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An Evaluation of Clemson University's Cooperative Extension Services Online Learning Programs and Framework For Program Development and Evaluation

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AN EVALUATION OF CLEMSON UNIVERSITY'S COOPERATIVE EXTENSION SERVICES ONLINE LEARNING PROGRAMS AND FRAMEWORK FOR PROGRAM DEVELOPMENT AND EVALUATION

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ABSTRACT

The COVID-19 pandemic brought online learning to the forefront with the need to define online learning with best practices. Clemson University Extension conducted a retrospective observational study compiling survey data from virtual extension agents and supervisor's conducting online programs. A literature review analyzed terminology for online learning to obtain a standardized definition to define online learning for Clemson Extension Services programs; evaluate and identify through literature strengths, weaknesses, opportunities, and challenges (SWOC) of on-line learning; determine and identify online learning competencies for instructors, assessment and evaluation; and analyze and evaluate response data from virtual extension agents delivering online programs in Extension. Qualtrics survey data was analyzed using mixed-method quantitative and qualitative data for interpretation.

Virtual agents' quantitative data proved 44 weeks agents averaged 8 hours of formal and informal direct education each week utilizing synchronous and asynchronous education, reached an average of 225 people each week with an average efficiency of 32 people per hour of instruction served. Virtual agent weekly summaries were coded for themes from the literature review on best practices using Atlatis.ti coding software. Evidence emerged supporting best practices with 8 semantic domains and subcategories were: advantages disadvantages, competencies, course structure, professional

responsibilities, professional qualities, program delivery method, and program implementation.

Virtual agent's supervisor summary proved data using 3-point Likert scale with top pros and cons for the role. Pros were agent job satisfaction/retention, programming despite office space, and all-team resources. Cons were stakeholder access, consumer in-person access and unfair to other agents. Open-ended comments provided asking should the virtual agent role continue, nine supervisors stated yes or maybe with to continuing modification with only one stated no to continuation. Open-ended data presented a common theme agreeing to the virtual agent role with modifications for improving it with a detailed position descriptions and to ensure stakeholders understand this is to broaden the Extension role and not change the current roles. When giving virtual agents the means to develop an effective course with best practices while implementing the supervisor's modifications, the VAE role can continue to improve for the population and citizens of Clemson University and South Carolina.

DEDICATION

I want to dedicate this work to my family for all their love and support along my journey. My husband, Matt, for believing in me and pushing me to do my best. My son, Rob, for being patient when times called for it. My mom for her unwavering support and guidance throughout life. My sister for checking on me to see how I was doing with all my research going on. My mother-in-law for believing in me and checking in to see how things were going. Thank you to all my friends that have listened and supported me along the way.

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INTRODUCTION

On March 11, 2020, the World Health Organization (2020) declared the outbreak of Corona Virus, COVID-19, a pandemic and the world went into lockdown for safety. This impacted everyone in different ways and marked a first for many with challenges for schools and Universities being forced to close. The world had to find a way to continue to communicate and educate students and professionals that were no longer allowed in the traditional face-to-face(F2F) classroom. A new normal had to be determined where people could continue to communicate, work, and learn but be physically distanced from each other for safety. Professionals had to adapt and change overnight to an online format and pedagogy. Many institutions had been reluctant about offering education through an online format but due to the crisis it became necessary (Dhawan, 2020). Dhawan et al. (2020) state that forcing this change will allow everyone to see "the lucrative side of online teaching and learning." This also allowed the ability to reach and sermonize large numbers at various times and places (Dhawan, 2020). One main concern that emerged was the need to maintain quality and academic integrity during this mandated online learning experience (Dhawan, 2020).

Clemson Extension Service was no exception to this. The extension agents had to start thinking of ways to reach the public for the programs and services the state still needed them to perform for the people of South Carolina. [The Newsstand (2020), Dr.

Thomas Dobbins stated, "Extension personnel have not stopped serving the citizens of South Carolina since we began modified operations back in March".] The Newsstand (2020) reported an increase in audience engagement, compared to prior years, in several programs. "Extension's program delivery methods for taking education to the citizens of South Carolina have continuously evolved over the past 106 years to adapt to changing times," Dobbins said. "We have made great strides in adapting to challenges resulting from COVID-19." The Newsstand (2020).

Most people think about traditional, in-person learning as the gold standard for education delivery. Traditional learning is when instructor or teacher and students or participants learn material by meeting in-person for a learning experience on a specific day and time in a location together with the instructor facilitating and presenting the information. When the COVID-19 pandemic hit, everyone was forced to look at what other options were available to continue educating the population without being in-person or face-to-face (F2F). This forced the need and demand for what most had termed “distance education” or “virtual education” to take place. In describing distance education there are a lot of terms that can be confusing and synonymous leading to the inability to compare impacts between education modes (Singh and Thurman, 2019). Delivery and assessment of programs are critical in making sure students and participants are gaining knowledge while the program is meeting the needs of its participants and stakeholders.

Statement of the Problem

Online learning has been a part of higher education for over 30 years and changing more as technology and individuals adapt, learn, and improve with science and learning. COVID-19 pushed everyone to accept online learning and quickly figure out how to navigate the immediate and challenging situation. Clemson Extension Service created an online environment for participants to access educational resources and topic experts. Some programs continued the online format leading to the question of "what is online learning and what criteria, measure, and evaluation process should look like for participants and instructors in this environment?" A deep look at online learning is needed to address concerns about effectiveness and efficiency to drive policy related to these programs.

Purpose of the Study

This study takes a deep dive into commonly used terminology for online learning and seeks to apply them to Clemson Extension Services online programs. This will provide a framework and better understanding of the ideal program structure for the greatest impact of the programs. A review of literature will determine the terms used in online education or learning and how they apply to Clemson Extension Services virtual programs.

The pandemic brought a need for everyone to develop new skills for online platforms to be able to communicate and have a sense of normal life. There are various terms used that may be difficult or confusing to understand. This paper will analyze

terminology used in online learning to obtain a standardized definition to define online learning for Clemson Extension Services programs; evaluate and identify through literature strengths, weaknesses, opportunities, and challenges (SWOC); determine and identify online learning competencies, assessment and evaluation; and analyze and evaluate response data from virtual extension agents delivering online programs in Extension.

Research Objectives

1. Analyze terminology for online learning through thorough literature review to determine a common definition for online learning in Extension.
2. Evaluate and identify through literature review strengths, weaknesses, opportunities, and challenges (SWOC) for online learning.
3. Determine and identify online learning competencies, assessment and evaluation.
4. Analyze and evaluate response data collected from Virtual Agents delivering online programs comparing to literature review on SWOC, instructor competencies, assessment and evaluation to identify online learning policies that can be implemented in Extension for efficient and effective Extension Programs.

Benefits of the Study

This study will benefit Clemson University's Extension Service by providing guidance for setting standards and policies for learning programs. It will address the need for common definitions and terminology to better understand online learning. This

study will develop a framework for current, developing, and new online programs in Extension Service to retain and build additional programs. It will address instructor competencies and evaluation of the programs to ensure programs are meeting the needs of the participants and stakeholders.

Limitations of the Study

Research was completed retrospectively leading to the instrument being created to assess virtual agent's weekly summaries and virtual agent supervisor summaries prior to this study. This led to the instrument not asking enough details that could have aided this project when coding data in more detail for themes. This was a small sample size with only 4 virtual agents to analyze for themes in the data.

Theoretical Framework

A literature review was conducted to determine what information or studies had been researched dealing with online learning and distance education in Extension Service programs to determine a framework for this study. This search did not produce a framework or much information at all, therefore a literature review was needed to begin looking at online learning and distance education in Extension service programs. A literature review was conducted to analyze terminology for online learning to determine common definitions. Next, research on Extension professional perceptions to online learning and delivering programs using strengths, weaknesses, opportunities, and challenges (SWOC) were analyzed using a literature review. Then, a literature review was conducted, and information compiled to determine and identify online learning

competencies, assessment and evaluation for online learning in Extension Services programs. This research identified online learning policies that can be implemented in Extension for efficient and effective online-learning programs. This created a set of best practices for online learning competencies, assessment and evaluation to use when analyzing data for this study. Evaluation of response data will be evaluated and compared to the literature reviews conducted for further analysis and discussion of online learning in Extension Service programs.

The theoretical frame for this study is grounded theory developed by Glaser and Strauss (1967). This theory is a method of collecting rich and unbiased data that develops theories considered "grounded" in data (Glaser and Strauss, 1967). It is more action orientated allowing the researcher to interpret data for theories and considered systematic involving iterative coding in two to three phases to derive and link themes, theories, patterns, phenomenon, and comparisons in data (Glesne, 2016). Saldaña (2014) developed a coding manual for qualitative researchers to help analyze data to look for commonalities, differences, and relationships within data. Saldaña (2014) defined code as a "word or short phrase that assigns summative or salient capturing and attribute or portion of the data that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2014, p.4). Saldaña (2014) states methodology for analyzing data for coding with the first code considered inductive with open codes, the second looks back at the initial codes for grouping similar codes, the final phase selective coding and groups by

categories if possible. Descriptive coding is appropriate for open-ended questions that look at data collected across various time periods for comparison and analysis (Saldaña, 2014).

