The COVID-19 pandemic and agricultural education: An exploration of challenges faced by teachers

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Abstract
Exploring the challenges faced by agriculture teachers during the Spring 2020 semester brings to light the reality of teaching during the COVID-19 pandemic. Further, understanding the challenges faced by teachers empowers the profession to make agricultural education more resilient to broader, social forces in the future. In this study, a national sample of agriculture teachers were asked to identify the three most pressing challenges they experienced during the COVID-19 pandemic. Using qualitative research methods, eight challenge themes emerged: (a) Communication, (b) FFA (National FFA Organization, a student leadership organization previously named the “Future Farmers of America”), (c) Instructional Quality, (d) Program Facilities and Activities, (e) Supervised Agricultural Experiences (SAE), (f) Student Motivation, (g) Technology and the Internet, and (h) Work-Life Balance. Using quasi-statistical methods, the most commonly reported challenges were identified - Instructional Quality, FFA, and Student Motivation. Analysis of all the challenges suggested permeation across each aspect of the three-component model of agricultural education. Furthermore, many challenges appeared to be related to each other. Finally, analysis of the results illuminated responding teachers, and their students, each experienced the challenges brought about by COVID-19 differently, including evidence of exacerbated educational inequality for students from lower income households.

1 INTRODUCTION

For more than a century, middle school and high school agricultural education in the United States has faced a teacher shortage that has negatively impacted students (Eck & Edwards, 2019; Lawver et al., 2018). Currently, an agriculture teacher shortage exists in most states (Foster et al., 2020). In addition to program disruption and potential declines in student achievement (Ingersoll, 2001; Ronfeldt et al., 2013), there are financial costs associated with replacing teachers who leave the profession, some costs are estimated to be more than $2 billion per year (Alliance for Excellent Education, 2005; Watlington et al., 2010). Given the high financial costs and negative impact on learning, retaining current agriculture teachers is essential to the profession. Increasing agriculture teacher retention relies, in part, on identifying teacher challenges and implementing interventions (e.g., professional development, school organizational change, modifications to teacher education) to addresses those challenges (Touchstone, 2015).

In addition to existing challenges, COVID-19 introduced new obstacles for middle school and high school agricultural educators. On 11 Mar. 2020, the World Health Organization (WHO) declared that COVID-19 was no longer merely a public health crisis but a pandemic impacting economies and
educational systems worldwide (WHO, 2020). While some educators accomplished the arduous task of adapting their curriculum to remote delivery, others struggled due to a lack of training, internet access, and ease of content transition (Dietrich et al., 2020). In addition to changing their teaching practices, teachers faced the cancellation or modification of events and activities.

In a recent study, McKim and Sorensen (2020) found agriculture teachers experienced a significant decline in job satisfaction based on changes brought on by the COVID-19 pandemic. This decline in satisfaction points to the loss of components which are valued by agriculture teachers, including hands-on learning, face to face instruction, FFA (National FFA Organization, a student leadership organization previously named the “Future Farmers of America”) events, and career and leadership development events (McKim & Sorensen, 2020). The research done by McKim and Sorensen (2020) adds to existing scholarship on job satisfaction which has identified extended work hours (Hainline et al., 2015; Murray et al., 2011; Sorensen et al., 2017) and conflicts balancing work and family responsibilities (Crutchfield et al., 2013; Murray et al., 2011; Sorensen & McKim, 2014; Sorensen et al., 2016; Sorensen et al., 2017) are negatively related to job satisfaction. In combination, these studies illuminate that job satisfaction may not be solely related to the amount of work, but also the kind of work teachers experience.

With an ongoing shortage of qualified agriculture teachers nationwide (Eck & Edwards, 2019; Lawver et al., 2018), teacher retention is extremely important. Therefore, understanding the challenges agriculture teachers face as a result of COVID-19 is critical. Findings from our research can inform school and state administrators, university teacher education faculty, and other stakeholders as they seek to remove barriers and ameliorate the situation caused by the COVID-19 pandemic.

