks expected to be completed by workers, and the value of the skills required to perform those tasks can be assessed. However, it is difficult to measure and concretely connect these tasks and skills to the acquisition of human capital (Autor & Handel, 2013). To this aim, Autor and Handel (2013) proposed

individuals select tasks based on their perceived value to a job's expectations, realizing these tasks may vary greatly based on the specific demands of the job in question.

Gibbons and Waldman (2004) also found that tasks were central to a worker's value, coining the term "task-specific human capital" (p. 203). They said, ". . . some of the human capital an individual acquires on the job is specific to the tasks being performed . . ." (p. 203). Similar to other types of human capital, task-specific human capital is dependent on the nature of the work conducted, allowing for the skills acquired to be transferred readily from one job to another (Gibbons & Waldman, 2004). The authors maintained that this transfer reinforces the notion of task-specific human capital as widely valued in industries and offers enhanced employability to workers. As such, human capital acquisition is linked to proficiency in performing general and specific tasks (Gibbons & Waldman, 2004). Task-specific human capital implies that value is inherent in the skills associated with completing job-specific tasks (Gibbons & Waldman, 2004). Tasks, therefore, are central to job performance and facilitate skill acquisition (Autor et al., 2003; Autor & Handel, 2013). Therefore, tasks were central to the theoretical framework of the study. Garland (1985) defined *task* as "a body of work requiring mental and/or physical activity" (p. 346). In formal settings, tasks are often an individual's role and responsibility to master, and they can be either "self-selected or assigned by a superior or co-worker" (Garland, 1985, p. 346). Lewin (1951) posited that tasks predispose individuals to perceive tension or stress; therefore, resulting in them experiencing cognitive and physical activities, or both.

Purpose

Research has indicated that *general tasks* associated with teaching SBAE, such as excessive paperwork, working overtime, and meeting deadlines, can be sources of stress for teachers (Torres et al., 2009). However, determining *specific tasks* required of SBAE teachers is a difficult undertaking. Although the tasks of teaching SBAE can be inferred from the abovementioned professional needs, challenges, and expected professional characteristics, limited literature exists detailing the specific tasks SBAE teachers are expected to perform. Identifying a comprehensive list of tasks could offer insight into the daily demands of the profession and provide context and backgrounding for future research. To understand the various expectations placed on SBAE teachers, Traini et al. (2021) recommended that the profession should compile a "flexible position description of the agriculture teaching job detailing tasks that are expected as well as those that are not expected" (p. 179). Therefore, the purpose of this study was to identify the specific tasks associated with the classroom and laboratory instructional component of comprehensive SBAE programs.

Methods

This study was part of a larger investigation (Best, 2023). The methods of the larger investigation are presented here inclusive of the procedures yielding the findings reported in this manuscript. A modified Delphi method was used to meet the study's objective. This method is considered a multiple-round approach to collecting data where "three iterations are often sufficient to collect the needed information and to reach a consensus in most cases" (Hsu & Sandford, 2007, p. 2).

The study's population of interest was agricultural education doctoral students enrolled in public universities in the United States during the fall semester of 2022. The frame for the study consisted of doctoral students in agricultural education identified by department heads of agricultural education academic units across the United States. This population was selected as experts due to their unique perspectives on SBAE and higher education in agricultural education, i.e., recent or current practitioners as well as burgeoning teacher educators and researchers. As former or current SBAE teachers, this population was identified as an appropriate group of potential Delphi panelists because of their knowledge of and competence in SBAE and their desires to pursue terminal professional degrees in agricultural education.

Their understanding of the philosophy of SBAE through higher education coursework coupled with SBAE teaching experience qualified them as unique experts who met the following criteria:

1. Enrolled in a doctoral program (PhD or EdD) in agricultural education with aspirations of joining the professoriate or advanced leadership positions.
2. A minimum of three years of SBAE teaching experience.
3. "[H]ighly trained and competent within the specialized area of knowledge" (Hsu & Sandford, 2007, p. 3), in this case SBAE.

These criteria were in accordance with the recommendations of Hsu and Sandford (2007) and Stitt-Gohdes and Crews (2004) for selecting Delphi panelists.

In total, 22 universities were identified as offering doctoral programs in agricultural education – 19 as reported by AAAE in 2018 (American Association for Agricultural Education, 2018) and three additional institutions implementing programs after 2018. On September 13, 2022, an electronic mail message was sent to department heads of 22 agricultural education programs offering a doctoral degree requesting the names and email addresses of students enrolled in their doctoral programs. Of those, 13 (59.09%) responded, identifying 40 doctoral students as potential Delphi panelists who met the criteria for inclusion in the study. Subsequent electronic mail messages were sent to panelists for each round with a link embedded to respective instruments requesting their participation in the study following the Tailored Design Method outlined by Dillman et al. (2014). In all, 23 (57.50%) of the initial 40 potential panelists responded to Round 1 and, thereafter, were considered the study's panel of experts. Twenty-two (95.65%) expert panelists responded in Round 2, and 20 (86.96%) responded in Round 3.

