THE INFLUENCE OF COVID-19 AND VIRTUAL LEARNING ON THE PCK DEVELOPMENT OF ARIZONA PRESERVICE SBAE TEACHERS

By

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As members of the Master's Committee, we certify that we have read the thesis prepared by Alexandra Schoeffling, titled The Influence of COVID-19 and Virtual Learning on the PCK Development of Arizona Preservice SBAE Teachers and recommend that it be accepted as fulfilling the dissertation requirement for the Master's Degree.

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I hereby certify that I have read this thesis prepared under my direction and recommend that it be accepted as fulfilling the Master's requirement.

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Abstract

The central research question that guided this study was: what is the influence of COVID-19 restrictions and modifications on the pedagogical content knowledge (PCK) development of the UArizona school-based agricultural education (SBAE) preservice teachers in agriculture, food, and natural resources content? This research was conducted using a single case study design of one preservice teacher cohort over the spring 2021 semester. Semi-structured interviews were conducted for all five preservice teachers, two university instructors, one teaching assistant, and five supervising practitioners throughout the student teaching experience. There were seven major themes that emerged from the data: it was primarily a classroom teaching experience, student teachers were prepared well in curriculum development, a lack of experimentation and problem solving in teaching, a lack of relationship building with students and professionals, student teachers were more protected from failure due to the COVID-19 environment, this cohort exhibited resiliency, and overall student teachers are prepared to teach. These themes support future research on PCK development through online and hybrid modalities while still incorporating early field experiences (EFE)’s and student teaching in-person. Further exploration on this cohort while in their first job post student teaching can provide information on the development and application of their PCK outside of the context of COVID-19.

Recommendations for practice include implementing multiple EFE’s with deep reflection and the creation of one semesters worth of curriculum prior to student teaching during teacher preparation. Additionally, it is recommended supervising practitioners and university instructors maintain a balance of constructive criticism and positive feedback throughout the student teaching process regardless of current circumstances.

Keywords: COVID-19; virtual learning, PCK development, preservice teachers, school-based agricultural education
Introduction

The rise of the novel coronavirus, commonly referred to as COVID-19, created mass disruption of education systems worldwide during the spring of 2020. Almost overnight, more than 55 million U.S school children were instructed to stay home, due to the cancellation of traditional education within the in-person classroom setting (Garcia & Weiss, 2020). On August 26, 2020, the U.S. Census Bureau reported that nearly 93% of households with school age children were engaging in some form of virtual learning (Mcelrath, 2020). University campuses around the nation, being the home to millions of students in higher education, were also forced to shut down their ecosystems (The Impact, 2020). By mid-March, more than 1,100 universities and colleges throughout the U. S. cancelled in-person courses, impacting over 14 million higher education students, and leading to the implementation of virtual learning for course work that had previously been delivered in-person (Hess, 2020; Smalley, 2020).

Virtual learning can be defined as a system for teaching and learning using the internet and other specialized software (Cambridge Dictionary, n.d.). This modality commonly involves instruction utilizing computers as the pathway for students to receive information, often coupled with online learning management systems like Google classroom or Blackboard (Beek, 2011). Students connect with their instructor through a variety of virtual learning options including synchronous learning (teacher and students interact in real time) asynchronous learning (learning does not require real-time interaction) and/or hybrid learning (Finol, 2020). Virtual learning as a teaching modality is not new. On the contrary, virtual learning has been a part of higher education for decades (Kentnor, 2015). The first institution to offer fully online bachelor’s and master’s degrees was the University of Phoenix in 1989 (Writers, 2020). Prior to the global pandemic, universities and colleges nationwide have continued to expand their virtual footprint through the offering of courses, workshops, and even entire degree programs completely online.
(Writers, 2020). However, the impacts of COVID-19 forced higher education to deliver the majority of content in a virtual format, within a severely truncated time frame, and often without the needed support systems in place to create high quality virtual instruction (Gardner, 2020). Virtual learning was no longer a choice based on content and student needs, but instead was mandated for the majority of higher education programs, including teacher preparation degree programs.

A plethora of research has been conducted on learning in virtual environments, surfacing both opportunities and challenges for educators (Simon & Bennett, 2012). Scholars have proposed a variety of advantages to virtual learning including the ability to provide just-in-time learning, wider student participation, reduction of class time, cost effectiveness, greater student accountability, and effective support for self-regulated lifelong learning (Kanuka, 2004; Ni, 2013). Additionally, proponents of virtual learning have observed it can provide flexibility to students (Hackarth, 1996), reduce student barriers to participation and allow for customized learning (Kiser, 1999), and provide increased convenience over traditional in-person instruction (Matthews, 1999; Ni, 2013; Swan et al., 2000).

However, challenges with virtual learning are also found throughout the literature (Ni, 2013), and these concerns were exacerbated with the dramatic shift to online learning spurred by COVID-19 restrictions. There is a growing concern about the digital divide and a lack of student interest in subject matter (Allen & Seaman, 2007). Additional documented challenges include the lack of face-time between students and teachers, devaluation of oral discourse/discussion practices, techno-centric models prioritized over in-person culture, lack of decision-making and service provision, increased technological and pedagogical inconsistency, violation of privacy policies, and redefining established cultural practices and discourse (Maki et al., 2000; Kanuka,
2004). One particularly alarming finding from researchers is extensive and deep learning cannot be adequately achieved without real-time classroom experience (Kanuka, 2004). The importance of experience in learning is well-documented in the literature. Dewey (1938) asserted, “principals become concrete only in the consequences which result from their application... everything depends upon the interpretation given them as they are put into practice in the school and the home” (p. 244).

Real time experience and deep learning is crucial for many degree programs in higher education, but is especially important for teacher preparation programs because of the need to intersect knowledge and practice through the application and use of experiential learning techniques (Myers & Dyers, 2004). Within school-based agricultural education (SBAE) teacher preparation specifically, the learning process is multi-faceted and relies heavily on application and interaction that is more difficult to facilitate in virtual formats. Preservice teachers learn to teach diverse learners and to create, implement, and evaluate the scope, sequence, and structure of agriculture through experiential learning (Whittington, 2005). This process culminates in student teaching, where preservice teachers are able to take the skills and knowledge they need to be effective and apply it in a classroom setting (Whittington, 2005). Darling-Hammond (2000) suggested, "universities are essential to high quality teacher education" (p. 181), ensuring the future of qualified teachers.

Virtual learning options to receive an agricultural education degree are currently offered through multiple universities across the U.S. including The Ohio State University, University of Tennessee, Utah State University, and Iowa State University, to name a few. However, these degrees are only offered through graduate degree programs and they do not certify students to be a SBAE instructor (NAAE, 2020). The only institution currently offering
teaching certification virtually is the State University of New York (SUNY) at Oswego; however, the program components still require a one-week live microteaching capstone following the online curriculum (NAAE, 2020). The lack of virtual learning options for SBAE teacher preparation programs that culminates in teacher certification nationally pre-COVID, further highlights the importance of in-person instruction as a critical component to the attainment of knowledge and skills gained through these degree programs.

Various aspects of SBAE teacher preparation outcomes were potentially impacted by the move to virtual learning; however, this study is concerned with the impacts on preservice teacher knowledge, more specifically knowledge for teaching or pedagogical content knowledge (PCK). PCK is a specialized form of teacher knowledge that includes the knowledge of, logic behind, and enactment of teaching content for enhanced student outcomes (Berry et al., 2015). Experts have asserted preservice teachers in all education disciplines need to hold and demonstrate PCK to be effective in the classroom (Darling-Hammond, 1997; NCATE, 2001). In SBAE teacher preparation, the development of PCK is vital (Rice & Kitchel, 2017) due to its positive influence on multiple teaching decisions related to student understanding of content such as selecting appropriate representations and examples of concepts, addressing student misconceptions of concepts, and incorporating and arranging ideas and concepts in the curriculum (Ball et al., 2008).