2 THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This study is grounded in Bandura’s (1986) Triadic Reciprocal Determinism theory, which suggests individuals are influenced by the environment but also have a certain level of control over the environment. Bandura’s theoretical model is comprised of three factors that influence behavior which include the individual (e.g., attitudes, feelings), their environment, and the individual’s behavior. This theory deviates from previous theories that suggested individuals were only passive recipients of environmental influences with no account for how the individual might also influence their own environment through their behavior. In the context of this study, agriculture teachers are the individuals, COVID-19 along with state and school district COVID-19 policies and mandates are the environmental factors, and the teaching and management practices of agriculture teachers during the pandemic are the behaviors. In congruence with the theory, these items are viewed as interrelated. For example, teachers’ attitudes regarding the challenges the environmental conditions pose can influence the adaptive changes made by agriculture teachers to their teaching practices.

The practices of most agriculture teachers are situated within the three-component model, a framework utilized for decades within school-based agricultural education for delivering well-rounded instruction to students. This model involves the interrelationships between classroom and laboratory instruction; Supervised Agricultural Experience (SAE) programs; and personal, leadership, and career development activities through FFA (Phipps et al., 2008). Classroom and laboratory instruction seem to be at the forefront of discussion when examining the impacts of COVID-19 in education because this is the most common domain in which teachers of all disciplines operate. However, agriculture teachers also plan and manage student activities within SAE and FFA, domains in which face-to-face interaction typically occurs on a regular basis. As a result of the pandemic, agriculture teachers have not only had to change their teaching practices within the classroom and laboratory; they have also had to change their teaching and management practices related to SAE and FFA. Conceptually, this study examines the perceived challenges agriculture teachers have faced (i.e., individual) in all areas of the three-component model as a result of the environmental factors imposed upon them by the COVID-19 pandemic.

The challenges faced by agriculture teachers during the COVID-19 pandemic are exacerbated by the approach to education lauded within the discipline. For over a century, agricultural education has provided authentic, practical, skills-based, and contextualized instruction through experiential learning and lab-based approaches (Newcomb et al., 2004; Phipps et al., 2008; Talbert et al., 2007). Pivoting to remote instruction in response to the COVID-19 pandemic removed

Core Ideas
- Hands-on nature of agricultural education was challenging to transition to remote instruction.
- Instruction, student organization management, and motivation were the most common challenges.
- The challenges experienced by teachers during COVID-19 were interconnected.
- The challenges experienced during COVID-19 differed substantially among individuals.
much of the contextualized and hands-on experiences for most students and teachers within classrooms and laboratories.

In addition to the incongruence between remote instruction and hands-on learning, the COVID-19 pandemic has undoubtedly influenced the working conditions of agriculture teachers. Furthermore, teaching school-based agriculture can be a stressful profession, and coping with the additional stressors related to a pandemic can result in teacher overload and diminished job satisfaction, self-efficacy, and career commitment (Kuntz et al., 2013; Smith & Smalley, 2018). The needs and challenges perceived by agriculture teachers have also been shown to differ by career phase (e.g., Mundt & Connors, 1999; Myers et al., 2005; Smith & Smalley, 2018; Stair et al., 2012). Additionally, research shows stress increases in teachers during external crises, such as the COVID-19 pandemic, because teachers often tend to their own personal distress while also supporting the emotional and academic needs of their students (Kuriansky, 2013). The extent to which a school is supportive of teachers can greatly influence how effectively teachers adapt during times of crisis or change (Kraft et al., 2020). Identifying the challenges teachers face can provide a framework of support for teachers. With a shortage of qualified agriculture teachers across the country (Foster et al., 2020), understanding challenges and providing support should be paramount.

While excessive workload and balancing work and family responsibilities are shown to increase the likelihood of teacher turnover (Sorensen et al., 2016), recently published research shows agriculture teachers devoting less hours to work responsibilities and a decrease in work-family conflict (i.e., the inability to balance work and life roles) as a result of the pandemic (McKim & Sorensen, 2020). Research indicating teachers are working fewer hours may, initially, seem encouraging; however, McKim and Sorensen (2020) suggest the decline in work hours may have negatively impacted teacher attitudes toward their job. In their study, researchers found the COVID-19 pandemic has significantly decreased job satisfaction among agriculture teachers (McKim & Sorensen, 2020). Research illuminating lower job satisfaction is concerning because job satisfaction is a significant predictor of career commitment in agricultural education (Sorensen & McKim, 2014).