The panel consisted of experts having taught SBAE in 16 different states with programs ranging from 45 to 700 students (see Table 1); approximately one-half of the respondents taught 150 or fewer students. Nine (39.13%) panelists were male, and 14 (60.87%) were female. Twenty-one panelists (91.30%) were white, and 22 (95.65%) were not Hispanic or Latino. Five (22.00%) were currently teaching SBAE, and 21 (91.30%) had taught SBAE in the past four years. The average number of years of experience teaching SBAE was 8.39 (range of 3 to 21 years). More than 95% ($f = 22$) were traditionally certified. Sixteen respondents (69.56%) were from 25 to 35 years of age. Thirteen panelists (56.52%) taught in communities with a population of fewer than 10,000 people (see Table 1).

Table 1

Selected Personal and Professional Characteristics of the Study's Delphi Panelists (N = 23)

Characteristics	*f*	%
Age		
25 to 30	7	30.43
31 to 35	9	39.13
36 to 40	3	13.04
41 to 45	3	13.04
46 to 50	1	4.35
Currently teaching SBAE		
Yes	5	21.74
No	18	78.26
Ethnicity		
Not Hispanic or Latino	22	95.65

Hispanic or Latino	1	4.35
Most recent year in which SBAE was taught		
2022	8	34.78
2021	6	26.09
2020	2	8.70
2019	3	13.04
2018	2	8.70
2017	0	0.00
2016	1	4.35
2015	0	0.00
2014	1	4.35
Number of teachers in most recent SBAE program		
1	10	43.48
2	6	26.09
3	4	17.39
4	1	4.35
5	0	0.00
6	0	0.00
7	1	4.35
8	1	4.35
Race		
White	21	91.30
Black or African American	1	4.35
Other	1	4.35
Sex		
Male	9	39.13
Female	14	60.87
Prefer not to answer	0	0.00
Size of community where most recently taught		
Less than 10,000	13	56.52
10,001 to 50,000	6	26.09
50,001 to 100,000	2	8.70
More than 100,000	2	8.70
Size of SBAE program where most recently taught		
50 or fewer students	2	8.70
51 to 100 students	4	17.39
101 to 150 students	6	26.09
151 to 200 students	5	21.74
201 to 250 students	0	0.00
251 to 300 students	2	8.70
301 to 350 students	1	4.35
351 to 400 students	0	0.00
401 to 450 students	1	4.35

451 to 500 students	0	0.00
501 or more students	2	8.70
Size of school where most recently taught		
500 or fewer students	11	47.83
501 to 1000 students	5	21.74
1001 to 1500 students	1	4.35
1501 to 2000 students	4	17.39
2001 to 2500 students	0	0.00
2501 to 3000 students	0	0.00
3001 to 3500 students	1	4.35
3501 or more students	1	4.35
State where last taught		
Texas	4	17.39
Florida	2	8.70
Louisiana	2	8.70
Minnesota	2	8.70
Missouri	2	8.70
Arizona	1	4.35
California	1	4.35
Illinois	1	4.35
Iowa	1	4.35
Kentucky	1	4.35
Nebraska	1	4.35
North Carolina	1	4.35
Ohio	1	4.35
Oklahoma	1	4.35
South Dakota	1	4.35
Wisconsin	1	4.35
Teacher certification pathway		
Traditionally certified	22	95.65
Alternatively certified	1	4.35
Years of total SBAE teaching experience		
3 to 5	9	39.13
6 to 8	6	26.09
9 to 11	3	13.04
12 to 14	2	8.70
15 to 17	1	4.35
18 to 20	1	4.35
21 or more	1	4.35

The instruments used in this study were evaluated for face and content validity (Gay et al., 2006) by a group of eight experts considered knowledgeable of social science research and SBAE. These included six teacher educators in agricultural education, one statistician who specialized in survey research and

instrument design, and one graduate student who was a former SBAE teacher and seeking an advanced degree in agricultural education at Oklahoma State University. Moreover, reliability in Delphi studies is dependent on maintaining a certain threshold of participants throughout the study's duration. Dalkey et al. (1972) indicated that 13 responses were needed to establish a reliability coefficient of .90 in Delphi studies. Due to the response rates of this study exceeding 13 participants per round, and because each round was comprised of the same participants only slightly fewer, the study's results are considered reliable (Dalkey et al., 1972).

The initial electronic mail message was sent to the 40 potential panelists on September 29, 2022, describing the study and inviting them to participate. A Qualtrics survey link to the Round 1 instrument was included that contained questions pertaining to the personal and professional characteristics of the panelists as well as one open-ended question: *What tasks are associated with the roles and responsibilities of a SBAE teacher regarding classroom and laboratory instruction in a typical year?* Panelists were asked to provide as many responses as they deemed appropriate to answer this question. Tasks identified by the panelists in Round 1 were analyzed using the constant comparison procedure, and any duplicated responses were eliminated (Creswell & Guetterman, 2019). Further, this method was used to inductively analyze responses and categorize them into themes (Creswell & Guetterman, 2019). Per the suggestion of Creswell and Guetterman (2019), responses were compared to one another and grouped into categories to eliminate redundancy.