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CHAPTER TWO

ANAYLSIS OF TERMINOLOGY FOR VIRTUAL LEARNING DURING THE COVID-19 PANDEMIC FOR CLEMSON UNIVERSITY'S COOPERATIVE EXTENSIVE PROGRAMS AND PROFESSIONALS

There are several terms that emerge in the literature related to online learning. Terms that appear are: distance learning, virtual education or learning, online learning, asynchronous, synchronous, and hybrid. Traditional education is a concept of bringing a group of people together in a physical setting at a specific time where the teacher explains topics or subject matter to students (Shimahara, et al., 2022). King et al. (2001) defines it as "formalized instructional learning where the time/geographic situation constrains learning by requiring synchronous person-to-person interaction." Education is a purposeful approach to gain knowledge and understanding while learning is the act of gaining education, understanding it, and applying it (Shimahara, et al., 2022). Researchers suggest that prior experience plus a change in behavior, knowledge, or skill that is relatively permanent is the product of learning (Domjan, 2000, King et al., 2001).

Non-traditional learning leads to several terms that can be synonymous at times and make definitions for online learning confusing. Anohina (2005) stated "distance" is a term that describes how the learning is being delivered and does not include delivery methods or technology used. The primary characteristic is physical distance between the learner and source of learning by time, place or both when learning is taking place. Information and communication technology (ICT) is used to connect the learner and the

teacher interaction in various forms such as: correspondence, TV, phone, audio conference, videoconference, course material on Web, radio, satellite broadcasts, videotape, facsimile, etc. In distance learning, the teacher provides support, materials, and tutorials for the student to go through and learn on their own time and at their own pace. The teacher evaluates progress along the way and provides help and in-person interaction when necessary (Anohina, 2005).

Schlosser and Simonson (2009) define distance education as formal education through an institution where learners are separated by time or place or both using telecommunication to connect teachers, learners, and resources for interactive learning. Johnston (2020) conducted research on the definition of distance education concluding three possibilities. Virtual network education (self-directed, possibly non-formal, autonomous learning with students having flexibility to do work using technology), cloned content education (instructor or school lead with asynchronous learning environment therefore some interaction with instructor), and remote classroom education (synchronous learning with instructor lead learning experience therefore intentional contact and more with instructor). According to *Encyclopedia Britannica,* "**distance learning**, also called **distance education, e-learning**, and **online learning**, form of education in which the main elements include physical separation of teachers and students during instruction and the use of various technologies to facilitate student-teacher and student-student communication" (Berg, Gary A. and Simonson, 2016). This suggests that distance learning, with distance education, e-learning, and online learning

are synonymous terms adding to confusion in definitions. Non-traditional students have been the typical participants of distance learning due to circumstances where they are unable to attend in-person traditional classrooms such as full-time workers, military personnel, and nonresidents living in various regions (Berg and Simonson, 2016). Berg and Simonson (2016) conclude that distance learning can be broke into two active parts to make up distance education. The student and teacher both play an active role in this type of learning with the student learning and the teacher teaching. This combination of both taking an active role make up distance education. The internet is usually the medium or platform used for communication. This type of learning is typically referred to as e-learning or online learning. Virtual learning is also used as broad term with the course using the internet and taking place outside the classroom (Berg and Simonson, 2016).

According to Berg and Simonson (2016), there are four characteristics to distinguishing distance learning. First, it must be through an institution that is accredited for traditional method courses and not self-study or nonacademic characteristic. Second, geographic separation must take place and time may also vary. Advantages to this are accessibility and convenience and if the program is designed properly, it can bridge the difference gap for intellectual, cultural, and social aspects. Third, interactive communication is key and essential to connect the teacher and student for learning, communicating, and resource distribution. There are various forms for connection with most taking place electronically through e-mail and platforms like zoom but postal can

be used when needed. They can be accessed using the computer, tablet and mobile phone which make it more convenient. Technology continues to improve and become more widely acceptable, available, and convenient for this type of learning to take place with less physical proximity. Lastly, a learning community is established connecting the teacher, student, and learning material and resources. Some teachers feel students may have a sense of isolation in this type of environment. Connection of community on various social platforms such as Facebook and YouTube can be established for them to connect and share content (Simonson, 2009a, p. 231).

Stauffer (2020) states difference between online learning and distance learning are location, interaction, and intention. For online learning, the location can be physically together in the same room or online while distance is online. Interaction for online is more of a blended method with regular meetings and will involve in-person while distance has no in-person interaction. Online learning intentions, due to the bended method, use more interaction and a variety of online and in-person to teach while distance learning is solely online for delivering instruction for teaching. Stauffer's research differs from other research stating the interaction for online learning using the blended approach with in-person meetings regularly is necessary while most say this is optional. Pearson (2020) states that online learning is online and blended learning, which is a combination of face-to-face and online learning.

The term virtual learning has been thoroughly researched by scholars due to the abundance of terms associated. Ryan et al. (2000) suggests "resource-based learning"

which is a term that encompasses open learning, flexible learning, individualized learning, computer-aided learning, project-based learning, problem-based learning, student-centered learning and self-organized learning. Picciano (2001) researched the description of “distance learning” with terms that are used interchangeably. That is, the educational process of geographical separation of teacher and student with terms of “distance education,” “distance teaching,” “distance learning”, “open learning”, “distributed learning”, “asynchronous learning”, “telelearning”, and “flexible learning”. Other terms mentioned are “direct learning” and “assisted learning. Researchers also uses the terms “distance learning” and “distance education” (Porter (1997)), “online education” (Kearsley, 2000) and “Web-based learning” (Jolliffe, 2001). Horton (1999) used the terms “Web-based training,” “Web-based instruction,” and “Web-based education.” Anohina (2005) suggested that these terms all fall under the term “virtual learning” with the word “virtual” meaning “different, peculiar.” They looked at the process for traditional learning and virtual learning and determined the differences are technology is used to replace the human teacher, learner and teacher can be separated and choose when time, place, and amount of learning takes place (Anohina, 2005). The new term has become virtual education or learning. Researchers have concluded that the term virtual means it is different from traditional in-person and will be delivered by a different communication online medium where the instructor and student are separated by time or space or both. Virtual education material and resources are conveyed through IT applications, multimedia resources, the Internet,

videoconferencing, etc. (Dung, 2020). Within any of these is a platform for the learning via a media device, i.e., computer, smartphone, tablet, for the knowledge to be presented to the audience.

Table 1 compiles the terms brought forth through literature review and help to show the emerging and related terms and synonymous terms. Anohina (2005) states distance learning as an umbrella term with distance education being under it with two active parts with the student actively learning and the teacher actively teaching (Berg and Simonson, 2016). From here, the synonymous terms seem to emerge and bringing forth the new term Virtual Education or learning (Dung, 2020).

Table 1

List of Terms from Literature Review for Virtual Education or Learning

Terms	Definitions	Sources
Distance Learning (Umbrella Term)	• Distance is geographical separation with learning being delivered. Method and technology not included	(Anohina, 2005)
	• Learning is the act of gaining education, understanding it, and applying it	(Shimahara, et al., 2022)
	• The primary characteristic is physical distance between the learner and source of learning by time, place or both when learning is taking place.	(Anohina, 2005)

	• Information and communication technology (ICT) is used to connect the learner and the teacher interaction in various forms such as: correspondence, TV, phone, audio conference, videoconference, course material on Web, radio, satellite broadcasts, videotape, facsimile, and etc. • The teacher provides support, materials, and tutorials for the student to go through and learn on their own time and at their own pace. • The teacher evaluates progress along the way and provides help and in-person interaction when necessary	
	Four characteristics: • First, it must be through an institution that is accredited for traditional method courses and not self-study or nonacademic characteristic. • Second, geographic separation must take place and time may also vary. Advantages to this are accessibility and convenience and if the program	(Berg and Simonson, 2016)

	is designed properly, it can bridge the difference gap for intellectual, cultural, and social aspects. • Third, interactive communication is key and essential to connect the teacher and student for learning, communicating, and resource distribution. There are various forms for connection with most taking place electronically through e-mail and platforms like zoom but postal can be used when needed. They can be accessed using the computer, tablet and mobile phone which make it more convenient. Technology continues to improve and become more widely acceptable, available, and convenient for this type of learning to take place with less physical proximity. • Lastly, a learning community is established connecting the teacher, student, and learning material and resources.	