Clarifying how the COVID-19 pandemic impacted agricultural educators requires a deeper dive into the types of instruction required during the pandemic; specifically, remote instruction. Remote instruction and the associated technology have altered teacher identity, increased burnout, and been a challenge for teachers during the pandemic (Hamilton et al., 2020; Reich et al., 2020). Research indicates teachers lack the training, equipment, and/or internet access to be successful with remote instruction (Dietrich et al., 2020; Sintema, 2020). As a result of the pandemic, Lindner et al. (2020) suggested agriculture teachers need more training in developing online curriculum. Many teachers have reported that the lack of access to the proper technology and internet, for both teachers and their students, along with district policies related to online tools, are barriers and challenges to effective teaching (Hamilton et al., 2020). With students unable to routinely access the internet, teachers face an additional challenge to effectively communicate expectations and connect with students to meet their needs. This has also worsened the educational equity gap among students and families (Hamilton et al., 2020; Kraft et al., 2020; Reich et al., 2020; Van Lancker & Parolin, 2020). Finally, teachers have reported struggling to motivate their students through remote or online instruction, leading to teacher frustration and burnout (Reich et al., 2020).

The challenges that already exist for agriculture teachers coupled with the challenges of teaching during a pandemic have the potential to impact teachers and agricultural education in many ways. While a dearth of literature exists examining challenges agriculture teachers face as a result of COVID-19 (McKim & Sorensen, 2020; Lindner et al., 2020), none have examined agriculture teacher challenges in relation to their daily activities in the three-component model on a national scale.

3 PURPOSE AND OBJECTIVES

The purpose of this study is to determine the challenges agriculture teachers face in their teaching practice (i.e., classroom and laboratory instruction, FFA, SAE) as a result of the COVID-19 pandemic. Specifically, this study aims to answer the following two research questions: (a) What are the challenges agriculture teachers faced as a result of the pandemic? (b) Which are the most commonly expressed challenges faced by agriculture teachers?

4 METHODS

This foundational study explores challenges experienced by agriculture teachers during the Spring 2020 semester, in the midst of the COVID-19 pandemic. This study was completed using survey research methods detailed below. The data described in this manuscript are part of a larger research project exploring agriculture teachers and the pandemic.

4.1 Population, sampling, and data collection

The population for this study included all middle school and high school agriculture teachers in the United States during the 2019–2020 school year (approximate N = 13,500). The names and email addresses of 790 agriculture teachers were
retrieved from FFA as a simple random sample of the population. Data were collected during May and June 2020 via a maximum of five points of email contact with potential respondents (Dillman, 2007); alternative methods of contact (e.g., phone call) were not conducted due to limited information provided in the sample frame. Of the initial list of 790 educators, 23 email addresses were unusable, reducing the sample frame to 767. A total of 140 agriculture teachers provided usable responses to the survey, equating to a 18.25% response rate (n = 140). Years of teaching experience and challenges identified during COVID-19 were compared between on-time to late respondents (Lindner et al., 2001; Miller & Smith, 1983), with no evidence of non-response bias. However, due to the comparatively low response rate obtained, we encourage readers to exercise caution extrapolating the results of this study to the entire population of agriculture teachers during the 2019–2020 school year.

### 4.2 | Instrumentation

The online, Qualtrics survey from which data were obtained included both open-ended and multiple-choice questions. The data for this study primarily come from a three-part open-ended question asked at the beginning of the survey. The open-ended question read, “what are the three most prominent challenges, brought about by COVID-19, you experienced as you modified how you ran your agriculture program – including teaching, advising FFA, managing SAEs, etc.” with three essay-style response boxes labeled “Challenge 1,” “Challenge 2,” and “Challenge 3.” One demographic question was also utilized in this study, which asked, “including the current year, how many years have you taught agriculture?”

### 4.3 | Data analysis

Data collected via the three-part COVID-19 challenges question included 412 responses which ranged from 1 to 41 words in length. Responses were reviewed multiple times and then inductively coded into eight emergent challenge codes (i.e., communication, FFA, instructional quality, program facilities and activities, SAE, student motivation, technology and the internet, and work-life balance). A single researcher completed the first round of coding; however, the coding process and resultant codes were reviewed and approved by two other researchers associated with this study. Full text entries are shared within the Findings to support the trustworthiness of the coding process.