Round 2 of the Delphi study sought to establish consensus of agreement among panelists (Barrios et al., 2021). An electronic mail message was sent to the 23 panelists responding to Round 1 on November 22, 2022, with a Qualtrics survey link to the Round 2 instrument. Tasks identified in Round 1 were presented to panelists to determine their perceived level of agreement for each. Panelists were asked to indicate their levels of agreement using a four-point, Likert-type scale (*1 = Strongly Disagree, 2 = Disagree, 3 = Agree,* and *4 = Strongly Agree*). An 80.00% level of agreement was established *a priori* to reach consensus, i.e., tasks receiving a score of 3 or 4 by 80.00% of panelists, were considered to have reached consensus among the panelists (Diamond et al., 2014). Tasks achieving 51.00% to 79.99% agreement were retained for use in Round 3. Tasks that failed to reach 51.00% agreement among the panelists were removed from the study.

Round 3 of the study sought to refine consensus of agreement among the panelists (Brady, 2015). An electronic mail message was sent to the 22 panelists who responded to Round 2 of the study on December 12, 2022, with a Qualtrics survey link to the Round 3 instrument. Tasks identified in Round 2 that achieved levels of agreement ranging from 51.00% to 79.99% were presented again to the panelists, per the recommendations of Buriak and Shinn (1989). Panelists were asked to indicate whether they agreed the task should be included in the task list by selecting either *1* for *No* or *2* for *Yes*. The 80.00% level of agreement identified *a priori* also was used for Round 3 analysis. Tasks receiving this level of agreement were considered to have reached consensus among the panelists and included in the final list of tasks that should be associated with the classroom and laboratory instructional component of SBAE. Tasks that reached levels of agreement of less than 80.00% were considered to not have reached consensus as defined by the researchers. The items reaching an 80.00% level of agreement in Round 2 and Round 3 were combined to form a final list of tasks. For all three rounds of the study, statistical feedback was reported per the suggestion of Sackman (1974) who indicated that measures of central tendency and dispersion (standard deviation) should be included when reporting the findings of a conventional Delphi study.

Findings

Round 1

In Round 1 of the study, panelists initially identified 265 tasks of SBAE teachers regarding classroom and laboratory instruction. After duplicated tasks were removed, 84 tasks remained as categorized into 14 themes for consideration in Round 2. Table 2 shows the tasks identified in Round 1.

Themes identified in Round 1 included Authentic Skill Development (*f* = 9; 10.7%), Classroom Management (*f* = 3; 3.6%), Clerical Work (*f* = 8; 9.5%), Inclusive Teaching (*f* = 8; 9.5%), Instructional Design (*f* = 6; 7.1%), Lesson Preparation (*f* = 9; 10.7%), Lifelong Learning (*f* = 5; 6%), Relationships and Rapport (*f* = 9; 10.7%), School Safety (*f* = 4; 4.8%), Student Evaluation (*f* = 2; 2.4%), Student Motivation (*f* = 2; 2.4%), Teaching and Instruction (*f* = 7; 8.3%), Teaching and Learning Resources (*f* = 10; 11.9%), and Teaching and Learning Supplies (*f* = 2; 2.4%; see Table 2).

In corresponding order to the abovementioned themes, the most frequently indicated tasks for each theme included: assist students in obtaining industry-based certification (IBC; *f* = 5, 1.89%), manage the learning environment (*f* = 20, 7.55%), manage classroom budget (*f* = 6, 2.26%), follow student individualized educational plan (IEP)/504 modifications (*f* = 4, 1.51%), develop instructional curriculum (*f* = 9, 3.40%), prepare daily lesson plans (*f* = 14, 5.28%), attend professional development (*f* = 6, 2.26%), communicate with students' parents/guardians (*f* = 6, 2.26%), follow safety/security protocol (*f* = 2, 0.75%), grade student work (*f* = 14, 5.28%), motivate students to learn (*f* = 3, 1.13%), teach students across all AFNR pathways (*f* = 14, 5.28%), manage teaching and learning facilities (*f* = 7, 2.64%), and obtain classroom and laboratory supplies (*f* = 11, 4.15%; see Table 2).