Distance Learning to Distance Education	Combination of student and teacher both playing an active role make Distance Education • Student actively learning and • Teacher actively teaching	(Berg and Simonson, 2016)
Distance Education	Formal education through an institution where learners are separated by time or place or both using telecommunication to connect teachers, learners, and resources for interactive learning.	(Schlosser and Simonson, 2009)
	3 possibilities: • Virtual network education (self-directed, possibly non-formal, autonomous learning with students having flexibility to do work using technology), • Cloned content education (instructor or school lead with asynchronous learning environment therefore some interaction with instructor), and • Remote classroom education (synchronous learning with instructor lead learning	(Johnston, 2020)

	experience therefore intentional contact and more with instructor).	
Distance Learning terms used synonymously:	That is, the educational process of geographical separation of teacher and student with terms of "distance education", "distance teaching", "distance learning", "open learning", "distributed learning", "asynchronous learning", "telelearning", and "flexible learning"	(Picciano, 2001)
	Other terms mentioned are "direct learning" and "assisted learning. Researchers also uses the terms "distance learning" and "distance education"	(Porter, 1997)
	"Online education"	(Kearsley, 2000)
	"Web-based learning"	(Jolliffe, 2001)
	"Web-based training", "Web-based instruction", and "Web-based education"	(Horton, 1999)
These terms all fall under the term "virtual learning" with the word "virtual" meaning "different, peculiar".		(Anohina, 2005)

The process for traditional learning and virtual learning differences are technology is used to replace the human teacher, learner and teacher can be separated and choose when time, place, and amount of learning takes place.		
The new term = Virtual education or learning.	Researchers have concluded that the term virtual means it is different from traditional in-person and will be delivered by a different communication online medium where the instructor and student are separated by time or space or both. Virtual education material and resources are conveyed through IT applications, multimedia resources, the Internet, videoconferencing, etc.	(Dung, 2020)

E-learning or Online learning or Virtual learning	When internet is the medium or platform used for communication = e-learning or online learning or Virtual learning	(Berg and Simonson, 2016)
Difference between online learning and distance learning	Location, interaction, and intention. For online learning, the location can be physically together in the same room or online while distance is online.	(Stauffer, 2020)
Online learning Definition	Is online and blended learning which is a combination of face-to-face and online learning.	(Pearson, 2020)
Virtual Learning	"Resource-based learning" which is a term that encompasses open learning, flexible learning,	(Ryan et al., 2000)

	individualized learning, computer-aided learning, project-based learning, problem-based learning, student-centered learning and self-organized learning.	

Singh and Thurman (2019) researched the topic of online learning through a systematic literature review from 1988 through 2018 compiling terms and definitions that can be confusing and sometimes related to attempt to better understand this topic and explain it fully with key concepts associated. They traced back the evolution of these concepts or definitions to understand how and why changes came about that could lead to confusion and determined a longitudinal study would be needed to track the growth of online learning. They started with a systematic literature review to compile online learning definitions and key elements in published literature then analyzed these through qualitative and quantitative measures. Systematic review allows thorough examination of contradictory and/or confusion within the definitions while also critically identifying and compiling all concepts and common elements around each definition for clarity of the defined problem (Martin, Ahlgrim-Delzell, and Budharmi, 2017). Singh and Thurman (2019) examined the evolution of key definitions over the last 3 decades then determined changes overtime. Shahini, Davis, and Borthwick (2019)

conducted a systematic review of literature and determined variation in terminology may be due to cultural differences and suggested that pedagogical strategies of contextual and behavioral strategies are needed in specific populations.

Singh and Thurman (2019) conducted a meta-analysis of peer-reviewed journal articles using “online learning” and “definitions” as key. Researchers reviewed 151 articles and found 37 unique references to definitions of online learning. They compiled them in a spreadsheet for future examination while deleting duplications and found with 46 unique definitions for online learning. They used content analysis methodology for qualitative analysis. Content analysis is a qualitative method of looking at the text and then classifying it into categories, explicit or inferred meaning, of similar meanings (Weber, 1990). This type of analysis method was needed to determine word usage for defining terms and/or setting the context for better understanding of the situation and words. NVivo, qualitative data analysis software, was used to collect and categorize the data set. Initial coding categories and key concepts were used from established prior research in content analysis (Potter and Levine-Donnerstein, 1999). Two researchers reviewed, coded, discussed, and came to a common agreement and understanding for each definition to create a final list of categories for codes created. These categories were then used to code the definitions to form the key definitions of online learning. The evolution of key concepts was analyzed by temporal analysis or time-series analysis. Singh and Thurman (2019) presented a content analysis using NVivo for data analysis of definitions of online learning found in articles with definitions for the code scope they

looked at. The definitions found were: (code, Number of articles code present in) technology – 34, synonymous terms – 11, time-asynchronous – 11, problems in the field – 10, interactivity – 10, time-synchronous – 9, physical distance – 7, and educational context – 2 (Singh and Thurman, 2019).

Singh and Thurman (2019) concluded with 19 overlapping terms and concepts to define online learning. They coded the definitions of online learning as well to showcase the confusion that exists when defining this term. Challenges arise for researchers and practitioners in the field due to this term not having a standard definition. Research by many authors has identified the concern for a lack of a standard definition of online learning and suggest needing clearly defined terms for the definition. Singh and Thurman (2019) concluded that defining online learning is difficult because the term is broad and synonymous with many others. Some authors define it explicitly while others simply use related terms or imply a definition. There has been confusion surrounding the definition of online learning as early as 2001 and recently in 2017. Bates (2001) states online learning is unclear with what qualifies it online learning with most having materials online as meeting the requirement for online learning. Lee (2017), Moore et al. (2011) and Ryan et al. (2016) report that some scholars use terms interchangeably adding to confusion with online education being internet based and e-Learning having additional components such as CD ROMs, satellite, and television. Research finding for online learning showed technology as the most clearly defined and crucial element for online learning. Singh and Thurman (2019) state many authors reference various

methods of electronic communication to aid correspondence between student and instructor. Elements of technology also include the platform to keep learning material organized, enhance interaction between student and instructor and enhance the learning environment. The findings also found time as a key element. Both synchronous and asynchronous are mentioned as options with synchronous being a beneficial option and asynchronous as an opportunity and not a component of online learning. Asynchronous definitions were associated more with Distance Education. Another key element was interactivity (instructor to student, student to student, student to technology) using both asynchronous (discussion boards), synchronous (chatrooms) or digital technology formats. When defining online learning, physical distance is mentioned but not always and linked more to distance education and learning as a subset or synonymous when defining. When defining online learning, formal or higher educational institutions are not a requirement. It can aid when looking at open learning environments and formal online learning. “Traditional classroom setting” or face-to-face (F2F) can have online content with terms being used to demonstrate the contrast or difference when defining online learning. It is noted that the term blended learning adds more confusion when defining online learning. Looking at how the definition of online learning has evolved over the past three decades, Singh and Thurman (2019) found it continually changes as we evolve and new technology and concepts such as flipped classroom evolve. Inconsistent terms for technology such as E-learning or web-enhanced learning add to the confusion. We have gone from blended and/or hybrid to

F2F on the internet which has led to online learning. Over the years, we have used email, messaging, chat groups, newsgroups, and online conferencing tools to increase interactivity. The variations of online components add to the confusion in defining online learning over the years.

Singh and Thurman (2019) coded research for the evolution of definitions:

- Problems in the field – lack of agreed upon terminology and definitions,
- Synonymous terms – used inconsistently and sometimes incorrectly aiding to confusion,
- Time – has evolved through the years and is broad including asynchronous and synchronous elements and was discussed more in the early years but is looked at now as a benefit,
- Technology – clearly defined with evolving technology changes and is used consistently in defining online learning,
- Physical distance – through evolution has dropped off and no longer discussed,
- Education context – is assumed to be associated with higher education unless mentioned as discussing school or online communities for training and learning.

These terms have evolved over the years from being confusing to acknowledging this and trying to correct it by acknowledging it. Singh and Thurman's (2019) research found when defining online learning the top five terms are: online learning, E-learning,

blended learning, online education, and online course. The research concluded by saying authors are trying to reduce confusion by including it as these concepts evolve and grow. Online learning is a misused and overused term for online education. Within online learning, the component of how learning and student engagement is happening is left out. Researchers suggested that to define online learning one must consider the following: clear domain delineation of concept, explication of use of technology, teaching environment is synchronous or asynchronous, and interactivity/learning examples and specify physical distance if any. The main elements are technology, time, synonymous terms (top terms are: online learning, E-learning, blended learning, online education, online course, distance education, and distance learning) (Singh and Thurman, 2019). Online education is a broad term with online learning and online teaching as subsets. Online learning is used as an umbrella term and is used when including many concepts.

Today, web-based course-management systems are used for distance learning courses that incorporate digital reading materials, podcasts (recorded sessions for electronic listening or viewing at the student's leisure), e-mail, threaded (linked) discussion forums, chat rooms, and test-taking functionality in virtual (computer-simulated) classrooms. Both asynchronous and synchronous systems are used. Within virtual learning and online learning there are a few approaches for setting up the program online to deliver the course for material and connect for interactive environments. These terms can be confusing to new users and need to be examined

further. There are three formats for online education: asynchronous, synchronous, and hybrid.

Asynchronous format is online learning that is time-independent, and both the instructor and student can access the information at their convenience. Dung (2020) states this format is not in real-time and students are more active in the process of doing the work since it is more at their pace. Interaction and discussion are through boards, blogs, and email or various mediums. The flexibility allows for students with busy or time constraining schedules. This typically has dates to have information performed by and deadlines for assignments therefore no class meeting time. Asynchronous are used more often and allow students to access materials when needed. According to Perveen (2016), asynchronous environments allow for learning material (audio/video lectures, handouts, articles, PowerPoint presentations) to be provided to students with the ability to access at their convenance in time and location. Raymond et al. (2016) discussed tools for online teaching where the instructor provides the lesson through videotape, YouTube, digital video disc (DVD) or podcast for the student to access later and communicate through email. With this type of environment, students do not have to answer immediately and can take the time to think about the question and apply it for higher order thinking and learning then construct an answer. The geographic difference between teacher and student also helps students to be less shy with less pressure which enables them to reach out more to the teacher and participate (Perveen, 2016, p.22). Coogle & Floyd (2015) report that students enjoy

asynchronous environments because they allow for flexibility and working at their own pace.