Research objective two was completed using quasi-statistical methods which “enable you to assess the amount of evidence in your data that bears a particular conclusion or threat” (Maxwell, 2005, p. 113). Quasi-statistics involve counting instances of qualitative data, in this case codes, to answer a research question (Becker, 1990; Maxwell, 2010). Given our aim to illuminate the most common challenges identified by agriculture teachers during the pandemic, quasi-statistics emerged as a valuable option for data analysis. Results, therefore, include the frequency of each code alongside the percentage of teachers who articulated the challenge in one of their three responses. The findings section includes these results for all respondents as well as a table in which these data are provided for respondents categorically grouped by years of teaching experience. In this analysis, early career teachers are those with one to five years of teaching experience, mid-career teachers are those with 6 to 15 years of teaching experience, and late career teachers are those who reported 16 to 41 years of teaching experience. For each career phase, the denominator for the percentage calculation was the number of teachers within that group (i.e., early career = 42; mid-career = 40; late career = 42). Importantly, the cumulative number of teachers included in the career phase analysis (i.e., 124) is lower than the number of total survey respondents (i.e., 140) due to non-response on the career phase question.

### 4.4 | Limitations

The first limitation is the low response rate obtained through the survey research methodology. As supported by the Findings, the pandemic introduced myriad new challenges for agriculture teachers; therefore, a limited number of responses is understandable. As a result of this limitation, the results and conclusions are limited to the respondents of this survey and inferential statistics were not used. The second limitation is the utilization of qualitative data obtained through survey research methods. The authors of this manuscript recognize interviews with teachers would have yielded more in-depth data. However, the choice was made to gather data from a broader scope of teachers as a preliminary, and timely, analysis of the challenges agriculture teachers throughout the United States experienced during the COVID-19 pandemic. Despite some limitations, we believe this study yields valuable insights.

### 4.5 | Description of respondents

Respondents included agriculture teachers from 40 states and Puerto Rico. The only states in which responses were not received were Colorado, Delaware, Louisiana, Maryland, Massachusetts, Nevada, New Hampshire, New Mexico, Rhode Island, and Vermont. Additionally, among respondents, the average years of agriculture teaching experience was 12.91 (SD = 10.47) years.
5  |  FINDINGS AND DISCUSSION

The challenges articulated by agriculture teachers during the pandemic were grouped into eight distinct themes, introduced in alphabetical order. The first challenge theme was titled Communication, which encompassed new barriers to delivering information to, or obtaining information from, students or other stakeholders related to classroom learning, FFA experiences, and/or SAEs. Representative data include, “communication – not seeing my students every day is a barrier that prevents us from properly managing the chapter,” “reaching the students; you don’t see them, so you have no real access to them,” and “unable to meet with students for FFA or SAE due to stay at home orders.”

The second challenge theme emerging from the data was FFA. This theme was defined as the negative impact of cancelled FFA events (e.g., conventions, career development events [CDEs]) and challenges preparing FFA members for success in alternatively formatted FFA experiences (e.g., officer teams, banquets, virtual CDEs). The negative impact of cancelled FFA events is represented by the following excerpts, “disappointed about all the hard work the students have done [that] is now ‘shelved’ for the CDE season” and “it is integral – kids like the FFA aspect.” Data representing the challenges associated with alternatively formatted FFA events included, “many FFA activities were in progress, and the uncertainty about whether things would happen, when, in what format, etc. was stressful for students and advisors alike” and “struggling through FFA chapter officer elections, virtual banquets, and other end of the year financial reporting, all while trying to teach from a distance.”

The third challenge theme was titled Instructional Quality which was defined by an inability to offer the same quality learning opportunities in remote formats, emphasizing an inability to offer hands-on or laboratory learning experiences, identifying appropriate assignments, and challenges supporting students with special education needs. The predominant sentiment within this theme was the challenge of not teaching using hands-on or laboratory learning methods, exemplified by the following quotes, “my kids are about 90% hands-on, they had no interest in being online,” and “completely flipping all instruction from hands-on to hands-off.” In addition, identifying appropriate assignments emerged within the Instructional Quality theme, illustrated by the quote, “making the work not over-exerting but meaningful.” Also emerging within this theme were challenges supporting students in special education. The Instructional Quality theme is summarized by the following teacher contribution, “I felt like I was teaching content, not kids.”

Program Facilities and Activities emerged as the fourth challenge theme within the data. The Program Facilities and Activities theme was defined as program-based experiential learning activities that were cancelled or modified due to the pandemic. The following quote comprehensively illustrates the nature of this theme, “abrupt ending to all hands-on programs, and need to abandon [a] greenhouse full of plants, cancel plant sale, foster out classroom cats, FFA rabbits, tortoise, etc.” The impact of local fair cancellations also emerged within this theme alongside other expressed challenges of managing school/community gardens, fish projects, and land labs during the pandemic.