However, in various education disciplines, including science and mathematics education, researchers have found PCK in preservice teachers is lacking (Ball, 2000; Berry et al., 2015; Kind, 2009). Preservice teachers in mathematics education struggled to apply examples of topics in a useful way to promote student understanding (Chick, 2007), and experienced difficulties diagnosing student misconceptions with content to provide meaningful feedback (Marshman &
Porter, 2013). PCK is complex and develops over time through experiences (Grossman, 1990), but can begin at the preservice level through purposeful instruction (Hume & Berry, 2010). Classroom practice is an essential component of PCK development (Berry et al., 2015), leading SBAE teacher preparation programs nationwide to include field experiences, micro-teaching experiences, and student teaching as critical components for teacher knowledge development (Retallick & Miller, 2010). Learning from the act of teaching is a fundamental aspect of the vocation of teaching (Berry et al., 2015), and was directly impeded by the move to virtual learning propelled by the global pandemic.

If PCK is difficult for preservice teachers to develop in the best of circumstances, and is a vital factor in teacher preparation, how has COVID-19 and the subsequent move to virtual learning formats impacted SBAE preservice teachers’ knowledge development? One specific university that offers a SBAE teacher preparation program in-person and was impacted by the shift to virtual learning catalyzed by COVID-19 is The University of Arizona (UArizona). This study will examine SBAE preservice teachers at UArizona and how the transition to virtual learning impacted their PCK development at all stages of preparation for the 2020-2021 academic year.

**Need for the Study**

The 1918 influenza pandemic was the most severe pandemic in recent history, until the rise of COVID-19 (CDC, 2019). Present-day U.S. education systems, including higher education, have never needed to adapt educational practices and norms to a virtual environment to serve the current volume of students. Multiple studies have been conducted, or are in progress, to investigate the impacts of COVID-19 on elementary, secondary, and post-secondary students (Program Information, 2020; Schleicher, 2020). These studies have included exploration into the
impacts of the COVID-19 pandemic on students’ experiences, expectations, mental health, academic achievement, and use of technology (Garcia & Weiss, 2020). There have been few studies conducted which address the impacts of virtual learning on preservice teacher populations pre-COVID-19 (Duncan & Barnett, 2009; Hume, 2015; Malone & Yılmaz, 2020), and a single study that specifically examined the effects of COVID-19 on SBAE student teachers (Doss & Rayfield, 2020). There remains a paucity of research in this area and a need to explore the impacts of COVID-19 on the entire educational experience of preservice SBAE teachers throughout their teacher preparation program, which this study aims to address.

**Purpose of the Study and Research Questions**

The purpose of this study is to explore the influence of COVID-19, and the shift to virtual learning, on the preparation of SBAE preservice teachers at UArizona with a focus on their PCK development. An in-depth examination into the impacts of the preparation of SBAE preservice teachers from the onset of COVID-19 through student teaching is needed as university teacher preparation programs nationwide continue to adapt to virtual and hybrid learning environments. The following central research question guided this study: What is the influence of COVID-19 restrictions and modifications on the PCK development of the UArizona SBAE preservice teachers in agriculture, food, and natural resources content? Secondary research questions included: 1) How did COVID-19 and virtual learning impact preservice teachers’ development and enactment of professional knowledge bases for teaching? 2) How did COVID-19 and virtual learning impact preservice teachers’ development and enactment of topic-specific professional knowledge? 3) How did COVID-19 and virtual learning impact preservice teachers’ beliefs and orientations for teaching? (4) How did COVID-19 and virtual learning impact preservice teachers’ classroom practice during student teaching?
Guiding Frameworks

Conceptual Framework: SBAE Teacher Preparation

Figure 1. depicts the framework for teacher preparation in agricultural education utilized within this research (Whittington, 2005). This framework identifies the major goals and foundations of a teacher preparation program, guiding graduates to acquire the major knowledge, skills, and dispositions needed by beginning SBAE teachers. The post secondary coursework is aligned with the National Council for Accreditation of Teacher-Education (NCATE) standards, Interstate New Teachers Assessment and Support Consortium (INTASC) principles, state criteria for licensure, and the American Association for Agricultural Education (AAAE) teacher preparation standards (Byrd et al., 2015).

Figure 1.

A Model for Teacher Preparation in Agricultural Education (Whittington, 2005)

The SBAE Teacher Preparation Framework is based on a four-year undergraduate sequence of experiences arranged in four stages of preservice teacher development: building foundations, exploring careers, professional planning, and professional practice, all culminating
in the knowledge, skills, and dispositions needed to be an effective SBAE teacher. Each of these four stages are important building blocks in the overall process of SBAE teacher development and are grounded in Dewey’s (1938) experiential learning model (Whittington, 2005). For the purposes of this study, the focus will be on the second half of the model after students have achieved admission to professional standing. At UArizona, the stages of professional planning and professional practice are addressed during students’ junior and senior years in the program and encompass their primary pedagogical course work for degree completion.

The purpose of the professional planning stage is to assist students in the development of teacher knowledge needed to be effective SBAE teachers (Whittington, 2005). This includes three broad areas of teacher knowledge (knowledge of learners, knowledge of subject matter, and knowledge of teaching) all encompassed within the lens of viewing teaching as a profession and learning in a democracy (Darling-Hammond, 2006). The coursework is hands-on in nature, combining lecture and discussion based delivery methodologies with micro-teaching experiences and authentic product development for teaching. Concepts learned within in these courses serve as the primary pedagogical inputs needed to be successful during the capstone student teaching experience.

The professional planning stage is focused on developing preservice teacher knowledge in the areas of program planning, curriculum development, laboratory methods, and teaching methods. Students engage in field experiences with current agriculture teachers to observe classroom practice and develop curriculum. UArizona courses aligned with the professional planning stage include: AED 462 Curriculum Development, AED 438 The Teaching of Secondary School Agricultural Science (i.e. teaching methods), and AED 469D Teaching Science and Mathematics Through Inquiry, which includes CASE AFNR curriculum
certification (UAzona, 2020). AED 462 is required during the spring semester of the students’ junior year of the program. AED 438 and AED 496D are required during the student’s senior year of the program, the fall prior to student teaching. Students also engage in additional course credits that allow them to conduct field experience at their cooperating sites.

Within AED 462, students learn principles of teaching and learning, how to write instructional objectives, how to create a comprehensive lesson plans, scope and sequence of curriculum, concepts of student motivation, an introduction to teaching methods, and how to incorporate community needs into curriculum design. Within AED 438, students expand upon their previous knowledge to learn concepts such as classroom and behavior management, work/life balance, how to create effective assessments, teaching special populations, and dive deeper into various methods for teaching including problem solving, collaborative teaching methods, and experiential learning techniques. Within AED 496D, students engage in CASE AFNR curriculum through hands on activities, projects, and problems aligned with the National AFNR Standards and Next Generation Science Standards (CASE, 2020). Preservice teachers explore concepts of laboratory methods and inquiry-based instruction through the CASE AFNR curriculum ultimately achieving a provisional certification.

The next stage in the SBAE Teacher Preparation Framework is the professional practice stage. The purpose of this stage is to take all of the knowledge from prior coursework and apply it within the student teaching internship experience (Whittington, 2005). This is where students, guided by a supervising practitioner, synthesize and practice teaching to prepare them for entry into the profession upon graduation. This stage also assists preservice teachers in creating a vision of professional practice (Darling-Hammond, 2006). At UAzona, students are assigned a supervising practitioner, who serves as their mentor and the cooperating site for their student
teaching experience, in April of their junior year and complete their student teaching experience during the spring semester of their senior year. Student teaching lasts 14 weeks and includes two university seminars and visits from their university supervisor to monitor progress at their cooperating site throughout the semester.