Table 2

*Themes and Tasks Associated with Teaching School-Based Agricultural Education in the Classroom and Laboratory Instructional Component from Round 1 (*N = *23)*

Themes and Tasks	*f*	%
Authentic Skill Development		
Assist students in obtaining industry-based certification (IBC)	5	1.89
Obtain industry-based certification (IBC) for teachers	2	0.75
Provide content area expertise	2	0.75
Provide academic service-learning opportunities	1	0.38
Provide hands-on learning experiences	1	0.38
Provide inquiry-based learning opportunities for all courses	1	0.38
Stay current with industry trends	1	0.38
Teach laboratory skills	1	0.38
Teach students practical skills	1	0.38
Classroom Management		
Manage the learning environment	20	7.55
Provide clear instruction	1	0.38
Vary instruction	1	0.38
Clerical Work		
Manage classroom budget	6	2.26
Write grants	4	1.51
Complete required school-wide paperwork	3	1.13
Secure funding for the learning environment	3	1.13
Enter student grades	2	0.75
Manage student record books	1	0.38
Submit instructional lesson plans	1	0.38
Use learning management system (LMS) competently	1	0.38
Inclusive Teaching		

Follow student individualized educational plan (IEP)/504 modifications	4	1.51
Create an inclusive learning environment	3	1.13
Attend individualized educational plan (IEP)/504 meetings	2	0.75
Create culturally competent students	2	0.75
Ensure equitable student access to resources	2	0.75
Scaffold content to meet individual students' needs	2	0.75
Engage students from non-agricultural backgrounds	1	0.38
Establish a community/safe space in the classroom	1	0.38
Instructional Design		
Develop instructional curriculum	9	3.40
Create a curriculum map across AFNR pathways	7	2.64
Align curriculum to appropriate standards	3	1.13
Apply curriculum concepts to real-world situations/scenarios	1	0.38
Develop instructional visual aids	1	0.38
Modify existing curriculum	1	0.38
Lesson Preparation		
Prepare daily lesson plans	14	5.28
Organize teaching materials/resources	11	4.15
Prepare for field trips	5	1.89
Prepare for guest speakers	3	1.13
Align lessons with AFNR standards	2	0.75
Manage time	2	0.75
Prepare facilities for instruction	2	0.75
Prepare lesson plans for substitute teachers	2	0.75
Practice labs ahead of time	1	0.38
Lifelong Learning		
Attend professional development	6	2.26
Implement feedback from administrative evaluations	3	1.13
Collaborate with other agricultural education teachers in Professional Learning Communities (PLC)	1	0.38
Coordinate with all school staff to facilitate learning	1	0.38
Develop leadership abilities	1	0.38
Relationships and Rapport		
Communicate with students' parents/guardians	6	2.26
Build relationships with students	2	0.75
Build relationships with the community	2	0.75
Communicate with advisory council	2	0.75
Coordinate community volunteers	2	0.75
Promote program	2	0.75
Serve as mentor for students	2	0.75
Communicate with administrators	1	0.38
Communicate with students	1	0.38

School Safety		
Follow safety/security protocol	2	0.75
Manage laboratory safety	2	0.75
Model safety	1	0.38
Serve as an armed school guardian to provide campus security	1	0.38
Student Evaluation		
Grade student work (i.e., summative evaluations, outcome assessments, and standardized tests)	14	5.28
Assess student learning (i.e., formative assessments, feedback, and check for understanding)	10	3.77
Student Motivation		
Motivate students to learn	3	1.13
Recruit students to program	1	0.38
Teaching and Instruction		
Teach students across all AFNR pathways	14	5.28
Serve as the agricultural content expert	3	1.13
Supervise students in the laboratory	3	1.13
Adapt content for hybrid instruction	1	0.38
Follow school instructional policies	1	0.38
Serve on various committees	1	0.38
Take students on educational field trips	1	0.38
Teaching and Learning Resources		
Manage teaching and learning facilities (i.e., classroom, shop, greenhouse, land lab, and project facility)	7	2.64
Maintain school project center (i.e., land lab, school farm, and ag barn)	4	1.51
Conduct annual inventory of equipment/supplies	2	0.75
Maintain school equipment	2	0.75
Manage greenhouse	2	0.75
Repair school equipment	2	0.75
Handle laboratory equipment	1	0.38
Landscape school grounds	1	0.38
Manage animals housed at school facilities	1	0.38
Purchase laboratory equipment	1	0.38
Teaching and Learning Supplies		
Obtain classroom/laboratory supplies	11	4.15
Maintain classroom/laboratory supplies inventory	2	0.75
Total	265	100.00

Note. *f* indicates the number of original statements provided by panelists which were reduced to a single, unduplicated task; % indicates the task's percentage of the total tasks identified in Round 1 of the study.