The fifth challenge theme emerging from the data was titled Supervised Agricultural Experiences (SAEs). The SAE theme included challenges due to student work locations being closed and, for those work experiences that remained open, teachers’ inability to conduct in-person visits with students, leading many to cancel the SAE element of the program during the Spring 2020 semester. The following quote exemplifies the challenges within the SAE theme, “most SAEs also ended abruptly, as only a few students have home-based SAEs; most are through the classroom, local veterinary clinics, riding stables, livestock and crop production facilities, all of which were closed to students.” The challenges existing within this theme led many teachers, or schools, to cancel or dramatically lessen the SAE requirement, illustrated here, “administration cancelled SAE requirement” and “SAEs have halted as well as it has made it very challenging to manage; this may also [impact] our normal SAE project for next school year.”

The sixth challenge theme was titled Student Motivation which was defined as students not engaging in remote learning. Teachers reported a significant decline in student participation; for example, “20% of the students are doing very little or no work” and “student participation dropped in half.” Emergent within this theme were school and home characteristics which influenced lower student motivation. The following sobering quote brings to the forefront the impact of home challenges, “hunger – many of my students have no or limited access to food and they rely on the school; food insecurity is a major problem and kids don’t work when they are hungry.” School-based grading policies also appeared to have impacted student motivation, illustrated by teachers sharing, “student buy-in after district announced pass or incomplete grading system” and “[students] knew they did not have to, so they did not do the work.”

Technology and the Internet was the seventh challenge theme identified. Technology and the Internet was defined as the inability to utilize remote learning resources due to limited internet connectivity or challenging learning management systems. The lack of access is exemplified by the following quotes, “limited internet in my house and for my students in a rural community,” and “not all students have access to the internet to use Google Classroom.” A clear element of the Technology and the Internet theme was the inequities of remote instruction, foregrounded by the following statements,
“all students weren’t on the same playing field, some students were intimidated by using and relying on computers,” and “several of our students did not have access to online learning due to internet connectivity issues, poor bandwidth or location; multiple students did not have access to the internet due to where they lived or due to their family’s financial situation.”

The final challenge theme was titled Work-Life Balance and was defined as challenges teachers experienced balancing work obligations alongside family responsibilities. Most common within this theme were teachers balancing childcare responsibilities during the pandemic, illustrated by the following excerpts, “teaching and caring for my own personal kids, it has limited how I can virtually teach my students,” and “teaching from home with small kids who also had school from home.” In addition, teachers identified the emotional toll of the pandemic as a challenge, illustrated by one teacher sharing, “just letting go of concerns in these trying times.”

In research question two, we explored the frequency of the challenge themes introduced in objective one (see Table 1). Across all responding teachers, the most common challenge theme was Instructional Quality, which 107 agriculture teachers identified as one of the challenges brought about by COVID-19 (f = 107; 76.43%). FFA (f = 85; 60.71%) and Student Motivation (f = 60; 42.86%) rounded out the top three most common challenges identified by teachers.

Continuing with research question two, we explored the frequency of challenge themes identified by agriculture teachers by career phase (see Table 2). Comparing the percentages of teachers who identified each challenge across career phases illuminates how teachers with different years of experience navigated the pandemic. Early career teachers (n = 42), for example, identified FFA (f = 27; 64.29%), SAE (f = 14; 33.33%) and Program Facilities and Activities (f = 9; 21.43%) as a top challenge more frequently than their more experienced peers. Alternatively, early career teachers perceived Instructional Quality (f = 28; 66.67%) and Technology and the Internet (f = 7; 16.67%) less often than mid- or late career teachers. Mid-career teachers (n = 40), on the other hand, were most likely to articulate challenges related to Work-Life Balance (f = 3; 7.50%) but the least likely group to perceive challenges associated with Student Motivation (f = 14; 35.00%) or Communication (f = 15; 37.50%). Finally, late career teachers (n = 42) were the most likely to perceive Instructional Quality (f = 33; 78.57%), Student Motivation (f = 23; 54.76%), and Technology and the Internet (f = 10; 23.81%) as challenges experienced during the pandemic; however, least likely to perceive FFA (f = 23; 54.76%), SAE (f = 7; 16.67%), Program Facilities and Activities (f = 5; 11.90%), and Work-Life Balance (f = 0) as challenges when compared to their less-experienced teaching peers.