The SBAE Teacher Preparation Framework was utilized in this study to consider the influence of COVID-19 and the subsequent shift to virtual learning on UArizona SBAE preservice teachers within the professional planning and professional practice stages. More specifically, I will explore preservice teachers’ knowledge development in the areas of program planning, curriculum development, laboratory methods, and teaching methods and their application during the professional practice stage (student teaching) while under the impacts of COVID-19 at each of their cooperating school sites.

**Theoretical Framework: PCK Development**

The Model of Teacher Professional Knowledge and Skill Including PCK served as the theoretical framework for this study, see Figure 2. (Berry et al., 2015). Resulting from research and best practices in science education, this framework is derived from generalizable professional knowledge of teaching and is applicable to any applied science discipline (Newsome, 2015), including SBAE. This framework is a model for teacher knowledge development, where PCK is defined as both a knowledge base utilized in the planning and delivery of topic specific content and a skill within the act of teaching (Newsome, 2015). The framework depicts how teaching is related to student outcomes encompassing teacher professional knowledge bases (TPKB), topic specific professional knowledge (TSPK), teacher beliefs and orientations, student beliefs, and classroom practice.
Figure 2.

Model of Teacher Professional Knowledge and Skill Including PCK (Berry et al., 2015).

Determined by experts and researchers, TPKBs (assessment knowledge, pedagogical knowledge, content knowledge, knowledge of students, and curricular knowledge) overarches the framework. This is considered the formal body of knowledge, is generic and not content specific, and includes elements that the entire education community can identify (Newsome, 2015). Knowledge within TSPK is derived from TPKB, once the attention is focused on teaching a specific topic with the teacher’s education discipline (Newsome, 2015).

TSPK is specific to the field of study and content topics because it is topic and context specific (Newsome, 2015). TSPK includes the knowledge of instructional strategies, content representations, student understandings, and science practices (Newsome, 2015). A topic-specific area within SBAE could be food safety taught to senior high school students. TSPK would include instructional strategies and content representations specific to food safety that
considers students’ developmental level and academic maturity. Using their TSPK in food safety, a teacher may choose to use hands-on instructional strategies and enact a lab where students grow bacteria from meat samples because students have already taken previous sciences courses given the senior class background in lab practices that can aid in learning food safety content.

TPKB and TSPK are then filtered through the lens of teacher’s beliefs, orientations, prior knowledge, and current context of the teacher when enacted during classroom practice. As individual professionals, teachers may approach the application of knowledge differently across classroom settings (Newsome, 2015). Classroom practice is influenced by both TPKB and TSPK; however, this stage is where the unplanned and unexpected happen and personal PCK and classroom context interact (Newsome, 2015). Within classroom practice, teachers attempt to execute lesson plans, while also monitoring student engagement and behavior and adapting instruction based on cues from students. These cues from students stem from the students’ personal amplifiers and filters, including their beliefs, prior knowledge and behaviors (Berry et al., 2015). Just like teachers, students are individuals and bring their own knowledge and beliefs to the educational experience. All of the knowledge bases in the framework directly impact student outcomes, which is connected to every single tier in the model. Student outcomes (student work and achievement in the course) are a powerful learning opportunity and impact teacher knowledge development (Newsome, 2015).

The arrows in the model between TPKB and TSPK are bi-directional because growth in one knowledge base can lead to growth in another. Additionally, the arrows between TSPK and teacher’s amplifiers and filters and the arrows between classroom practice and teacher’s amplifiers and filters are also bi-directional and influence one another. For example, a teacher’s method for the design of summative and formative assessments is a reflection of their assessment
knowledge. How the teacher chooses to implement that assessment is influenced by the teacher's TSPK for the specific content topic. As the assessment is implemented (classroom practice) the teacher may decide to only use summative assessments due to the teacher’s prior knowledge of implementing this form of assessment with a particular group of students. Continuing with this example, as the summative assessment is disseminated, feedback from the students to the teacher (in this case, rolling of the eyes) stems from the students’ beliefs of this assessment. As the teacher is reviewing the assessment, the student outcomes are not as positive as expected. This drives the teacher to change the type of assessment or method of implementation. This reaction is demonstrated by the prevalent arrow on the left stemming from student outcomes to teachers’ beliefs.

Serving as the theoretical framework for this research, the model illuminates the key pedagogical skills and knowledge bases effective classroom teachers’ possess. This framework hones in on the generalizable professional knowledge of teaching, while addressing topic specific professional knowledge, funnelling down to how these components are enacted in the classroom, considering teacher and student beliefs and the overall effect student outcomes have on all of the tiers in the model. At UArizona, preservice teachers should begin to procure these pedagogical skills and knowledge bases by the time they enter the student teaching experience and put their knowledge into practice.

**Methods**

This research employed a single case study design of one preservice teacher cohort (Hancock & Algozzine, 2011). Case studies are utilized for conducting an empirical investigation on a contemporary phenomenon (in this case, the teacher preparation experiences of preservice SBAE teachers) within its natural context using multiple sources of evidence.
(Hancock & Algozzine, 2011). Case studies are also time-bound (Hancock & Algozzine, 2011), and this study focused on SBAE student teachers time spent during teaching preparation courses and student teaching under the implications of COVID-19. This particular case was chosen as the focus of this study because of the unique nature of the teacher preparation during the COVID-19 pandemic and the shift to virtual learning. A single case study can represent a critical test of a significant theory and answers how and why questions (Hancock & Algozzine, 2011). Therefore, case study methodology aligns with the central research question for this study by examining PCK development throughout the COVID-19 pandemic and its influence on teacher preparation and classroom practice in-depth from multiple perspectives to identify trends.

**Epistemology and Positionality**

I approached this study through a constructivist lens. The core of constructivism is knowledge is not absolute but instead co-constructed by individuals experiencing a phenomenon (Boghossion, 2006). Through a constructivist lens, knowledge is formed through observing reality, past and prior experiences, and one’s reality being formed in their daily life (Ültanır, 2012). Grounding my study in constructivism permitted me as a researcher to evaluate the practical application of PCK within each participant’s teacher preparation experience in relation to “how” and “why” their PCK enactment was effected by COVID-19 and virtual learning.

To avoid bias is my research, it is also important to disclose my positionality (Creswell, 2013). I completed the UArlona SBAE teacher preparation program in spring 2018 unaffected by COVID-19. I attended every course in-person, and none of my courses required face masks or social distancing. Within my time in the program, I completed all core courses for my degree and engaged in student teaching. Additionally, I served as the teaching assistant for AED 496D and
AED 462 during the COVID-19 pandemic, two of the core courses for the UArizona SBAE teacher preparation program.

**Description of the Case**

This study only focused on UArizona SBAE preservice teachers, their supervising practitioners, and UArizona instructors and teaching assistants. Seven preservice teachers completed UArizona agricultural education department course prerequisites, permitting them to complete final coursework in fall of 2020. Of those seven students, five finished their student teaching curriculum, were permitted to student teach in spring 2021, and were included in this study. When describing the case, it is important to consider all modifications as it relates to COVID-19 and virtual learning from both the UArizona perspective and the SBAE teacher preparation perspective. Additionally, it is important to note that the two university instructors who participated, also sit on the master’s committee for this thesis.

**COVID-19 Restrictions and Virtual Learning at UArizona**

On March 6, 2020, UArizona President, Dr. Robert C. Robbins, sent an email to all students, faculty, and staff acknowledging the COVID-19 outbreak, yet maintained the health risk in Tucson, Arizona, where the university is located, was low. With the expectation to return to a normal academic routine after spring break, UArizona turned to temporary virtual learning modalities. By March 30th, 2020, UArizona shut down facilities, suspended all experiential learning and in-person activities, canceled commencements, and the Tucson Mayor, Regina Romero, declared a local emergency forcing dining rooms in restaurants, bars, and food courts to close. Arizona governor, Doug Ducey, announced a stay-at-home order for the entire state of Arizona, effective Tuesday, March 31st, 2020 until April 30th, 2020. By late April 2020, The
UArizona announced all summer courses would be moved to online instruction, and remained hopeful for in-person courses to resume at the start of the fall 2020 semester.