Round 2

In Round 2, panelists reached consensus of agreement (80.00% or higher) using a Likert-type scale ranging from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*) for 72 of 84 tasks (85.70%) associated with classroom and laboratory instruction in SBAE. Table 3 shows the means (*M*) and standard deviations (*SD*) of item responses, with lower values indicating more perceived disagreement and higher values indicating

more perceived agreement, and the percent of agreement for tasks associated with teaching SBAE in the classroom and laboratory instructional component. Percent of agreement was defined as the percentage of panelists selecting 3 (*Agree*) or 4 (*Strongly Agree*) in response to the item. Of the tasks achieving consensus of agreement, 45 (62.5%) reached 100.00% agreement among the panelists (see Table 3). Examples of tasks with the highest mean for each of the 14 themes included: provide hands-on learning experiences (M = 3.95, SD = 0.21); manage the learning environment (M = 3.86, SD = 0.35); enter student grades (M = 3.59, SD = 0.50); create an inclusive learning environment (M = 3.64, SD = 0.49); apply curriculum concepts to real-world situations/scenarios (M = 3.91, SD = 0.29); manage time (M = 3.86, SD = 0.35); attend professional development (M = 3.68, SD = 0.57); build relationships with students (M = 3.95, SD = 0.21); follow safety/security protocol (M = 3.86, SD = 0.35); assess student learning (M = 3.86, SD = 0.35); motivate students to learn (M = 3.82, SD = 0.40), and recruit students to program (M = 3.82, SD = 0.40); supervise students in the laboratory (M = 3.77, SD = 0.43); handle laboratory equipment (M = 3.59, SD = 0.50), and purchase laboratory equipment (M = 3.59, SD = 0.50); and maintain classroom/laboratory (M = 3.55, SD = 0.51). Nine tasks that reached levels of agreement from Round 2 between 51.00% and 79.99% advanced to Round 3 for additional consideration by the panelists. As a result, three tasks failed to reach at least 51.00% agreement and were eliminated from the study. Those tasks were: serve as an armed school guardian to provide campus security (M = 1.68, SD = 0.89), repair school equipment (M = 2.41, SD = 0.91), and landscape school grounds (M = 1.86, SD = 0.89). Table 3 displays the findings of Round 2.

Table 3

Consensus of Agreement for Tasks Associated with Teaching School-Based Agricultural Education in its Classroom and Laboratory Instructional Component from Round 2 (N = 22)

Themes and Tasks	*M*	*SD*	% Agreement
Authentic Skill Development			
Provide hands-on learning experiences	3.95	0.21	100.00
Teach students practical skills	3.91	0.29	100.00
Teach laboratory skills	3.77	0.43	100.00
Stay current with industry trends	3.68	0.48	100.00
Provide content area expertise	3.64	0.49	100.00
Provide inquiry-based learning opportunities for all courses	3.59	0.50	100.00
Provide academic service-learning opportunities	3.23	0.69	86.36
Assist students in obtaining industry-based certification (IBC)	3.18	0.66	86.36
Obtain industry-based certification (IBC) for teachers	2.68	0.84	63.64[a]
Classroom Management			
Manage the learning environment	3.86	0.35	100.00
Provide clear instruction	3.82	0.40	100.00
Vary instruction	3.59	0.50	100.00
Clerical Work			
Enter student grades	3.59	0.50	100.00
Complete required school-wide paperwork	3.45	0.60	95.45
Use learning management system (LMS) competently	3.36	0.58	95.45
Manage classroom budget	3.50	0.67	90.91[c]
Manage student record books	3.27	0.70	86.36
Submit instructional lesson plans	2.91	0.81	81.82

Write grants	3.05	0.79	72.73[a,c]
Secure funding for the learning environment	2.91	1.02	63.64[a]
Inclusive Teaching			
Create an inclusive learning environment	3.82	0.40	100.00
Scaffold content to meet individual students' needs	3.82	0.40	100.00
Follow student individualized educational plan (IEP)/504 modifications	3.77	0.43	100.00
Engage students from non-agricultural backgrounds	3.77	0.43	100.00
Create culturally competent students	3.68	0.48	100.00
Ensure equitable student access to resources	3.68	0.48	100.00
Establish a community/safe space in the classroom	3.68	0.48	100.00
Attend individualized educational plan (IEP)/504 meetings	3.64	0.49	100.00
Instructional Design			
Apply curriculum concepts to real-world situations/scenarios	3.91	0.29	100.00
Modify existing curriculum	3.68	0.48	100.00
Align curriculum to appropriate standards	3.41	0.50	100.00
Develop instructional visual aids	3.36	0.58	95.45
Develop instructional curriculum	3.32	0.57	95.45
Create a curriculum map across AFNR pathways	3.00	0.69	77.27[a]
Lesson Preparation			
Manage time	3.86	0.35	100.00
Prepare facilities for instruction	3.73	0.46	100.00
Organize teaching materials/resources	3.59	0.50	100.00
Prepare for guest speakers	3.59	0.50	100.00
Prepare lesson plans for substitute teachers	3.59	0.50	100.00
Align lessons with AFNR standards	3.50	0.51	100.00
Prepare for field trips	3.59	0.60	95.45[c]
Practice labs ahead of time	3.23	0.69	86.36
Prepare daily lesson plans	3.36	0.79	81.82[c]
Lifelong Learning			
Attend professional development	3.68	0.57	95.45
Collaborate with other agricultural education teachers in Professional Learning Communities (PLC)	3.59	0.59	95.45
Implement feedback from administrative evaluations	3.27	0.63	90.91
Develop leadership abilities	3.50	0.74	86.36[c]
Coordinate with all school staff to facilitate learning	2.91	0.75	77.27[a]
Relationships and Rapport			
Build relationships with students	3.95	0.21	100.00
Communicate with students	3.86	0.35	100.00
Promote program	3.73	0.46	100.00
Serve as mentor for students	3.73	0.46	100.00
Build relationships with the community	3.59	0.50	100.00