Synchronous format is an online learning environment where the instructor and student meet virtually at a set day/time to go over material together simultaneously. Dung (2020) reports that “synchronous” is when material instruction is delivered at a set day/time with instructor and students online simultaneously from the convenience of where they are in real-time. This allows both instructor and students to actively participate during the discussion through video, polls, and can even break off to groups for participation. Synchronous is used with live video, audio, and shared access to electronic documents at scheduled times. Educational interaction takes place in shared spaces such as blogs, wikis (web sites that can be modified by all classroom participants), and collaboratively edited documents (Berg, Gary A. and Simonson, 2016). Hybrid format is an alternative blended combination of these two plus face-to-face allowing for a mix of interaction between the instructor and student. According to Skylar (2009), advantages of synchronous learning include the ability to have the instructor present to answer questions with real time learning and discussion of knowledge taking place. Contradictory to traditional online learning environments where learning is at participants convenience (day, time, and pace), the disadvantage is a set day and time for this to take place. It is common knowledge that some students struggle with traditional classroom style of learning when they are introverts by nature. This type of learning environment allows these students to be comfortable in their environment as

they need to be and achieve the learning needed in a less stressful way (Amiti, 2020). According to Perveen (2016), instructors can record lessons and store them in an e-library for students to access as needed to review and replay lectures when necessary to understand the material. Mick & Middlebrook (n.d.) discussed advantages of synchronous e-learning on the interpersonal level were participants have the real-time engagement or feeling of intimacy, which tend to be associated with student satisfaction, student learning, and lower rates of attrition. These interactions can help students gain understanding and alleviate miscommunication through feedback. Tabatabaei and Sharifi (2011) went on to say teaching and learning is enhanced by using real-time interaction and participation through discussion forums and online chat rooms because the student must quickly process content and respond. One challenge with synchronous media software stated by Mick & Middlebrook (n.d.) is scheduling challenges for the instructor to speak to the entire class or even a one-on-one interaction. Another disadvantage as stated by Chen, Liu, & Wong (2007) is the fact that each person learns at a different pace therefore the instructor may feel the need to slow down while the more advanced learners may zone out causing issues that will need to be addressed for learner styles.

Table 2 below shows the online delivery formats (asynchronous, synchronous, and hybrid) with definitions, advantages, and disadvantages for each for better understanding.

Table 2

Online Delivery Formats (asynchronous, synchronous, and hybrid) with Definitions, Advantages, and Disadvantages

Online Delivery Formats	Definition	Advantage	Disadvantage
Asynchronous	• Unsynchronized, and both the instructor and student can access the information at their convenience. • Format is not in real-time, and students are more active in the process of doing the work since it is more at their pace. • Interaction and discussion are	• Flexibility allows for students with busy or time constraining schedules. Dung (2020) • Students to access materials when needed. • Allow for learning material (audio/video lectures, handouts, articles,	• Interaction or interactivity between participant and instructor. Chen, Liu, & Wong (2007)

	through boards, blogs, and email or various mediums. • Typically has dates to have information performed by and deadlines for assignments therefore no class meeting time Dung (2020)	PowerPoint presentations) to be provided to students with the ability to access at their convenance in time and location. • With this type of environment, students do not have to answer immediately and can take the time to think about the question and apply it for higher order thinking and learning then	

		construct an answer. • geographic difference between teacher and student also helps students to be less shy with less pressure which enables them to reach out more to the teacher and participate. Perveen (2016) • Students enjoy synchronous environments because they allow for	

		flexibility and working at their own pace. Coogle & Floyd (2015)	
Synchronous	• When material instruction is delivered at a set day/time with instructor and students online simultaneously from the convenience of where they are in real-time. • Able to actively participate with each other for learning experiences and	• Ability to have the instructor present to answer questions with real time learning and discussion of knowledge taking place. Skylar (2009) • Less stressful environment for introvert learners to be able to participate and	• A set day and time for this to take place. Skylar (2009) • One challenge with synchronous media software with schedules and speaking all at the same time. Mick & Middlebrook (n.d.) • Each person learns at a

	engagement. Dung (2020)	learn. (Amiti, 2020) • Instructor can create an e-library for participants to access material later for review or better understanding. (Perveen, 2016) • Participants have the real-time engagement or feeling of intimacy, which tend to be associated with student satisfaction,	different pace therefore the instructor may feel the need to slow down while the more advanced learners may zone out causing issues that will need to be addressed for learner styles. Chen, Liu, & Wong (2007)

		student learning, and lower rates of attrition. Middlebrook (n.d)	
Hybrid	• Alternative blended combination of these two plus face-to-face allowing for a mix of interaction between the instructor and student. Skylar (2009)		

Moser & Smith (2015) suggest some best practices for the conduct of synchronous online courses: provide a welcome message that is displayed approximately 15 minutes before class, notify class of your presence and encourage equipment checks, provide easily accessed methods to connect/enter the virtual classroom, record class meetings, discourage unnecessary use of video sharing, maintain virtual office hours, pre-load software that will be used during class presentation, if possible have more than one monitor/display, equip your teaching/production facility with various video options, use electronic textbooks and other reference materials, encourage (require?) students to participate in virtual study sessions/group meetings, and integrate additional software systems to augment the virtual classroom experience (Adapted by Moser & Smith, 2015, p.46-48).

Terminology Conclusion

The COVID-19 pandemic brought online learning to the forefront when a time of social distancing was needed to weaken the spread of the virus and allow everyone to continue to work and learn in an online or virtual setting. Historically, some institutions have been reluctant to pursue the online learning environment in addition to traditional pedagogical approaches. COVID-19 required learning institutions to think and act quickly to identify a new approach to teaching and learning in the online environment. Institutions not ready for this change had to quickly implement, overnight, a means of online learning which included a technology platform for communication, building lessons and uploading material online, determining how to interact and assess student or participant learning to ensure they were gaining knowledge and retaining the material. They also had to determine online capabilities for Wi-Fi and mobile devices, downloading errors, login problems, audio or video issues to ensure students or participants were able to obtain and understand the material. Instructors had to learn new technology, build the lessons in the platform and figure out technology issues all while teaching the class and attempting to keep the students or participants interested and learning the material with two-way interaction. Liguori and Winkler (2020) suggested that Institutions' innovative solutions will aid in the pandemic, adding the three biggest challenges to online learning are distance, scale, and personalized teaching and learning. Stauffer (2020) states the difference between online learning and distance learning are location, interaction, and intention which makes Clemson

University's Extension Services online programs termed distance education. Use of technology exploded with products from Google and the most popular Zoom coming to forefront and aiding to the success as alternatives for face-to-face environments (Basilaia et al. 2020). Saxena (2020) realized the need for etiquette online and developed a list of instructions for attending class to make it a smoother teaching/learning environment.

The COVID-19 pandemic made it necessary for Clemson Extension Services to be online to reach and educate participants and residents of South Carolina. To provide an accurate analysis of the programs Extension delivered online, we must standardize a definition for those we include in our analysis. The population for Extension Service is often older adults who are employed full-time that may need an environment of learning that is free from the traditional in-person or classroom constraint of time and location (Bacow et al., 2012). The availability of online learning at a distance enables them to be able to continue work while gaining knowledge and understanding that is wanted or needed for careers or personal experiences. Based on the research above on terms and definitions, Clemson University Extension Services defines distance education as: an institutional-based learning experience delivered through internet with no geographic constraints using either a synchronous environment (instructor and participants meet at a specific day/time simultaneous but not dependent on physical location to interact through communication and active environments), or an asynchronous environment (instructor loads material to a platform and students access

it at their convenience to engage and learn the material), for means of communicating knowledge, skills, and materials to participants.

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CHAPTER THREE

EXTENSION SERVICES PERSPECTIVES TO ONLINE LEARNING AND DISTANCE EDUCATION

Extension Services and agriculture continue to evolve through the emergence of science and technology (Kuhn 1962) along with information communication technology (ICT) continuously changing and improving leading to knowledge discovery and new practices. With improved technology, audiences look for and demand information on the latest programs and practices to be online to meet the needs locally and globally (Huffman 1977; Anderson and Feder 2007). World Bank (2017) suggests barriers for farmers gaining information through online resources is lower due to improvements to information communication technology (ICT) making it more readily available. Farmers tend to dislike software packages and technology because they typically learn by doing and experimenting. However, they do adapt to technology that is presented in small doses or sequentially with demands that fit what they need (Pannell and Claassen 2020). Developing countries are adding to the current hands-on approach by supplementing with new technology with cell phone apps and distance learning to reach farmers and the global population with in-depth information published in a timely manner with evaluation for success (Norton and Alwang, 2020). Norton and Alwang (2020) also point out online options, when applicable, can decrease impact on institutional budgets by eliminating the expense of printing materials and hosting workshops and field days. Continued success of Extension Services requires

disseminating newly discovered knowledge and leading the field with the latest agricultural innovations and practices (Norton and Alwang, 2020).