On July 23rd, 2020, President Robbins reported the following at a campus re-entry briefing, “The UArizona will be open for in-person classes for Fall 2020. We are offering classes in the four learning modalities: In-Person, Flex In-Person, Live Online, and iCourse.” On August 24, 2020, classes began using all four modalities, with select courses being able to operate in-person due to small cohorts or needed in-person lab activities. In the 16 weeks leading up to re-opening, the university underwent a tremendous overhaul to protect against COVID-19 transmission. Facilities maintenance re-tuned the air-conditioning system of every building on campus to bring in more fresh air and upgraded the filters to those used in hospital operating rooms. The university fabricated and installed 1,755 plexiglass shields and sneeze guards, replaced 3,000 paper-towel dispensers with the touchless, battery-operated variety, and mounted 1,530 hand-sanitizer dispensers in 326 campus buildings (Fishman, 2020). Compared to a regular academic year, there was at least a 50% reduction of students in classrooms, with faculty and staff being encouraged to work from home. Individuals present on campus were required to wear a face covering in all buildings and outdoors at all times.

Although core, hands-on courses were allowed to meet in-person, the COVID-19 restrictions necessitated additional modifications to teaching and learning modalities. To adequately enforce physical distancing protocols, collaborative learning and group activities were restricted. Although courses who met the requirements for phase one re-entry could meet in-person, students and instructors attending these classes complied with enhanced health protections such as wearing face coverings, decreasing classroom density, and physical distancing (UArizona, 2020). Flex in-person courses allowed students to participate in a mix of in-person and online
modalities. For example, a student may be in a rotating group that alternates between in-person and online meetings following the weekly class schedule, or they may participate in lectures online and labs in-person. The exact mix of in-person and online instruction was up to the discretion of the primary instructor. Courses offered in the live online modality permitted instructors and students to be online simultaneously, and the instructor provided content in a live online platform. The final modality, icourses, were conducted asynchronously and the majority of coursework was completed by students independently as they were not required to be online simultaneously (UArizona, 2020).

**COVID-19 Restrictions and Virtual Learning within SBAE Teacher Preparation Program**

Core curriculum courses (AED 462, AED 438, and AED 496D) that all five UA preservice teachers took prior to student teaching were adapted to the guidelines from UArizona. These courses under regular circumstances were all in-person, collaborative learning environments. In addition, all three courses were moved to live online after Thanksgiving break. In Table 1, the course modalities and meeting times are listed to show the differences between pre-COVID-19 and during COVID-19 restrictions and modifications.

**Table 1.**

*Comparison of Core Course Work Pre-COVID-19 and During COVID-19*

<table>
<thead>
<tr>
<th>Core Curriculum Courses</th>
<th>Course Schedule Pre-COVID-19</th>
<th>Course Schedule during COVID-19</th>
<th>Modality Pre-COVID-19</th>
<th>Modality during COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>AED 438</td>
<td>Mon and Wed 9:00am- 10:15am</td>
<td>Mon: Live Online Wed: In-Person 9:00am- 10:15am</td>
<td>All In-Person</td>
<td>Flex In-Person</td>
</tr>
<tr>
<td>AED 462</td>
<td>Tues and Thurs 2:00pm- 3:15pm</td>
<td>Tues and Thurs 2:00pm- 3:15pm Tues: Live Online</td>
<td>All In-Person</td>
<td>Live Online</td>
</tr>
<tr>
<td>AED 496D</td>
<td>Tues and Thurs 8:00am- 10:45am</td>
<td>Thurs: In-Person 8:00am- 10:45am</td>
<td>All In-Person</td>
<td>Flex In-Person</td>
</tr>
</tbody>
</table>
In years prior to COVID-19, 100% of AED 496D, CASE AFNR activities were completed in-person as individuals, pairs, or small groups. Under COVID-19 restrictions, the course modality was flex in-person with students completing 40% of activities in-person, and 60% live online. For the in-person lab sessions, the teaching assistant was in-person with students, while the lead instructor joined via Zoom. The classroom was rearranged to accommodate for social distancing protocols from the university. During in-person sessions, discussions were still fostered, but students completed activities individually, with individual lab stations and equipment. Labs completed online were modified to be completed to the highest degree possible without equipment available at students’ homes. With the reduction of in-person classes, some lab activities were demonstrated by the teaching assistant via Zoom to fulfill the lab requirements. Lastly, not all students held perfect attendance for in-person sessions. Due to students having contact with others who had COVID-19, students having COVID-19 themselves, and other non COVID-19 related issues, individual students would occasionally Zoom into the in-person lab sessions.

Prior to COVID-19, AED 438 met 100% in-person and adopted the flex in-person modality during COVID-19. Approximately 40% of the course took place in-person, while 60% was conducted live online via Zoom. The curriculum remained the same, only adapting to the flex in-person modality. During in-person sessions, one instructor was fully online Zooming into the class session, while one instructor was in-person. Due to students having contact with others who had COVID-19, students having COVID-19 themselves, and other non COVID-19 related issues, individual students would occasionally Zoom into the in-person class sessions.

Lastly, AED 462 was one of the courses drastically interrupted by COVID-19 in mid-March, 2020. This course pre-COVID-19 met 100% in-person until mid-March, 2020 when all
UArizona courses transitioned to fully online modalities. The course continued to operate during the scheduled time, but met via Zoom using the live online, synchronous modality. The coursework was altered to accommodate the new modality, but all concepts were retained from the original syllabus.

Participants

Participants in this study included five UArizona undergraduate SBAE preservice teachers, two UArizona instructors, one UArizona teaching assistant, and five supervising practitioners from high schools across Arizona. These five preservice teachers all fall between the ages of 20-24. They were included in this study due to their direct experience of student teaching during COVID-19 in 2021. Additionally, all five preservice teachers met the requirements for inclusion in this study, including the completion of core teacher preparation curriculum courses (AED 462, AED 438, and AED 496D). One of the preservice teachers identified as a man and four identified as women. Table 2 describes various attributes of the preservice teachers including pseudonyms, gender identity, semester each of the core courses were completed, and the semester they student taught. All course work completed in 2019 occurred pre-COVID-19 and all course work completed in 2020 and 2021 was directly impacted by COVID-19 and included virtual learning components. It is important to note that due to varying paths to degree completion, one preservice teacher completed AED 462 pre-COVID-19.
The five supervising practitioners were employed at high schools across the state of Arizona. These supervising practitioners were included in this study because they served as a mentor to a preservice teacher for their student teaching experience during spring 2021. In addition, they experienced the student teachers in the classroom and were able to observe their knowledge in action. Table 3 describes various attributes of the supervising practitioners including pseudonyms, years spent teaching, number of student teachers supervised including spring 2021, cooperating site location, student teacher supervised, and the modalities for instruction during the student teaching experience in spring 2021.