Communicate with administrators	3.59	0.50	100.00
Communicate with students' parents/guardians	3.59	0.50	100.00
Communicate with advisory council	3.36	0.58	95.45
Coordinate community volunteers	3.23	0.61	90.91
School Safety			
Follow safety/security protocol	3.86	0.35	100.00
Model safety	3.82	0.40	100.00
Manage laboratory safety	3.77	0.43	100.00
Serve as an armed school guardian to provide campus security	1.68	0.89	18.18[b]
Student Evaluation			
Assess student learning (i.e., formative assessments, feedback, and check for understanding)	3.86	0.35	100.00
Grade student work (i.e., summative evaluations, outcome assessments, and standardized tests)	3.64	0.58	95.45
Student Motivation			
Motivate students to learn	3.82	0.40	100.00
Recruit students to program	3.82	0.40	100.00
Teaching and Instruction			
Supervise students in the laboratory	3.77	0.43	100.00
Follow school instructional policies	3.50	0.51	100.00
Take students on educational field trips	3.41	0.59	95.45
Teach students across all AFNR pathways	3.32	0.78	95.45
Serve as the agricultural content expert	3.18	0.59	90.91
Serve on various committees	2.77	0.81	63.64[a]
Adapt content for hybrid instruction	2.64	0.90	54.55[a]
Teaching and Learning Resources			
Handle laboratory equipment	3.59	0.50	100.00
Purchase laboratory equipment	3.59	0.50	100.00
Manage teaching and learning facilities (i.e., classroom, shop, greenhouse, land lab, and project facility)	3.82	0.50	95.45[c]
Conduct annual inventory of equipment/supplies	3.55	0.60	95.45
Manage greenhouse	3.41	0.80	90.91
Maintain school equipment	2.95	0.84	81.82
Manage animals housed at school facilities	3.32	1.04	77.27[a,c]
Maintain school project center (i.e., land lab, school farm, and ag barn)	3.27	1.16	72.73[a,c]
Repair school equipment	2.41	0.91	50.00[b]
Landscape school grounds	1.86	0.89	22.73[b]
Teaching and Learning Supplies			
Maintain classroom/laboratory supplies inventory	3.55	0.51	100.00
Obtain classroom/laboratory supplies	3.41	0.59	95.45

Note. Tasks listed in order by consensus of agreement from highest to lowest by theme; Participants used a 4-point, Likert-type scale 1 (*Strongly Disagree*) to 4 (*Strongly Agree*); [a]Denotes 51.00% to 79.99% consensus of agreement; [b]Denotes less than 51.00% consensus of agreement; [c]Denotes tasks for which

greater dispersion of scores existed as demonstrated by higher mean scores than tasks achieving a higher percentage of agreement.

Round 3

Round 3 employed a dichotomous response approach for agreement (i.e., *Yes* or *No*). Of the nine tasks that achieved between 51.00% and 79.99% agreement in Round 2, panelists reached consensus of agreement (80.00% or more selecting *Yes*) for two items in Round 3: adapt content for hybrid instruction (M = 1.80, SD = 0.41), and serve on various committees (M = 1.80, SD = 0.41). Both tasks comprised the Teaching and Instruction theme (see Table 4). Seven tasks failed to reach consensus of agreement and were eliminated from further study. In the area of Authentic Skill Development, obtain industry-based certification (IBC) for teachers (M = 1.55, SD = 0.51) reached 55.00% agreement. Two tasks were related to Clerical Work: secure funding for the learning environment (M = 1.75, SD = 0.44), and write grants (M = 1.70, SD = 0.47). One task was from the area of Instructional Design: create curriculum map across AFNR pathways (M = 1.75, SD = 0.44). Another task that failed to reach consensus was from Lifelong Learning: coordinate with all school staff to facilitate learning (M = 1.75, SD = 0.44), and two other tasks were from the theme Teaching and Learning Resources: maintain school project center (M = 1.70, SD = 0.47), and manage animals housed at school facilities (M = 1.70, SD = 0.47). Table 4 displays panelists' levels of agreement from Round 3.