Research in education often looks at the internal and external elements through SWOC (strengths, weakness, opportunities, and challenges) evaluation. Strengths are categorized as capabilities, weakness as challenges (negative issues to improve), opportunities as prospects, and challenges as issues (external issues out of a person's control) (Dhawan, 2022). Diem et al. (2011) discussed demand for technology and stated that some people expect programs to be available online while others still want the in-person traditional programs. The need to reach both populations is important and expected within Extension Services outreach to provide services. These researchers conducted a survey to determine if Extension is ready for delivering programs online while reaching current and new audiences. They found weakness and issues with time, training, meeting the needs of the current audience and reluctant to change, technology capabilities, and funding. Researchers also provided strengths and opportunities as: changes needed to address this growing audience as a balance approach with the need to reach the global audience; be the model for leadership in use of technology in Extension; establish and implement a technology plan along with promoting and recognizing use for it and dedicating resources and support. They state adding on job functions to current Extension agents will not work due to the workload and expectations for in-person programs and on-site help to farmers (Diem et al., 2011).

A successful asynchronous online Extension program for Forest Landowners through Washington State University was described by Zobrist (2014). Zobrist (2014) developed online learning modules testing participants and identified the need for asynchronous online programs that can reach new and larger audiences with lower cost and greater efficiency and the ability for participants to work at their own pace as strengths. Some challenges highlighted include: time commitment for initial development of the online program, logistics for program delivery (gathering feedback, assessing knowledge, evaluation impacts), meeting publication standards for online images, and cost of e-commerce systems (Zobrist, 2014).

Dromgoole and Boleman (2006) completed a Delphi study of 51 county extension agents, specialists, associates, and managers to determine perceived barriers and opportunities for distance education. Researchers reported that agents had to be adaptive for the program to work and that online delivery needed to be viewed as an integration or added value to the current program and not competition for the traditional program. Top strengths for online delivery were decreased travel time and expenses, increased availability and ability to reach different places and larger more diverse audiences, potential for expansion of programs, and opportunity for multi-delivery systems. Top challenges included concern about connectivity for client's homes, computers/technology needs, and competencies with technology. They add the agents have a lower concern with interaction with the learner, cost of developing high quality programs delivered at distance, and clientele not accepting distance education.

Potential topics for online education opportunities were determined to add diverse and flexible content for the audience.

Review of literature on SWOC for Extension identified some common key factors for online learning. While literature was not very specific to Extension, the broad context of programmatic research exists. Dhawan (2020) conducted a thorough SWOC analysis of online learning during times of crisis using a descriptive research method. Crisis times create havoc on people's lives with the potential of psychological problems such as stress, fear, anxiety, depression, and insomnia leading to loss of concentration and focus (Di Pietro, 2017). Barboni (2019) suggests a mix of traditional and e-learning can bring efficiency, effectiveness, and a competitive edge to produce a quality educational experience.

Dhawan (2020) SWOC analysis conducted during the COVID-19 pandemic analyzed online learning for one such Extension program. Results for strengths were time flexibility, location flexibility, catering to wide audience, wide availability of courses and content, and immediate feedback. Weaknesses are technical difficulties, learner's capability and confidence level, time management, distractions, frustration, anxiety and confusion, and lack of personal/physical attention. Opportunities that emerged are scope for innovation and digital development, designing flexible programs, strengthen skills such as problem solving, critical thinking, and adaptability, users can be of any age and an innovative pedagogical approach (Radical transformation in all aspects of

education). Finally, challenges brought out unequal distribution of ICT Infrastructure, digital illiteracy, digital divide, and technology cost and obsolescence (Dhawan, 2020).

Joshi et al. (2020) conducted a SWOT or SWOC analysis with Analytical Hierarchical Process (AHP) at Oklahoma State University for Agriculture and Natural Recourses Education to determine instructor perspectives and prioritize them. SWOT-AHP found strengths were work-home life balance, participant's access to recorded lectures, generally less expensive, and facilitates student/instructor autonomy. Weaknesses were lack of hands-on experiences (e.g. field trips and real world application), lack of social interactions, delay in feedback from instructor, and diminished quality of instruction. Opportunities identified included virtual classroom for working professionals, increases diversity in the higher education, can potentially cultivate independent learning environment, and could help to improve self-discipline. Finally, threats identified were societal skepticism on quality of education, vulnerable to scams or academic dishonesty, may challenge university prestige in long-run, and obstacle for innovative ideas. Joshi et al., (2020) concluded for online learning to take place effectively there needs to be an environment for real-world applications to occur, incentivize students to get active and local and for real-world experiences, implement social interactions through peer-engaging activities, and the use of secure platforms to help with cyber security and academic integrity.

Stotz et al. (2019) with the University of Georgia examined perspectives of key stakeholders with the nutrition education program for low-income adults through a

semi structured focus group of UGA Extension peer nutrition educators and SNAP-Ed-eligible individuals. Strengths identified from focus groups were internet accessibility and flexibility with time, location, and asynchronous/synchronous delivery. Lack of motivation for the content was a weakness. Opportunities included tailoring content, making "hot topics" and more of what the audience is needing and interested in and mandating the program for SNAP beneficiaries. Challenges were mandating the program to get SNAP benefits. Issues presented were based in change theory research that supports intrinsic motivation as the biggest factor in people's desire to make a behavioral change for self-efficacy (Sherman et al. 2016).

University of Maryland conducted research based on observation that plant Clinics were going virtual due to limited resources and the need to reach participants with technology (Kness et al., 2021). They created material and conducted synchronous classes and administered participant questionnaires for data collection. Researchers concluded that virtual programs allowed increased participation, improved knowledge transfer, more inclusive audience, greater communication between agent, faculty, staff, and participants geographically. They further concluded that virtual programs serve the client best because increased knowledge transfer to farmers helped them save crops and money while the University saved money because the program is less expensive and manageable to run once implemented compared to in-person (Kness et al., 2021).

Eck et al. (2021), researched synchronous online instruction during the COVID pandemic to determine if Extension agents were able to navigate online learning

effectively thereby meeting the needs of participants while F2F was not allowed. The research team was Agricultural and Extension educators evaluating proficiency and competency when using synchronous learning platforms. The Zoom platform was identified as the most commonly used platform although agents were not using the available features to the fullest and therefore not getting the most out of class or discussions with participant interaction. Eck et al. (2021) found no difference in impact of F2F program when delivered online with agents being able to use platforms (Zoom and Microsoft Teams) with participants to disseminate knowledge. Lack of knowledge with the platform features and accessibility tool available with Zoom and Microsoft products was a disadvantage. Eck et al. (2021) stated the need for more training of features to improve knowledge about platform features and ways to use features to assess participant knowledge gained from program delivery. These results suggest Extension can have a strong online program but need to be trained to communicate clearly using best practices for program delivery and utilizing technology to maximize impact on clientele (Dromgoole and Boleman, 2006).

Research was conducted by University of Florida and University of Kentucky to see how Extension professionals performed at spreading information, technology used, and wellbeing during the COVID 19 pandemic (Israel et al., 2020; Sampson et al., 2020). A survey with open- and closed-ended questions was administered to extension agents and professionals to assess their preparedness for outreach and support during times of crisis. The survey was distributed through the Southeastern Coastal Center for

Agricultural Health and Safety (SCCAHS) and 10 other agricultural safety and health centers. Results of the survey showed agents reached clientele through social media, websites, professional networking, newsletters, and webinars or online training. Two-thirds of agents reported being moderately or greatly prepared for meeting the needs of participants during this pandemic and 80% said they had the support that was needed to delivery these programs. Researchers concluded that professionals have substantial capacity to work online but need the support and training to conduct more of these programs (Israel et al., 2020; Sampson et al., 2020). These reports support the notion that Extension Services can conduct online programing effectively if they have appropriate technology equipment and support.

Extension Services is an outreach service known for holding in-person meetings, programs, and trainings. Due to Extension Services programs being mostly in-person, there is not an abundance of literature specifically on online programs to aid in this study. Table 3 summarizes the findings from the literature review and provides a literature driven SWOC analysis for online education through Cooperative Extension.

Table 3

Strength, Weakness, Opportunity, and Challenges Analysis for Online Education

SWOC Table	
Strength = capabilities	Weakness = challenges • Technical difficulties

• Saving time and money for traveling and hosting workshop • Location flexibility • Reach a larger and more diverse audience • Versatility of course content • Have immediate feedback	• Learner's capability and confidence level • Time management
Opportunity = prospects • Innovation and digital development • Designing flexible programs • Strengthen skills for problem solving • Critical thinking • Adaptability - users can be of all ages • Innovative pedagogy	Challenges = issues • Distribution of information communication technology infrastructure • Digital illiteracy • Digital divide • Technology cost and obsolescence

(Dhawan, 2020).

Conclusion for Perspectives to Online Learning and Distance Education

Review of literature on strengths, weakness, opportunities, and challenges (SWOC) for Extension Services provides a strong justification for online learning program deliveries in today's society. Literature-driven review of SWOC shows the strengths and opportunities outweigh the weakness and challenges presented. Extension's priority is

to reach people locally and globally to disseminate research-based knowledge that is accurate and innovative with materials, technology, and programs. Research suggests the need for online programs to reach audiences who expect information to be online with the ever-evolving information communication technology and for convenience with the mindset of being able to access information and programs when they want with participation at their own pace. Research shows Extension professionals see the need for online programs and have the capabilities and support to develop these programs which is the biggest time commitment (Zobrist, 2014). Extension professionals identify saving time and money for traveling and hosting workshop, location flexibility, ability to reach a larger and more diverse audience, versatility of course content, and potential for immediate feedback as strengths for online education. Weaknesses to consider are technical difficulties, learner's capability and confidence level, and time management. Opportunities include innovation and digital development, ability to design flexible programs, potential to strengthen skills for problem solving, critical thinking, and adaptability. Additional opportunities identified include the potential for online education to reach users of all ages, and implementation of innovative pedagogy. Challenges that may occur exist in topics such as the lack of information communication technology infrastructure, digital illiteracy, digital divide, and technology cost and obsolescence (Dhawan, 2020).