### Table 3.

<table>
<thead>
<tr>
<th>Supervising Practitioner Pseudonym</th>
<th>Years Teaching</th>
<th>Total Student Teachers Supervised</th>
<th>Coordinating Site Location</th>
<th>Student Teacher Placing</th>
<th>Modality Used at Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms. Roberts</td>
<td>5</td>
<td>1</td>
<td>Urban</td>
<td>Michelle</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Ms. Wilson</td>
<td>20</td>
<td>9</td>
<td>Urban</td>
<td>Kimberley</td>
<td>In-Person w/retractions</td>
</tr>
<tr>
<td>Ms. Murphy</td>
<td>20</td>
<td>7</td>
<td>Urban</td>
<td>Aaron</td>
<td>Hybrid</td>
</tr>
<tr>
<td>Mr. Martin</td>
<td>8</td>
<td>1</td>
<td>Suburban</td>
<td>Vanessa</td>
<td>In-Person w/retractions</td>
</tr>
<tr>
<td>Ms. Pack</td>
<td>5</td>
<td>1</td>
<td>Rural</td>
<td>Rachel</td>
<td>In-Person w/retractions</td>
</tr>
</tbody>
</table>
The final group of participants included the two UArizona instructors and one UArizona teaching assistant who taught one or more teacher preparation courses during 2020 and 2021. These participants were included due to their experience in the course work prior to COVID-19 and during COVID-19. In addition, these instructors have insights into the development of preservice teachers’ PCK prior to student teaching through engagement in coursework. Table 4 describes pseudonyms for instructors, includes their designation as a primary instructor or teaching assistant, number of year taught, and number of years in UArizona SBAE teacher preparation.

Table 4.

<table>
<thead>
<tr>
<th>Pseudonyms</th>
<th>Instructor Role</th>
<th>Years Teaching</th>
<th>Years in UA SBAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Robinson</td>
<td>Instructor</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Mr. Miller</td>
<td>Instructor</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Ms. Smith</td>
<td>Teaching Assistant</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Data Sources and Collection

Data was collected over the spring of 2021 semester. Semi-structured interviews were conducted for all five preservice teachers, two university instructors, one teaching assistant, and five supervising practitioners. Using a variety of methods to collect data decreases the risk of chance associations and biases present in a single method of data collection and allows for triangulation of data within the case study method (Hancock & Algozzine, 2011). Additionally, multiple interviews with preservice teachers, in combination with supervising practitioners, university instructors, and teaching assistant added multiple perspectives to the phenomenon being explored.
Semi structured interviews were conducted for all preservice teacher participants and served as the primary data source for this research. Posing predetermined open ended questions, with follow-up questions invited interviewees to express themselves freely, defining their world from their own perspective (Hancock & Algozzine, 2011). These interviews were conducted via Zoom, as this was the most logical method due to location of individuals across the state of Arizona and to comply with COVID-19 restrictions at the cooperating sites. Figure 3. depicts a timeline for the conduction of interviews.

**Figure 3.**

*Data Collection Timeline January- May 2021*

Three individual interviews were conducted with all five preservice teachers utilizing Zoom. The first interview took place prior to the beginning of the student teaching experience in January 2021, the second interview took place in March 2021 midway through the student teaching experience, and the final interview was conducted in May 2021 at the conclusion of the student teaching experience. These interviews were conducted within this timeline to monitor changes within the preservice teachers’ experiences in PCK development, classroom delivery, and personal readiness. An example of one of the questions within the pre-interview protocol was, “Were adjustments made to your lesson plans to accommodate COVID-19 implications?”

Two interviews were conducted with the two University instructors and one teaching assistant, one prior to the beginning of student teaching in January 2021 and one after the student
teaching experience ended in May 2021. The two university instructors and one teaching assistant were interviewed a second time at the end of student teaching as they were involved in the student teaching experience through university seminars and supervision of preservice teachers. An example of one of the questions asked within the pre-interview with university instructors was, “What parts of the student teaching experience (if any) were comprised by COVID-19?”

Two interviews were conducted with the five supervising practitioners, one at the mid-point of the student teaching experience in March 2021 and one at the end of the student teaching experience in May 2021 via Zoom. Supervising practitioners were interviewed to gain additional knowledge into preservice teacher development and enactment of their PCK through classroom instruction with students. An example question within the pre-interview protocol included, “In what ways is the student teacher excelling or struggling with adapted content knowledge for student understanding?”

In addition to interviews, documents were analyzed to provide another data source in the case study. The syllabi from the three core teacher preparation courses (AED 462, 496D, and 438) were analyzed for changes and modifications under COVID-19 restrictions. Additionally, cooperating site schedules were examined for each cooperating site to provide further insight into the modalities of instruction for spring 2021. Finally, preservice teacher lesson plans were analyzed to uncover evidence of PCK during the planning process.

Data Analysis

Nvivo 12 was the data management software used for data analysis in this research. All data sources (interviews and documents) were included in analysis. Data were analyzed for trends aligned with the central research question and secondary questions that guided the study.
Inductive and deductive approaches were utilized. First, I deductively coded the data using codes created from the frameworks for this study including the model of teacher professional knowledge and skill development including PCK (Berry et al., 2015), and a model for teacher preparation in agricultural education (Whittington, 2005). In addition to theoretical coding, I inductively coded the data and created open codes to capture any emergent findings outside of my theoretical and conceptual frameworks. After both inductive and deductive coding was completed, I further collapsed the emerging data into categories and themes that served as the basis for my findings. Figure 4. depicts a table of the deductive codes used in Nvivo 12.

**Figure 4.**

*Deductive codes for a Model of Teacher Professional Knowledge and Skill Development Including PCK (Berry et al., 2015)*

<table>
<thead>
<tr>
<th>Code Description</th>
<th>Code A</th>
<th>Code B</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSPK</td>
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<td>35</td>
</tr>
<tr>
<td>TPKB</td>
<td>20</td>
<td>53</td>
</tr>
<tr>
<td>Student Outcomes-PCK m...</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Amplifiers &amp; Filters-ST</td>
<td>16</td>
<td>35</td>
</tr>
<tr>
<td>classroom practice-Main</td>
<td>15</td>
<td>44</td>
</tr>
</tbody>
</table>

**Trustworthiness**

To ensure the trustworthiness of my study, I employed data triangulation, member checking, rich thick description, and clarified my research bias through disclosing my positionality as recommended for quality qualitative research (Tracy, 2010). I utilized multiple interviews with multiple participant groups (preservice teachers, university instructors and teaching assistants, and supervising practitioners) to achieve data triangulation. I also utilized documents to add an additional layer to my analysis of the developing phenomenon. I reached out to participants through member checking to ensure the findings of this study were representative of their experiences. I utilized rich, thick description through examples and quotes.
from the data. By outlining my positionality and beliefs I clarified any bias to make transparent the lens of the researcher when analyzing the data (Creswell, 2013).

**Findings**

All five student teachers completed their 14-week student teaching experience and graduated with a degree in Agricultural Education. Seven themes emerged following data analysis. The findings showed that student teachers had a 1) *loss of total SBAE teaching experience*. All participants (University instructors and teaching assistant, supervising practitioners, and student teachers) agreed that 2) *student teachers were prepared well in curriculum development*. University instructors and the teaching assistant had similar views that student teachers would be successful during student teaching and the content of each teacher preparation course remained largely the same. However, due to COVID-19 restrictions, there were unavoidable modifications that ultimately changed the full experience. This led to 3) *a lack of experimentation and problem solving in teaching* and 4) *a lack of relationship building with students and professionals*. Due to the extenuating circumstances surrounding the COVID-19 pandemic, all participants practiced grace and compassion in their expectations of one another which led to 5) *student teachers being more protected from failure due to the COVID-19 environment*. All supervising practitioners spoke very highly of their student teacher, and each student teacher loved their student teaching experience. Nevertheless, 6) *overall student teachers are prepared to teach*.

**Loss of total SBAE Teaching Experience**

Data analysis revealed student teachers received primarily a classroom teaching experience rather than a complete SBAE teaching experience encompassing aspects of SAE and FFA as a part of their student teaching internship. Due to COVID-19 restrictions throughout the professional planning stage, student teachers were unable to join their cooperating school at the
state leadership conference (SLC) and visit their cooperating sites prior to the start of student teaching. COVID-19 restrictions continued into the professional practice stage where student teachers, regardless of the modality they were teaching in, missed out on all typical national, state, and local FFA/CDE events. This resulted in student teachers not having the opportunity to build relationships with supervising practitioners, students they would be teaching, and opportunities to be an advisor and supervisor for events outside of the classroom. Michelle surfaces her professional planning stage experience, “Not getting to go out for the five days, I really feel like we have a disconnect. I haven't gotten to meet their officer team. I didn't get to connect with my students.” This was also mentioned by UArizona instructors, highlighted here by Dr. Robinson:

They had to contact their teacher and meet them virtually. SLC in June was virtual, that's where they meet some students face-to-face for the first time.