## 6 | Conclusions and Recommendations

In this study, we explored the challenges experienced by school-based agriculture teachers during the Spring 2020 semester, in the midst of the COVID-19 pandemic, through the lens of Triadic Reciprocal Determinism (Bandura, 1986). Results from these data illustrate the realities of teaching agriculture during a global pandemic; additionally, results shed light on how future social, economic, and health-related events may impact the expectations of agriculture teachers. For this final section, findings from this study were distilled into three core ideas, (a) pervasive nature of challenges, (b) relationships between challenges, and (c) differences in challenges experienced. The findings provide insights that can assist stakeholders in providing support for agriculture teachers which might aid in teacher retention efforts.

### 6.1 | Pervasive nature of challenges

The first core idea foregrounds how each pillar of the three-component model of agricultural education was dramatically impacted by the COVID-19 pandemic. Within instruction, teachers reported challenges offering quality learning experiences due, at the most basic level, to issues of teachers and students not having access to the internet and learning management systems. For those able to connect, an inability to provide hands-on learning opportunities was the major limitation to providing quality learning experiences. Additionally, instruction was negatively impacted by the lack of immediate, in-person communication agriculture teachers previously relied on in their classrooms. These challenges can also be linked to student motivation, with limited student motivation viewed as both causing, and being caused by, challenges within the instructional domain. As remote learning continues in the United States, research is needed to identify and share best practices for enhancing the quality of instruc-
TABLE 2  Frequency of challenges faced by agriculture teachers by career phase

| Challenge theme                     | Early Career | Mid-Career | Late Career |
|-------------------------------------|--------------|------------|-------------|
|                                     | f  | %     | f  | %     | f  | %     |
| Instructional Quality               | 28 | 66.67 | 31 | 77.50 | 33 | 78.57 |
| FFA                                 | 27 | 64.29 | 25 | 62.50 | 23 | 54.76 |
| Student Motivation                  | 16 | 38.10 | 14 | 35.00 | 23 | 54.76 |
| Communication                       | 18 | 42.86 | 15 | 37.50 | 18 | 42.86 |
| SAE                                 | 14 | 33.33 | 11 | 27.50 | 7  | 16.67 |
| Technology and the Internet         | 7  | 16.67 | 7  | 17.50 | 10 | 23.81 |
| Program Facilities and Activities   | 9  | 21.43 | 6  | 15.00 | 5  | 11.90 |
| Work-Life Balance                   | 2  | 4.76  | 3  | 7.50  | 0  | 0.00  |

Note. Teachers with 1–5 years of teaching experience were designated as Early Career (n = 42); teachers with 6–15 years of teaching experience were designated as Mid-Career (n = 40); and teachers with 16–41 years of teaching experience were designated as Late Career (n = 42). The number of teachers within each career phase served as the denominator for that respective percentage calculation. FFA, National FFA Organization; SAE, Supervised Agricultural Experience.

tion, especially those interventions which support hands-on learning in remote settings within agricultural education.

The FFA and SAE circles of the three-component model were also negatively impacted by the COVID-19 pandemic. Teachers reported challenges with either (a) cancelled FFA events, (b) modified FFA events, or (c) uncertainty regarding the status of FFA events. As key tools to engage, motivate, and empower students, FFA experiences being cancelled or highly modified added a major strain on agriculture teachers during the Spring 2020 semester. Similarly, many respondents reported being forced to pause all SAE opportunities during the pandemic due to a lack of student access to program facilities (e.g., greenhouse, lab) or their places of work and/or lack of teacher access to the students to support their growth and learning through SAE. The inability to conduct traditional FFA, SAE, and face-to-face teaching experiences likely has taken a toll on agriculture teachers and their job satisfaction (McKim & Sorensen, 2020), particularly as many have entered the profession to implement traditional experiences within the three-component model (Ingram et al., 2018).

Stepping away from the three-component model, teachers also highlighted challenges managing the nexus of their work and life roles. While not as frequent as others, the work-life theme illustrates that, for some agriculture teachers, the unprecedented challenges brought about by the COVID-19 pandemic within their agricultural education program occurred in addition to unexpected new obligations in their other domains of life (e.g., family). We recommend continued research on the work and life realities of agriculture teachers during and after the pandemic, including research which addresses how work and life responsibilities differentiate by gender identity and career stage.