While education has traditionally been delivered through face-to-face (F2F) interactions, the COVID-19 pandemic disrupted lives and technology surfaced as a tool

for online delivery of education. Extension leads the way in service, research, and innovation and can be the leader in online learning by utilizing technology to get the information and programs out to the global audience. Eck et al. (2021) identified that a best practice for synchronous online instruction includes professional development for extension agents who are willing to search for training opportunities to improve knowledge and skills on platform features to offer successful synchronous online learning experiences for participants. Agents need to be proficient in platform skills and knowledgeable about interactive online methods for material delivery and assessment.

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CHAPTER FOUR

ONLINE LEARNING AND DISTANCE EDUCATION COMPETENCIES, ASSESSMENT AND EVALUATION

When examining online learning and distance education, a literature review was conducted to determine best practices for online programs success and to ensure participants gain knowledge. Research has indicated instructors are able to adapt F2F competencies to online environments to be increase success there is a need for additional competencies and skills (Harasim, Hiltz, Teles, & Turoff, 1997; Stephenson, 2001; Goodyear, 2002). Literature review of strengths, weakness, opportunities, and challenges (SWOC) for perspectives of online learning proved the need for online platform training opportunities as professional development to ensure instructors are using all skills available to engage and educate learners. Eck et al (2021) stated the need for training with platforms to improve knowledge and ability to ensure knowledge transfer and understanding of material to participants with interaction and discussion for assessment. Palloff and Pratt (2001) discuss the need for professional training for the instructor to be able to take on not only the role of the facilitator of knowledge but also technology. We are going to examine research for online learning and distance education to determine instructor competencies, assessment and evaluation.

Competency

A competency is “a knowledge, skill or [ability] that enables one to effectively perform the activities of a given occupation or function to the standards expected in

employment" (Richey, Fields & Foxon, 2001, p. 26). Spector (2001) stresses the issue of Information and Communication Technology (ICT) constantly changing therefore the need to reevaluate competencies for online instructors is needed to continue to be up-to-date and successful in the online environment. When examining competencies, the role of the instructor adds an additional level of skills compared to traditional class instruction by becoming facilitator, use of technology, platform development for the course materials and lessons, active teaching and learning, and pedagogical aspect for online learning (Thach and Murphy, 1995; Goodyear, Salmon, Spector, Steeples & Tickner, 2001; Aydin, 2005; Bawane & Spector, 2009; Abdous, 2011; Farmer & Ramsdale, 2016). It is emphasized by Beck and Ferdig (2008) and Easton (2003) that the role of the instructor changes paradigm being more student-centered for engagement, high interaction with instructional time, space, and virtual management techniques, and high initiator for the need to engage students through communication platforms (canvas, blackboard, etc.). Zhen, Garthwait, and Pratt (2008) found self-efficacy in using online course applications and technology effectively was a barrier to teaching online. Faculty with high self-efficacy in platforms and the ability for students to learn online were more willing to invest the time commitment in developing and teaching online programs. Shea (2007) conducted a survey on 386 professors at 36 institutions determined those more skilled in technology were more willing to use it while Tabata and Johnsrud (2008) found if faculty believed in their technology skills they were more agreeable to teach online.

Martin et al (2019) compiled research from eight award-winning faculty for online teaching to determine key competencies. The method used was in-depth qualitative open-ended questions that were then coded by two researchers for agreement. Five roles emerged from the data: facilitator, course designer, content manager, subject matter expert, and mentor. See table 4 for detailed information for each area. Martin et al. (2019) stated two common task being course design (structuring and organizing content, developing materials and activities, designing assessment, and reviewing previously taught for revisions) and teaching (get to know students, interact with them, be visible on screen so they know who you are and associate you as a person, facilitation discussion, meaningful engagements, actively creating student connections and meetings during discussion for students to have peer connections if help is needed, and provide feedback).

Table 4

Roles and Responsibilities of Online Instructors

Roles and Responsibilities of Online Instructors	
Role	Responsibility
Facilitator	• Presence – make presence known so students have a feeling of the instructor is there even if they are not always • Be available • Share expertise

	• Model what is needed for the online course • Interactivity to Forster and Engage students to ensure they are learning. Use different media (example: recorded lecture then videos and active discussion post) • Formative assessment for student learning • Reflection for assessment to determine if course design is benefiting student learning
Course Designer	• Learning objectives with active learning strategies, designing the course with the content and deliver approach in mind, accessible and ADA-compliant • Creative approach to designing the classroom or area to make it inviting and have a sense of the subject matter • Ability to reflect on course design and determine what did and did not work to address for future • Creative design may depend on institution and software, rules, and if experienced experts to help create • Some pointed out institution should have technical support to aid participants in technical issues. Not instructor job. Learning Management Systems for instructions on uploading files, submit assignments, use collaborative learning spaces

Course Manager	• Content – video, lecture, text on page, grading, collecting assignments, encouraging students not attending
Subject Matter Expert	• Content expertise in instructional design, choice of content, connection of content to real-life
Mentor	• Instill professionalism • Guidance, Career goals, encouragement, personal connection to keep students connected in the online environment • Create an effective and productive learning experience. Engaging students, ensuring interaction, being responsive with communication for the course, providing detailed instructions and expectations • Be more intentional online to reach all types of learners • ensure meaningful learners through creating meaningful interactions to support learning

(Martin et al, 2019).

Martin et al. (2019) found competencies of online instructors to be technical skills, willingness to learn, knowledge of how people learn, content expertise, course design skills, and student learning assessment skills. Martin et al. (2019) states technical skills are ability to design and teach the course effectively using a learning management system (LMS), effectively use technology skills (E-mail, navigate browser windows, file

upload and download, and PDF creation), ability to create audio and video materials, screencasting, use microphones, PowerPoint with voice over, uploading videos, providing online feedback, successfully working in collaborative online platforms, and writing for web and audience when conveying materials. Martin et al (2019) describes willingness to learn is to be a life-long learner, search out how to effective teach online and stay current with research and trends, know various learning styles and design with these in mind, learn various technology to reach students, look at material from the learners perspective, have a desire to teach and assess student learning to know knowledge gain and is it effective, be willing to put extra time in to interact with students. Knowledge of "how people learn" is knowing the different learning styles and designing the course with this in mind to reach all participants with assessment to ensure accurate knowledge is being learning. Be a content expertise but also know how to deliver the content so students can learn. Learn course design skills to be able to design and navigate the online course with regulations effectively with learning objectives and logical sequence, content filed together and in manageable size for students to learn and include appropriate assessment of students. Finally, Martin et al. (2019) states the need to assess student learning to ensure accurate knowledge transfer, reflect to see if students learned what was intended, and provide timely constant feedback to students to keep them motivated and learning. Table 5 summarizes this information.

Table 5

Competencies of Online Instructors

Competencies of Online Instructors	
Competency	Description
Technical skills	• Ability to design and teach the course effectively using a learning management system (LMS) • Effectively use technology skills (E-mail, navigate browser windows, file upload and download, and PDF creation) • Ability to create audio and video materials, screencasting, use microphones, Powerpoint with voice over, uploading videos • Provide online feedback • Successfully working in collaborative online platforms • Writing for web and audience when conveying materials
Willingness to learn	• Be a life-long learner • Search out how to effectively teach online and stay current with research and trends • Knowledge of various learning styles and design with these in mind • Learn various technology to reach students

	• Look at material from the learner's perspective to design appropriately • Have a desire to teach and assess student learning to know knowledge gain and is it effective • Be willing to put extra time in to interact with students
Knowledge of "how people learn"	• Knowing the different learning styles and designing the course with this in mind to reach all participants • Assess to ensure accurate knowledge is being learning
Content expertise	• Be an expert in the field • Ability to learn and deliver the content so students can learn
Course design	• Learn instructional design skills to be able to design and navigate the online course with regulations effectively • Use learning objectives • Have a logical sequence • Build content that is filed together and in manageable size for students to learn • Create appropriate assessment of students
Assess student learning	• Ensure accurate knowledge transfer • Reflect to see if students learned what was intended

	• Provide timely constant feedback to students to keep them motivated and learning

(Martin et al, 2019).

Martin et al. (2019) states novice instructors become proficient in online competencies by attending workshops and seminars not only to learn the material but to see and how others do it and see from the student's point of view. Search for training opportunities through the institution's professional development opportunities, workshops, webinars, help sessions, professional organizations, and have a formal peer review for feedback.

Research found International Society for Technology in Education (ISTE) (2023) created seven standards for teachers to implement online education: learner, leader, citizen, collaborator, designer, facilitator, and analyst (Table 6).