Student teachers in the past had that endorsement going into it [student teaching] already. SLC laid that groundwork for a positive relationship, and they got a chance to see just how high school students really are.

While student teaching (professional practice stage), some student teachers were teaching all in-person, while some were hybrid with a mix of online and in-person students. Regardless of the cooperating site's teaching modality, all national, state, and local FFA/CDE events were postponed, resulting in student teachers missing out on the supervisor and advisor roles an Arizona SBAE teacher does during a normal school year. While student teachers did not mention missing out on these aspects of their experience while student teaching, both UArizona instructors and supervising practitioners commented on this phenomenon during the experience and while reflecting. Mr. Martin and Ms. Roberts, both operating in the hybrid modality, surface
aspects of the full teacher program their student teachers missed out on. Mr. Martin, Vanessa’s supervising practitioner, commented, “Hopefully she'll be able to get some of those skills that maybe she'll miss out on like collecting money and planning for events and trips.” Ms. Roberts, Michelle’s supervising practitioner, further elaborated:

She missed out on the planning and implementation of a field trip. How to register with Arizona FFA, collect those permission slips, and notify parents. We didn't have FFA events. She didn't go to district, or state, once. These kinds of things help you be a little bit more prepared to take high school kids away from high school. She didn't get the experience there.

Another supervising practitioner, Ms. Pack, whose site was in-person the entire time, still highlighted her student teacher Rachel missed out on various aspects of being a SBAE teacher beyond classroom instruction. She stated, “New teacher things. Making sure that you're juggling everything at one time, there's so many different parts that you have to keep track of, sponsors and all of those things.” UArizona instructors and supervising practitioners both expressed concern for how steep the climb will be when these student teachers take on a position of their own that requires all three components of classroom teacher, advisor, and supervisor, given most of their experiences during student teaching only focused on the classroom component of SBAE.

Student Teachers Were Prepared Well in Curriculum Development

All participants (student teachers, University instructors and teaching assistant, and supervising practitioners) collectively agreed the student teachers were well prepared in curriculum development, lesson planning, and technology use. Student teachers did not feel like they missed anything from a content standpoint in their teacher preparation courses. UArizona instructors confirmed the content of each course had remained the same despite COVID-19
restrictions at the University level. Uarizona instructor Mr. Miller said, “If you ask me content wise, I would say that it is apples for apples. I think the content has been the same.” Student teachers all expressed that the area where they felt most prepared was their curriculum development and having their lesson plans ready for student teaching. Rachel stated, “I think that I'm most prepared within my curriculum that I've created, and confidence also comes from thinking if I didn't have the curriculum that I have right now, I would be very scared.” Aaron commented midway through his experience, “Lesson planning, all of it in one semester, is difficult and frustrating. But it’s really helpful now that I'm in the classroom. I’m not having to spend hours every day prepping for the next class.” While reflecting, Kimberly stated, “I definitely feel especially with our lesson plans, although they've changed a little bit, everything I needed was there…content wise, everything I needed was readily available.” When analyzing the student teachers’ lessons plans, it was also apparent they had every crucial component included for all lessons was at a high caliber.

Supervising practitioners and UArizona instructors in all interviews highlight lesson plans and curriculum development as a strength of the student teachers. Ms. Pack, Rachel’s supervising practitioner, stated at the beginning of the semester, “She's most prepared with her lessons, they’re ready to go.” In the final interview Mr. Martin, Vanessa’s supervising practitioner, stated, “She's excellent at curriculum and lesson planning. Very, very good. She's very creative with her lessons, especially for this online, I would say online she has done really, really, really well with it.” Ms. Wilson, Kimberly’s supervising practitioner, claimed she was most prepared with lesson planning. She said, “She's got her lessons ready; she reviews them the night before she updates them, and she adjusts. I feel like she could teach any subject. So overall, lesson planning.”
UArizona instructors pointed out this cohort's lesson plans have been one of the better sets they have received compared to previous cohorts. Dr. Robinson claimed, “They [student teachers] collectively have some of the best lesson plans that we've seen from any cohort, and they had 462 [curriculum development course] online. So that says quite a bit.” While curriculum development was an area all student teachers excelled in, participants also felt that a silver lining of COVID-19 was gaining technology skills that aided them within their curriculum development. Kimberly stated, “I feel like we really benefited from learning how to use online platforms.” Michelle elaborated, “COVID prepared me for this online stuff. I had gone pretty much my whole college career avoiding Google classroom. I got familiar with some of the technology I'm going to have to be using when I start student teaching.” Mr. Miller, University instructor, echoed this by reflecting on their experience, “I was blown away by how technically sound and savvy this group became very quickly. The technical ability they have now because of COVID is amazing.”

**There Was a Lack of Experimentation and Problem Solving in Teaching**

While the student teachers had exceptional lesson plans, analysis reveals there was a lack of experimentation and problem solving during the act of teaching. Student teachers in predominantly online and hybrid modalities faced these challenges more so than student teachers who were primarily in-person. However, all were challenged to some degree due to unavoidable COVID-19 restrictions that permeated the educational environment. During the preparation stage, student teachers were unable to microteach. While student teachers mentioned this is something they missed out on, they did not realize the swath of opportunities it presented them until reflecting on their experience at the conclusion of student teaching. Vanessa stated how it would have benefited her, “I feel like having that exposure to students would have helped me
know what to expect. I know they're not the same group of students, but it sets the overall demeanor, and makes me more mentally prepared.” UArizona instructors and the teaching assistant all felt this was a concern from the initial interview, predicting this missed opportunity would ripple into their student teaching experience. University instructor, Mr. Miller, commented:

They didn't get that experience of being able to go in the classroom in-person and teach a lesson. The longer I do this, the more I realize that those real time experiences in the classroom are so beneficial. They're going to be fine because they have the information. But how quickly can they connect the information with reality? So, I'm a little worried about that. Not that they are prepared, but just that they're not prepared to utilize it yet in the sense that they haven't had the experience.

Ms. Smith, University teaching assistant, also surfaced her apprehension with the lack of microteaching during the professional planning stage:

The biggest loss this group faced was missing out on microteachings. That worries me the most. I learned so much from just one experience that it drastically changed how I wrote lesson plans. I learned how much you need to make students care and actually want to interact. On top of hitting all of your components of a lesson plan, you have to facilitate students who aren’t paying attention, passing notes, throwing things. There was a huge reality check of how an actual high school classroom functions like when I stepped into one.

Whether the student teacher was teaching in-person, hybrid, or online, there were restrictions in place due to COVID-19 during the professional practice stage. This limited the
student teachers’ opportunities to facilitate a full functioning high school classroom including classroom management and experimentation of methods when disseminating lessons, labs, and activities. Some students remained partially online all year, lowering class sizes drastically. Supervising practitioner Mr. Martin stated, “Classroom management or lab management with a large number of students, it's a totally different dynamic when you have a big class. Classroom management with even 10 kids is nothing compared to a class of 20.” Dr. Robinson, University instructor, echoes this fear about the lack of classroom management experience during student teaching due to the alteration to class sizes and other constraints due to COVID-19:

It's one thing to hear about a theoretical or hypothetical case about a student who flips you the middle finger and what you would do and discuss it versus a student face-to-face with you flipping you the middle finger. And you have to react in the moment. I don't know that they got an authentic experience for how to set classroom norms and procedures because things shifted so much with how to deal with disciplinary issues, because we were all trying to account for grace and leniency. Which is important because we're all under stress, but it doesn't mimic a regular classroom dynamic of authority and how we get students to be engaged and listen and do the things they need to do. I don't know that they all got that.