Table 4

Consensus of Agreement for Tasks Associated with Teaching School-Based Agricultural Education in its Classroom and Laboratory Instructional Component from Round 3 (N = 20)

Themes and Tasks	*M*	*SD*	*%* Agreement
Authentic Skill Development			
Obtain industry-based certification (IBC) for teachers	1.55	0.51	55.00
Clerical Work			
Secure funding for the learning environment	1.75	0.44	75.00
Write grants	1.70	0.47	70.00
Instructional Design			
Create a curriculum map across AFNR pathways	1.75	0.44	75.00
Lifelong Learning			
Coordinate with all school staff to facilitate learning	1.75	0.44	75.00
Teaching and Instruction			
Adapt content for hybrid instruction	1.80	0.41	80.00[a]
Serve on various committees	1.80	0.41	80.00[a]
Teaching and Learning Resources			
Maintain school project center (i.e., land lab, school farm, and ag barn)	1.70	0.47	70.00
Manage animals housed at school facilities	1.70	0.47	70.00

Note. Mean scores in Round 3 are based on *Yes* (2) or *No* (1) response options. Smaller mean (M) values indicate stronger disagreement, and larger mean values indicate stronger agreement; [a]Denotes tasks achieving consensus.

Final Analysis

Tasks achieving at least an 80.00% consensus of agreement in either Round 2 (72 of 84 tasks) [see Table 3] or Round 3 (2 of 9 tasks) [see Table 4] were compiled into a final list of tasks associated with teaching SBAE in its classroom and laboratory instructional component. In total, 74 tasks, as categorized

by 14 themes, reached consensus of agreement. The theme of Authentic Skill Development had 88.89% (f = 8) of its tasks reach consensus. Classroom Management had 100.00% (f = 3) of its tasks reach consensus. Clerical Work had 75.00% (f = 6) of the theme's tasks reach consensus. Inclusive Teaching had 100.00% (f = 8) of its tasks reach consensus. Instructional Design had 83.33% (f = 5) of the category's tasks reach consensus. Lesson Preparation had 100.00% (f = 9) of its tasks reach consensus. Lifelong Learning had 66.67% (f = 4) of the theme's tasks reach consensus. Relationships and Rapport had 100.00% (f = 9) of its tasks reach consensus. School Safety had 75.00% (f = 3) of the theme's tasks reach consensus. Student Evaluation had 100.00% (f = 2) of its tasks reach consensus. Student Motivation had 100.00% (f = 2) of the theme's tasks reach consensus. Teaching and Instruction had 100.00% (f = 7) of tasks comprising the theme reach consensus. Teaching and Learning Resources had 60.00% (f = 6) of its tasks reach consensus. And Teaching and Learning Supplies had 100.00% (f = 2) of the theme's tasks reach consensus (see Table 3 and Table 4).

Conclusions, Implications, and Recommendations

Based on the study's findings, we conclude that tasks related to the classroom and laboratory instructional component of SBAE are integral to the successful performance of SBAE teachers. As an entity of vocational education, and now career and technical education (CTE), the value of the instructional component of the SBAE model has been emphasized since enactment of the Smith-Hughes Act of 1917 (Phipps et al., 2008). As such, our findings support the notion that SBAE is highly dependent on the tasks teachers are expected to perform in association with classroom and laboratory instruction. Moreover, the findings aid in describing the sector-specific skills needed by teachers as a component of their human capital (Smith et al., 2010). Three overarching themes emerged as conclusions regarding classroom and laboratory instruction in the context of SBAE and the tasks of teachers.

First, we conclude that SBAE teachers are relationship builders. This conclusion is based on the themes related to building relationships and rapport among students and stakeholders, motivating students to learn, and including all learners in the instructional process. Tasks related to this conclusion include serving as a mentor for students, building relationships with students, creating an inclusive learning environment, and motivating students to learn. These conclusions align with research from Eck et al. (2019), who found teachers should be relatable, student-focused, and empathetic, and from Roberts and Dyer (2004), who identified caring for students, working well with parents, establishing strong community relationships, and working well with alumni as characteristics of effective SBAE teachers.

Second, we conclude that SBAE teachers are competency-driven. SBAE teachers value competency and technical skill acquisition. This conclusion is supported by themes such as Authentic Skill Development and Instructional Design. Specific tasks aligning with this conclusion include assisting students in obtaining industry-based certifications, teaching practical skills to students, providing inquiry-based learning opportunities in all courses, aligning curriculum to appropriate learning standards, and applying curriculum concepts to real-world situations and scenarios. This conclusion reinforces research conducted by DiBenedetto et al. (2018) who found that the acquisition of technical, competency-driven skills was a professional development need of SBAE teachers. In addition, it supports the content-based model proposed by Roberts and Ball (2009) by demonstrating the need for SBAE teachers to acquire technical agricultural skills.

Third, we conclude that SBAE teachers strive to be high-quality instructors. SBAE teachers plan for and execute effective instruction in various settings, including in classrooms, in laboratories, and in informal teaching environments. This conclusion is based on the participants' agreement on tasks such as instructing students, managing the classroom, organizing teaching materials and resources, practicing laboratory instruction ahead of time, preparing daily lesson plans, preparing laboratory and classroom facilities for instruction, and managing time for instructional preparation. These tasks imply that instruction

is intentional and well-planned, which is consistent with previous research (Lambert et al., 2011; Robinson et al., 2010; Torres et al., 2008; Torres & Ulmer, 2007) indicating that SBAE teachers devote large amounts of time to planning for instruction.