Table 6

International Society for Technology in Education (ISTE) (2003) Standards for Implementing Online Learning

International Society for Technology in Education (ISTE) (2023) Standards for Implementing Online Learning	
Standard	Description

Learner	• Continued research and growth in technology skills. (Collaborate with other professionals, professional networks, stay abreast of current trends and research)
Leader	• Look for opportunities to enhance teaching and learning. Research new technologies
Citizen	• Mentor students to become ethical and technology safe
Collaborator	• Work with colleagues to create learning experiences • Work with students to learn new technology and diagnose technology issues
Designer	• Design technology that is learner-centered and promote independent learning
Facilitator	• Create an online environment that supports student achievement and fosters them own the learning experience
Analyst	• Formative and summative assessments that provides data to supporter learning

Borah and Devarani (2021) conducted research using institutes in North-East India teaching agricultural undergraduates to determine faculty member competency in online teaching during the COVID-19 pandemic. They used a pre-test questionnaire with the Likert scale with a response rate of 58.67%. Results found faculty members felt they had highest competency rankings with ethics (wanting to teach, be fair, facilitate

student learning, mission of the institution). Technology was next with the ability to be competent with Microsoft office, online teaching platforms, online exams followed by session management (design clear detailed lessons, provide feedback, manage time during session) then facilitation (engage students through two-way communication, group discussion, show empathy when communicating) and finally content facilitation (encourage students with additional resources for deeper learning) (Borah and Devarani, 2021).

Conclusion for Competency

Research on online learning and distance education instructor competencies prove skills are vital to creating and conducting a successful online program. Any program can be online but creating one that is dynamic and reaches the students with active learning and engagement is key. Instructors need to take an active role with the willingness to learn and search out new technology for communication therefore not feeling disengaged from students due to the communication forms available not meeting the desired needs (Arend, 2009; Haber & Mills, 2008; Mazolini & Maddison, 2007; Ward et al., 2010). The instructor must take on various roles compared to traditional teachers due to the complexity of online learning environments. Martin et al (2019) found the key roles to be: facilitator, course designer, content manager, subject matter expert, and mentor. Martin et al. (2019), International Society for Technology in Education (ISTE) (2017), and Borah and Devarani (2021) all provide evidence of similar competencies that make a difference in creating and instructing a successful online

learning environment. Martin et al. (2019) summarized competencies by stating competencies of online instructors to be technical skills, willingness to learn, knowledge of how people learn, content expertise, course design skills, and student learning assessment skills. When looking at creating or reevaluating an online program, instructors need to look at these competencies to ensure they are creating the most successful program for both the instructor and the student to learn and engage together. Research found faculty felt motivated, rewarded and were more attracted to teaching online when positive learning, high-quality training, program support, mentoring, or professional development for new technology was offered to help them grow and learn more intellectually (Chapman, 2011; Green et al., 2009; McQuiggan, 2012; Pandra & Mishra, 2007; Seaman, 2009; Alsofyani et al., 2012; Chao et al., 2010; Shea et al., 2005; Wang & Wang, 2009).

Assessment and Evaluation

As online learning and distance education continues to grow, assessment and evaluation are key component to the online learning environment not only for accountability but for quality of the course and program. It allows institutions and administrators to determine the depth of the program and usefulness of the program. Assessment and evaluation can gage if the program is disseminating the perceived knowledge of the program to the participants, enables instructors to know if students are gaining perceived knowledge and able to transfer it for true knowledge learned, and allows for revision to ensure success with program and instructional outcomes.

Research suggests assessing quality and evaluation to help guide and develop the course with student learning objectives (Parscale et al., 2015). Research states institutional differences found with evaluation standards therefore professors need to create standards and course review for quality assurance for the online program (Chua and Lam, 2007). Martin et al. (2019) states "the adoption of best practice and standards for online courses helps to create a culture of intentionality with carefully constructed learning outcomes connected to engaging learning materials, systematic procedures and processes used throughout an online course's life-cycle, and an overall focus on quality leading to ongoing evaluation and revision of online courses." Peterson (2016) examined formative assessment as a methodology for value added to the course by conducting evaluations during and throughout the course to assess quality and student learning to revise material immediately for improvements when necessary for both student and teacher for improvement and to have an effective course. Moore and Kearsley (2011) examined literature and found consistent results stating the importance of online courses needing to look at student learning outcomes and clearly communicate these and the assessment with the students. Some institutions use instruments such as Quality Matter Rubrics to determine standards for assessing quality and developing course design (QualityMatters, 2018; Legon, 2015). Other forms of evaluation explored up in research are logic models and developmental evaluation. Logic model are graphics showing how the program will work looking at program resources, activities, and its intended outcomes (Funnell & Rogers, 2011). Research indicates logic models can be

time consuming and require an expertise to design and facilitate (Gugiu and Rodríguez-Campos, 2007; Renger and Titcomb, 2002) and may limit professors' ability to revise when needed to meet the needs of the students in complex programs (Taylor-Powell & Henert, 2008; Renger et al., 2011). Developmental evaluation is an adaptive evaluation that reviews and evaluates the program then allows for implementation for new measures when needed to adapt to the situation (Patton, 2016).

Research was conducted by Martin et al. (2019) to determine online teaching practices for course design, assessment and evaluation, and facilitation. They used eight award winning faculty for online teaching to determine best practices for course design, assessment and evaluation, and facilitation. The use of "award winning" faculty is common in higher education (Dunkin & Precians, 1992; Kember & McNaught, 2007; Morris & Usher, 2011, Bailey, 2008) and is a great source of knowledge and best practices for standards, competencies, and effective design and delivery for engaging online courses. Martin et al. (2019) first examined literature to develop a conceptual framework to organize material and then developed a semi-structured interview and collect in-depth qualitative information from purposefully selected faculty and data was coded with three times for agreement.

Martin et al. (2019) conducted extensive research and developed a conceptual framework for effective online courses in three areas: online course design, online course assessment and evaluation, and online course facilitation. Martin et al. (2019) stated "the courses are carefully designed before, facilitated with intention during,

systematically evaluated after, and revised accordingly to support learning objectives". They developed a three-circle approach with design, assessment and evaluation, and facilitation looking at the program before, during, and after to reassess and reevaluate for needed improvements. The three-circle approach has all circles working together and connecting in the middle creating the effective online course. Online course design is designing the course with the student learning outcomes in mind (Martin et al, 2019). Research on practices and standards become confusing due to terms being synonymous making it difficult to find information (Moore, Dickson-Deane, & Galyen, 2011). Numerous best practices and standards have been examined through theories and models of online learning (Community of Inquiry and Cognitive Load Theory) with no set rule or practice (Crews, Wilkinson, & Neill, 2015). Research states there is no superior model that meets all situations for online learning or a unified theory of learning (Tallent-Runnels et al., 2006) but several examples in instructional design models have been conducted on learning experiences (Czerkawski & Lyman, 2016; Dunlap, Verma, & Johnson, 2016; Puzziferro & Shelton, 2008; Kidney & Puckett, 2003; Shelton & Saltsman, 2011). Online course assessment and evaluation is a valuable part of teaching because it evaluates not only the program for administrators but also for the instructor and students to show knowledge transfer and success of the program (Martin et al., 2019). Morrison et al. (2012) conducted research for online learning and distance education best practices and instructional design models finding support for and importance of assessment and its use to evaluate and revise the course when needed to meet student

needs to achieve outcomes. Martin et al. (2019) conclude the best model is to look at the instructional design processes as a guide and use formative well-written learning outcomes, sequence the course material, assess student learning and course evaluation of outcomes. Sun et al. (2008) found overall learner satisfaction when the assessment is diversified by different techniques (quizzes, examinations, multiple choice, ePortfolios, online journals, group work, discussion forums, student evaluation, and peer evaluation). One concern is for clearly defined rubrics (Wang & Chen, 2017) along with quality and validity of assessment methods (Kirkwood & Price, 2015). Online course facilitation is the process of teaching the course with operating the online interface properly, timely instructor responses to email and discussion boards, managing any online issues, grading and feedback on assignments (Martin et al, 2019). Research showed instructor-to-student or instructor-led facilitation is preferred by students (Martin & Bolliger, 2018). Martin et al. (2019) researched facilitation and determined faculty member facilitation of the course has a drastic impact on the desired outcomes. Martin et al. (2019) found various forms of facilitation examples: Salmon (2011) developed a five-stage model called term moderating (access and motivation, online socialization, information exchange, knowledge construction, and development to prepare instructor for online moderation); Berge (1995, 2008) developed Instructor's Role Model making content expertise move to facilitator with four categories (Pedagogical, Social, Managerial, and Technical); Hosler and Arend (2012) termed discourse facilitation for critical thinking or cognitive presence with timely feedback

showed improvement in participation; and Shea, Li, and Pickett (2006) state timely feedback and questioning for accuracy of material showed positive influence on students' perception of learning.