Social distancing was still in place, meaning even if the student teachers were operating in-person students had to be put in the same groups each class period. Students could not share equipment, making labs more difficult to facilitate. Depending upon the site, student teachers could not take a group of students out to the mechanic shop or school greenhouse. Supervising practitioner Ms. Roberts described some of the experiences her student teacher Michelle missed out on:
Doing an activity, lab, or going outside to the shop with them. She's missing out on the group part of it, the large class activities. Labs, we are still able to do; however, there are extra protocols we have to follow for lab groups. When we can get away with it, there are pairs opposite sides of the table, three feet apart. It's not ideal.

If the student teacher was teaching hybrid, they were also restrained to staying by a computer to teach online students while simultaneously teaching the in-person students. This limited freedom across classrooms ultimately did not give student teachers as much room to experiment in the classroom and make mistakes. When reflecting on their experience, all student teachers stated they had not missed out on anything during student teaching. However, the supervising practitioners all highlighted the loss of freedom in the classroom. Ms. Murphey, Aarons’ supervising practitioner, stated:

It's really important when you are learning how to deliver content that you do play up with different groups and delivery methods. Having that restraint put on him made it hard to really explore as many different possible ways to deliver content. So that's a little disheartening. I think the hardest thing is the limitations. Definitely that freedom and flexibility, being able to let go and say today, I'm going to have you guys pick your own groups or today we're going to do these types of groups or we can all go into the greenhouse to do this together.

University instructor, Mr. Miller, corroborated Ms. Murphey’s claim as witnessed during his observations of the student teachers, “The ability to engage students through activity was also diminished quite a bit. I recognized that with all of the student teachers. Those emotional connection moments to the content and people weren't near as deep as normal.”
There Was a Lack of Relationship Building with Students and Professionals

The findings revealed there was a lack of relationship building with students and professionals for the student teachers. Prior to the start of the experience, student teachers highlighted they missed out on attending SLC, working with their supervising practitioners for the five days required during the summer and winter prior to student teaching, and microteaching experiences during the fall semester prior to student teaching. While the student teachers were able to have positive relationships with the students that came in-person and virtually, COVID-19 restrictions still impacted the number of organic interactions they could have with students during classroom instruction. Mr. Martin commented on this change in interactions for his student teacher Vanessa, “Normally, I don't think there's ever a day students aren’t here after school. We're always doing something, studying for contests, building something, breaking something. Now we don't have that. That's why we do what we do, to be with students.” Ms. Wilson, Kimberly’s supervising practitioner, elaborated on what she felt Kimberly missed out on. She said, “Interacting with kids all year long. It was really hard for her to get involved and get to know kids and kind of figure out the type of kid they were.” UA instructor Mr. Miller felt this cohort will be the least prepared in navigating human interaction as a teacher:

While we are teaching, we make connections with other teachers and faculty. How do you build colleague relationships and administrator relationships? Then how do you navigate students? Because none of that really happened at the same capacity. And so much of when you're a young teacher is how you establish yourself as a professional. I don't think this group was given the opportunity to experience the reality of teaching real life human adolescence. By that I mean a lot of the things that pop up that are human related, not content related, they're
just related to working with people. Students that come in and say, ‘hey, you
know what, I'm having this problem. I'm in a really negative environment right
now.’ I think every one of us student teachers had those moments where kids
reached out for help to us and just said, ‘hey, I'm really struggling. I'm having
some issues’ and then having to go through and navigate those moments and
really being able to understand that first and foremost is the person.

**Student Teachers Were More Protected from Failure Due to COVID Environment**

When comparing this cohort's experience to previous cohorts, the data revealed this
cohort was more protected from failure overall, stemming from COVID-19 restrictions. Within
the preparation stage, mental health checks were put in place throughout the semesters in each
teacher preparation course. University instructor Dr. Robinson stated, “When we could, we tried
to give some grace and I say we because I also saw this modeled with Mr. Miller.” While student
teaching, it was also apparent supervising practitioners were less critical of their student teachers
than previous years. When asked where student teachers could improve, or were least prepared,
all supervising practitioners were hesitant to answer. Ms. Pack shared, “She's most prepared in
every way.” Ms. Wilson replied, “That's a hard one, because she's really good.” The interviewer
had to ask multiple times in different ways to get an answer regarding where the student teacher
could improve in all interviews with supervising practitioners.

Overall, every participant (student teachers, university instructors and teaching assistant,
and supervising practitioners) pointed out this year was difficult, and they were just trying to
keep their head above water. Supervising practitioner Mr. Martin stated, “This year was so hard.
I mean, I think they just did the best that they could, given the situations that were at hand. I
know even the most seasoned veteran teachers have learned a lot this year.” Analysis also
revealed most supervising practitioners stayed in closer proximity to the student teacher on a
daily basis than they would in a typical year. University teaching assistant Ms. Smith reflected,
“When I student taught I wouldn't see my supervising practitioner until lunch sometimes. I was
running the show, whereas this year all of the supervising practitioners either stay in the room, or
their office connected to the room.” Four out of the five student teachers reflected positively on
their relationship with their supervising practitioner, while Vanessa felt, “The whole supervising
practitioner component could have been better for me.” Her comment stemmed from frustrations
that she was not given enough autonomy and missed out on various aspects of a complete SBAE
experience due to the focus on the classroom teaching component and protection by her
supervising practitioner from COVID-19 effects.

**Overall Student Teachers are Prepared to Teach**

All participants of this study (student teachers, supervising practitioners, and university
instructors and teaching assistant) collectively agreed the events of this past year made the
teacher preparation coursework, student teaching process, and life itself, more challenging.
When preparing for student teaching, there were collective fears and apprehension stemming
from COVID-19. With the inconsistencies and unknowns the pandemic presented, all were
concerned about what the student teaching experience would actually look like in practice.
Despite the modifications made in the spring and fall semesters, the online delivery of teacher
preparation courses, and the lack of microteaching experiences, all student teachers felt prepared
to student teach. The student teachers, and their supervising practitioners reflected, all stating this
was due to UA instructors, and the modifications made prior to student teaching. Michelle
commented, “I feel like my instructors went above and beyond with the extremely limited
amount of time that they had to throw this together.” Ms. Roberts, Michelle’s supervising
practitioner, shared, “I feel like they've done an excellent job of preparing students to get to this point. I can't think of anything else they could have done.”

Throughout the experience, circumstances eased up, and student teachers reflected they were able to get a positive teaching experience at their cooperating site. Each student teacher, along with their supervising practitioners, University instructors, and teaching assistant, stated in their final interview that they’re prepared to be teachers in agricultural programs in Arizona. When asked if they are prepared to teach, all answers were similar to Rachel's, “I definitely think so. Actually going in and student teaching really did prepare me.” Aaron echoed Rachel’s statement, “Yeah, definitely and definitely in the classroom and just like all of the classroom skills and creating curriculum and teaching it.” Supervising practitioners all had similar responses with independent anecdotes of their student teacher. Ms. Murphey, Aarons’ supervising practitioner, stated, “He's going to be green behind the ears like all of us were when we first started, but he's definitely going to be successful.” UArizona instructors may have been the most critical, and had the most hesitations, but overall agreed each student teacher will be successful on their own as an agriculture teacher.

Discussion

Overall, the student teachers had a largely positive student teaching experience where they were able to gain knowledge, skills, and dispositions as future agricultural educators. However, the findings reveal they did not receive a full SBAE student teaching experience, missing out on the areas of SAE and FFA from the three-component model of agricultural education as it was primarily a classroom teaching experience. While the classroom teaching component is arguably the most important part of student teaching, SAE and FFA are an integral part of what makes agricultural education unique, and experience in these areas are vital for
preservice teacher development. All supervising practitioners and university instructors noted this cohort did not receive the chance to extend themselves to any of these outside of the classroom experiences due to COVID-19, leaving a gap in their knowledge for future employment.