On the other hand, 10 tasks failed to reach consensus of agreement among the Delphi panelists: coordinate with all school staff to facilitate learning, create curriculum maps across AFNR pathways, landscape school grounds, maintain school project center, manage animals housed at school facilities, obtain industry-based certification (IBC) for teachers, repair school equipment, secure funding for the learning environment, serve as an armed school guardian to provide campus security, and write grants. Although the needs of SBAE programs vary by geographical location (Roberts & Dyer, 2004; Washburn et al., 2001), the list of items failing to achieve consensus could be a starting place to reduce the expectations placed on SBAE teachers (Traini et al., 2021) and begin to make their workloads more manageable, thus potentially decreasing teacher stress (Theiman et al., 2012) and burnout (Kitchel et al., 2012).

In all, panelists identified 74 independent tasks expected of SBAE teachers in classroom and laboratory instruction. Gibbons and Waldman (2004) stated acquiring necessary human capital is needed to perform both general and specific tasks associated with a job. Therefore, based on our study's results, SBAE teachers should acquire specific human capital regarding 74 different tasks to be deemed effective. Doing so would likely provide better instruction from teachers and improved skills acquisition by their students (Autor et al., 2003; Autor & Handel, 2013) in the SBAE context. However, the voluminous number of tasks identified will likely cause tension (Lewin, 1951) due to the heavy cognitive and physical loads required to accomplish such (Garland, 1985). SBAE teachers, therefore, should prioritize the tasks in ways that are meaningful to them and their local programs and communities. Teacher educators should introduce the tasks in teacher preparation programs. This would allow teachers to identify, develop, and initiate the tasks in manageable chunks. In addition, state staff and others providing professional development to teachers should offer in-service training on the tasks by introducing teachers to them in timely and appropriate ways for purposeful inclusion throughout the school year.

Based on their chosen profession and pursuit of a terminal degree in agricultural education, it can be inferred the experts queried in this study possessed inherent interests in the field of SBAE. Because SBAE teachers engage in work in which they are interested, they are encouraged to continue to pursue and develop their human capital through the ongoing acquisition of sector-specific skills (Smith, 2010). This pursuit is necessary because acquiring such task-specific human capital will not only improve teachers' effectiveness but also enhance their students' employability in the future (Gibbons & Waldman, 2004).

Due to the nature of the Delphi method (Hsu & Sandford, 2007), our findings should not be generalized to the general SBAE teacher population. To address this limitation, the study should be replicated with a larger participant size and broader scope. We recommend a national study be conducted consisting of participants across all career stages (i.e., early-, mid-, and late-career) which continues to explore the task-specific human capital needed by SBAE teachers related to classroom and laboratory instruction. Comparisons between the groups are needed to determine which tasks are most essential depending on a teacher's career stage. Such an analysis would provide essential information regarding the workload of SBAE teachers. The findings also could be used for context in studies examining stress, burnout, and retention of SBAE teachers as well as to plan and deliver tailored professional development (Garet et al., 2001).

Because classroom and laboratory instruction is a single component of the comprehensive SBAE model (Croom, 2008), we recommend that the study be replicated to determine the specific tasks expected of teachers in the areas of advising an FFA chapter and supervising students' SAEs. In addition, a study should be conducted with pre-service SBAE teachers to determine the specific job-tasks for which they perceive themselves to be competent and those for which they perceive needing additional development.

Doing so would align with the call of previous researchers (Autor & Handel, 2013; Smith, 2010) stressing the need to identify and measure *sector-specific human capital*. Perhaps a pre- and post-clinical teaching evaluation of these sector-specific tasks would inform pre-service teachers and teacher preparation faculty of the greatest needs regarding classroom and laboratory instruction. Considering the variation in SBAE programs by geographical region (Washburn et al., 2001), studies should be conducted in each state to determine the tasks of SBAE teachers specific to the state or region in which they teach. Moreover, an investigation on the impact of teacher competence regarding classroom and laboratory teaching tasks on SBAE students' learning outcomes is warranted and would likely inform the profession in meaningful ways.

In terms of practice, we recommend teacher preparation programs evaluate tasks required of SBAE instructors to inform the instructional content intended for pre-service teachers to support their pedagogical development. Further, our findings can inform potential SBAE teachers, and perhaps most acutely alternatively certified teachers, of the specific job-task expectations of the profession, allowing them to determine if teaching SBAE is the right fit for them (Edwards et al., 1998). It is possible that teacher attrition and retention rates may be impacted by such decision making as individuals who may be less likely to remain in teaching choose to pursue different career fields. Our findings may also assist school administrators to better understand the most appropriate job-tasks of SBAE teachers and, thereby, support the development of more accurate position descriptions, role expectations, and performance evaluations. A further implication of our findings is the use of these tasks to better describe the workload of teachers (Torres et al., 2009) regarding what is needed to develop and provide comprehensive, high-performing SBAE programs, especially in the provision of classroom and laboratory instruction.

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