FIGURE 1  Visual representation of the relationships between challenges experienced by agricultural teachers

6.2  Relationships between challenges

Each of the eight challenge themes identified in this study detail a unique hurdle experienced by responding agriculture teachers during the Spring 2020 semester. However, data also revealed the interrelationship between identified themes (see Figure 1). In the figure, the size of each circle corresponds to the relative frequency of the challenge theme, with larger circles representing more common challenges. Overlap between circles represents evidence of a relationship between the challenges experienced. For example, instructional quality was discussed in relation to (a) new life responsibilities (e.g., childcare) consuming time teachers would have otherwise spent on instructional design (i.e., work-life balance), (b) lack of access to program facilities (e.g., labs, greenhouses, school gardens) for hands-on learning opportunities (i.e., pro-
program facilities and activities), (c) limited ability for students to share lived experiences to enhance curriculum (i.e., SAE), (d) inability to utilize in-the-moment observations of student learning to adapt and improve instruction (i.e., communication), (e) the incongruence between remote learning and student preferences for hands-on learning (i.e., student motivation), and (f) the lack of access to learning management systems due to internet connectivity and unfamiliarity with new technology (i.e., technology and the internet).

In addition to instructional quality being a pivotal, linking theme, student motivation and communication emerged as two related, linking themes. Teachers’ inability to efficiently communicate (i.e., disseminate and receive information) with students and stakeholders was a critical component of challenges found within the FFA, SAE, and Instructional Quality themes. Similarly, the modifications required within the Instructional Quality and FFA themes, alongside challenges brought about by technology and the internet, greatly reduced student motivation. In the data, teachers commonly described FFA as the motivating force for students participating in their programs. With almost no predictability of FFA events, teachers lost their metaphorical “battery pack” for students in their agricultural education program. Potentially, these findings illustrate two things that hold together the three-component model of school-based agricultural education beyond the COVID-19 pandemic. Leveraging ways to motivate students and ensuring clear channels of communication, both with and from, students and stakeholders appear to be key skills for agriculture teachers bringing together instruction, FFA, and SAE. Research exploring the central role of communication and student motivation within the three-component model of agricultural education is needed. Further, correlational research should explore the relationship between teachers’ skills facilitating student motivation and communication and total program quality.

6.3 Differences in challenges experienced

The final core idea foregrounds the differences in experience among both students and teachers during the pandemic. First, while this study did not include direct responses from students, teacher responses illuminated challenges experienced by students during the pandemic. One clear and alarming challenge faced by some students was their inability to participate in remote learning due to limited family resources. Data suggest students from lower income households were less likely to have equal opportunities to learn during the pandemic due to family instability, lack of food, reduced family support for learning, limited access to technology, and/or unstable or nonexistent internet (Van Lancker & Parolin, 2020). Certainly, these inequities have disadvantaged students before the pandemic; however, the pandemic exacerbated educational inequality unlike anything in recent history. Interventions to address educational inequality during and after the pandemic are crucial to providing every student an opportunity to thrive in agricultural education.

In addition to differences among students, each educator who responded experienced the challenges of the pandemic differently. Data emerged illuminating unique challenges experienced by educators with children at home and educators who lived in rural communities with limited internet access. The quasi-statistical analysis of challenges by career phases also illustrated differences among educators. These differences suggest responsive professional development during and after the pandemic should be differentiated between early, mid-, and late career teachers. For early career teachers, managing SAE and program facilities and experiences should be the focus; for mid-career teachers, work-life balance; and for late career teachers, student motivation, technology, and the internet.

The COVID-19 pandemic introduced a new reality for agriculture teachers, a reality teaming with unprecedented challenges. This foundational study viewed through the lens of Triadic Reciprocal Determinism helped to illuminate the expansive, interrelated, and individualized nature of challenges experienced, and the impact on agriculture teaching practices. While we certainly hope the reality of teaching during a global pandemic does not become the norm, we anticipate this article will empower teachers, teacher educators, and stakeholders to make agricultural education more resilient to challenges, with or without a pandemic.

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The Institutional Review Board at Michigan State University approved this study on 29 Apr. 2020. The study conforms to recognized standards.

AUTHOR CONTRIBUTIONS

Aaron J. McKim: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Software; Writing-original draft; Writing-review & editing.
Tyson J. Sorensen: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Software; Writing-original draft; Writing-review & editing.
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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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