The COVID-19 restrictions each student teacher experienced ultimately impeded the preparation and practice stages of SBAE teacher development (Whittington, 2005), with the greatest impact occurring within the professional practice stage during student teaching. Their individual PCK development (Berry et al., 2015) was also stifled in areas of teacher professional knowledge bases including knowledge of content and teaching, knowledge of content and students, and knowledge of content and assessment. Ultimately this effected their topic specific professional knowledge bases, classroom practice, their beliefs and orientations, and overall PCK. However, their development of knowledge of content and curriculum PCK flourished during professional preparation and practice.

While the professional planning stage was predominantly online, all student teachers created strong curriculum they were able to utilize within the professional practice stage. Being successful during student teaching with their curriculum shows it is possible to facilitate curriculum development, and subsequently knowledge of content and curriculum PCK, via a virtual platform. However, early field experiences (EFE) also play an important role in teacher preparation programs (Retallick & Miller, 2010). This cohort did miss out on EFE’s including microteaching at local high schools and attending SLC. In agricultural teacher education, EFE’s were declared as a basis for experiential learning by the National Council for Accreditation of Teacher Education ([NCATE], 2002). Whittington’s (2005) model is grounded in Dewey’s (1938) experiential learning model, and experiential learning is especially important for teacher
preparation programs because of the need to intersect knowledge and practice through the
application and use of experiential learning techniques (Myers & Dyers, 2004). EFE’s offer
students the ability to practice their teaching skills prior to student teaching, develop their own
perceptions of a classroom, and allow them to learn at an early stage if working in a classroom is
what they want to do (McIntyre, 1983; Retallick, 2005). Due to the cohort's personal resiliency,
missing these EFE’s did not discourage their overall perception of student teaching; however,
they all recognized the benefits of EFEs and wished they were able to participate in them when
reflecting upon their overall experience. EFE’s play an important role in preservice teacher’s
perceptions, orientations, and beliefs of a classroom prior to student teaching. It is key for
teacher preparation programs to offer these experiences as it facilitates an introduction to student
teaching and the teaching profession, which could ultimately guide a person’s decision to remain
in that degree path.

Each student teacher faced different challenges based on the COVID-19 restrictions
within their professional practice stage including reduced class sizes, lack of face-to-face time,
missing out on organic relationships inside and outside of the classroom, and having to adjust
lessons to fit altered teaching modalities. Observed by university instructors and supervising
practitioners, student teachers were unable to develop full relationships with students. From a
previous study conducted on Arizona preservice student teachers, it was demonstrated
knowledge of content and students was one of the most important pieces of PCK student teachers
gained through their student teaching experience (Argueta, 2018). Overall, this cohort’s
knowledge of content and students PCK was severely impacted due to COVID-19 restrictions
and virtual learning, leading to a lack of relationship building with their students and other
professionals.
The absence of a deep connection with students, catalyzed by Zoom technology use, mask wearing, and lack of after school activities, led student teachers to make instructional decisions based on their current circumstances rather than having an emphasis on student learning. This highlights multiple pieces from the PCK model (Berry et al., 2015), specifically student outcomes which has a direct arrow to teacher beliefs and orientations, situated between TSPK and classroom practice. Previous research highlights students have better social and academic outcomes with a close student-teacher relationship (Decker et al., 2007). The stifled knowledge of content and students PCK can lead to teachers not being able to properly gauge student outcomes or meet students where they are at developmentally and academically (Berry et al., 2015). This lack of student knowledge in relation to the content also effects instructional strategy choices, content representations, and the real time instruction while disseminating lessons during classroom practice. While student teachers may have felt like they were not missing anything from their student teaching experience, the findings revealed their supervising practitioners protected them from failure. This led to a lack of experimentation and problem solving during teaching. While the intentions behind the protection stemmed from wanting to extend grace and understanding to the student teachers to mitigate the impact of COVID-19, it ultimately created an environment that inhibited the freedom to make mistakes and learn from those mistakes.

Additionally, this cohort’s knowledge of content and teaching PCK was severely impacted by COVID-19 restrictions. Methods for classroom management, instructional strategies to use for different students or classes, and the overall lack of instructional freedom, limited their ability to experience the reality of a typical high school classroom. This also ripples into knowledge of content and assessments PCK, as without freedom in the classroom student
teachers stuck to traditional assessment tactics. Subsequently this cohort’s classroom practice was impacted, influencing other areas of the PCK model including student outcomes, teacher beliefs, orientations, prior knowledge, and context. In SBAE teacher preparation, the development of PCK is vital (Rice & Kitchel, 2017). Classroom practice is an essential component of PCK development (Berry et al., 2015) as PCK is complex and develops over time through experiences (Grossman, 1990). While this professional practice stage was their first true experience with classroom practice, it leaves room for university instructors and supervising practitioners to question the development of this cohort’s beliefs and orientations for classroom teaching.

University instructors and supervising practitioners were not extremely concerned about the individuals in this cohort due to their excelled curriculum and personal resiliency demonstrated throughout both the professional planning and practice stages. However, this year presented them with challenges that altered their classroom practice and subsequently their knowledge of content and students, teaching, assessments, and their beliefs and orientations. The overarching fear from university instructors and supervising practitioners was there will still be a greater learning curve when the student teachers take their first teaching job. Highlighted by recent studies, there is an increasing concern for a shortage of qualified teachers in public education (Darling-Hammond & Carver-Thomas, 2016; Garcia & Weiss, Sutcher, 2019). The Consortium for Policy Research in Education concluded that 44% of new teachers leave the profession within the first five years of teaching (Ingersoll et al., 2018). By understanding the major problems beginning agricultural teachers face, teacher preparation programs have the ability to alleviate these challenges by providing preservice teachers the opportunity to fully experience the profession while in a partially protected environment. Conclusively, the findings
support the importance of experiential learning practices within teacher preparation and the need for preparation programs to require a fully in-person student teaching experience.

**Recommendations for Practice and Future Research**

This cohort demonstrated excellent curriculum development and growth in knowledge of content and curriculum PCK, which demonstrates a hybrid teacher preparation program could potentially be successful, at least for a curriculum development course or similar courses. It is recommended teacher preparation programs implement the creation of a full semesters worth of curriculum prior to the student teaching experience to provide student teachers a base of knowledge to build upon during student teaching, as this facilitates knowledge of content and curriculum PCK. However, further research is still needed as the findings reveal a fully online teacher preparation program is not ideal for other areas of PCK growth including knowledge of content and teaching, knowledge of content and students, and knowledge of content and assessments. Additionally, within the preparation stage, EFE’s are shown to be a vital portion of this process that influence classroom practice and serve as the foundation for their knowledge of content and students, teaching and assessments. It is recommended teacher preparation programs implement multiple EFE’s during preparation such as microteachings at local high schools and attending extracurricular events such as CDE’s and state conventions. Furthermore, it is recommended the student teachers deeply reflect following the EFE to ensure it is the most impactful experience possible.

A longitudinal study of this cohort during their first year teaching on their own could provide further information on the development and application of their PCK outside of the context of COVID-19. It is recommended a study be conducted on this cohort to gauge their beliefs and orientations as their experience did not reveal development in how student outcomes
effect instructional strategies. It is also recommended for all parties to hold the same standards for student teachers each year, regardless of extenuating circumstances like those experienced during the COVID-19 pandemic. While the intentions behind the grace and compassion from all parties came from a nurturing place, the lack of experience led to stifled PCK and a lack of experimentation and problem solving which is important for teacher development. While this cohort is prepared to teach, it is in the supervising practitioners and university instructor’s hands to maintain a balance of constructive criticism in all situations to ensure qualified teachers are produced.
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