Martin et al. (2019) took the conceptual framework and interviewed award-winning faculty to determine effective practices for online course design, online course assessment, online course evaluation, and online course facilitation. Online course design determined five areas to focus on with the first three being about course design specifically: systematic approach to content design, backwards design, course organization, meeting learner needs, and student interaction. Systematic approach to content design looks at the course description, builds objectives from it (weekly topics, resources in various forms for student learning) then develops the syllabus and course. One participant said to think about it in terms of what do you want your participants to know and what do you expect them to do to learn it and then demonstrate it (Martin et al., 2019). Content should be built in a systematic way so students understand why they are doing what they are doing and what is coming next. In backwards design, some faculty create learning objectives first along with course topics and resources then learning activities based on what they want the participants to learn and then build the course. Others may look at learning outcomes and assessment and determine activities and student engagement with the syllabus. Alignment is a theme for backwards design and making sure content is aligned with learning objectives, topics, syllabus, expectations, assignments. Course organization looked at faculty creating modules by

weeks for content termed “chunking”. Participants prefer consistency with this and know what is coming and what to expect with clear layout, objectives, expectations, and deadlines sometimes with time constraints. Meeting learner needs looks at learner types (adults with busy schedules vs typical college student), students’ prior knowledge, and variety of teaching material to make the course come alive and reach all students to ensure they are learning what is intended.

Hongsuchon et al. (2022) looked at assessing the impact of online learning self-efficacy in connection to effectiveness of the course. Self-efficacy is a person’s perception of their ability to perform or achieve a task or desired outcome and is typically based off previous experiences (Bandura, 1977). Hongsuchon et al. (2022) conducted a quantitative online questionnaire during the COVID-19 pandemic with sampling size of 469 and analyzed data using structural equation modeling (SEM) to confirm reliability and validity. This study found self-efficacy played a major role in how participants performed in online courses. Research found online-learning self-efficacy had a positive effect in various areas. Strategic online-learning showed positive effect on online-learning effectiveness, online-learning monitoring showed positive effect on strategic online-learning and effectiveness, online-learning confidence in technology indicated positive influence on online-learning strategies and motivation which aids online-learning effectiveness, online-learning willpower positively influenced online-learning motivation, and online-learning attitude influenced online-learning motivation which reflects in online-learning effectiveness and strategies. Online-learning

monitoring is both external (active participation during online learning, quick responses to student's questions, discussion forums and activities, and communication) and internal (students do self-check for learning needs and goals). These results show positive impacts for online learning when students have self-efficacy, either from past experiences or taught through the course, with the various aspects of online learning (self-efficacy, monitoring, confidence in technology, will power, attitude, motivation, with strategic planning of the course) and professor support (Hongsuchon et al., 2022). Student interaction means building a community with the participants and designing learning activities that make students collaborate and interact (collaborative projects, discussion forums, peer review, have them be creative with a collaborative project) (Martin et al., 2019).

Martin et al. (2019) looked at online course assessment finding important areas include: variety of course assessment, using traditional and authentic assessments, and using rubrics. Variety of assessments (quizzes, discussion forums, exams, final papers, position papers, final projects, peer assessments, self-assessments, reflections) conducted weekly or regular intervals, most the time with automated feedback, could be timed or open book or use of Voice thread to make it real-life, to assess were reading, learning, and could practice content. Using traditional and authentic assessments meant faculty wanted more than just final papers and expected students to demonstrate learning through different forms such as create digital content, use technology to create multimedia on a topic for discussion, present topic to show

mastery, use Prezi or timeline software, or describe reflection of an assignment in a creative way. Use of Rubrics for consistency with expectations, grading (discussion forums, activities, self-assessments), and connect with learning outcome to determine if students learned what was intended. Martin et al. (2019) found important areas for online course evaluation as quality assurance process and a student plus peer feedback.

Quality assurance process is a quality check of the online course by either the institution, peer evaluation or content expert. Student and peer feedback survey is when participants or peer review leader evaluate, sometimes with a rubric or connected to a student assessment if linked to learning outcomes, the course design and facilitation, typically mid-semester and end-semester, to determine any issues for revision.

Martin et al. (2019) looked at online course facilitation and found important areas: timely response and feedback, availability and presence, and periodic communication. Looking at timely response and feedback, professors indicated students didn't need to wait long because feedback is necessary for engagement and making sure they can progress with assignments and course content. Professors would check often in the morning and again in the afternoon to respond with some stating a policy to reply within 24-48 hours. Availability and presence show important to faculty because they are needing to engage so participants know they are visible in the online environment. Some professors where available by email, others by phone at all hours of the day and night, some did voice or video feedback to be visibly present and show empathy. Some

checked in more in the beginning of the semester and then less as the semester continued but used formative assessment for assurance. Finally, periodic communication is regularly communicating with participance through daily or weekly announcements with reminders, content reminders, course activities, and expectations followed up with timely grading (Martin et al., 2019).

Martin et al. (2019) thoroughly reviewed literature and conducted an in-depth qualitative study using eight award-winning faculty to determine effective online course design, assessment and evaluation, and facilitation (see Table 7 below).

Table 7

Martin et al. (2019) Conceptual Framework Description

Martin et al. (2019) Conceptual Framework Description Feedback from Award-Winning Faculty on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation	
Conceptual Framework	Description
Online Course Design	• Systematic approach to content design • Backwards design • Course organization • Meeting learner needs • Student interaction

Online Course Assessment	• Variety of course assessments • Using traditional and authentic assessments • Using rubrics
Online Course Evaluation	• Quality assurance process • Student and peer feedback
Online Course Facilitation	• Timely responses and feedback • Availability and presence • Periodic communication

(Martin et al., 2019).

They found online professors are designers, assessors, evaluators, and facilitators and provide examples of these areas for online professor to be able to learn and enhance their online courses. Online teaching is not easy and takes time commitment for designing, accessing, and facilitating the course so it will be effective.

Research on developmental evaluation was conducted by Donaldson and Franck (2021) to determine if it could encompass the complexity of programs in Extension, such as 4-H, for through evaluation. Extension service has various areas to evaluation making it complex. Patton (2011) states complex adaptive systems are: nonlinear, emergent, dynamic, adaptive, uncertain, and coevolutionary. Patton (2018) states formative evaluation helps to attain summative evaluation because formative evaluation is how the program is doing for improvements along the way while summative evaluation looks at if the program met the end goal at specific time periods. Patton (2018) states this is a

real time adaptive evaluation with eight guiding principles of developmental evaluation with definitions in Table 8: developmental purpose, evaluation rigor, utilization focus, innovation niche, complexity perspective, systems thinking, cocreation, and timely feedback.

Table 8

Patton (2018) The Eight Guiding Principles of Development Evaluation

Patton (2018) The Eight Guiding Principles of Developmental Evaluation	
Principle	Description
Developmental purpose	"Illuminate, inform, and support what is being developed, by identifying the nature and patterns of development (innovation, adaptation, and systems change), and the implications and consequences of those patterns" Patton (2018)
Evaluation rigor	"Ask probing evaluation questions, think and engage evaluatively, question assumptions, apply evaluation logic, use appropriate methods, and stay empirically grounded—that is, rigorously gather, interpret, and report data" Patton (2018)

Utilization focus	"Focus on intended use by intended users from beginning to end, facilitating the evaluation process to ensure utility and actual use" Patton (2018)
Innovation niche	"Elucidate how the change processes and results being evaluated involve innovation and adaptation, the niche of developmental evaluation" Patton (2018)
Complexity perspective	"Understand and interpret development through the lens of complexity and conduct the evaluation accordingly. This means using complexity premises and dynamics to make sense of the problems being addressed; to guide innovation, adaptation, and systems change strategies; to interpret what is developed; to adapt the evaluation design as needed; and to analyze emergent findings" Patton (2018)
System thinking	"Think systemically throughout, being attentive to interrelationships, perspectives, boundaries, and other key aspects of the social system and context within which the innovation is being developed and the evaluation is being conducted" Patton (2018)

Cocreation	"Develop the innovation and evaluation together—interwoven, interdependent, iterative, and cocreated—such that the developmental evaluation becomes part of the change process" Patton (2018)
Timely Feedback	"Time feedback to inform ongoing adaptation as needs, findings, and insights emerge, rather than only at predetermined times (e.g., quarterly or at midterm and end of project)" Patton (2018)

Patton's (2011) organizes finding into five uses of developmental evaluation: "ongoing development or adapting an intervention to new conditions; adapting effective general principles to a new context; developing a rapid response to a major change; performative development of a potentially scalable innovation, or getting an intervention ready for summative evaluation; and major systems change and cross-scale evaluation to provide feedback about how the intervention is unfolding and how it may need to be adapted for broader application" (Patton, 2011, pp. 21–22). This type of evaluation helps provide information to key stakeholders by producing actionable results for work and program while allowing learning and innovation of the program (Mitchell, 2019).

Donaldson and Franck (2021) research developmental evaluation by case study with Extension programs 4-H Science area by the National 4-H Council, Lockheed

Martin, involving 13 states 4-H programs. The process included observations, interviews, and document review (monthly activity reports of participation, demographics, and activities) (Donaldson & Franck, 2018; Donaldson & Franck, 2020). They evaluated information with the complexity of program in mind using Patton's (2011) characteristics of complex adaptive system (nonlinear, emergent, dynamic, adaptive, uncertain, and coevolutionary) and organized findings with Patton's (2011) five uses of developmental evaluation. This evaluation helped look at current situation and see areas needing improvements: supported a diverse population with STEM interests but may be aware of 4-H, identify volunteer/corporate roles, first year showed lack of professional development and curriculum for STEM careers and the National 4-H Council responded with resources, looked at mission and compared to activity reports for summative evaluation due to time constraints to show quality of program, and a major systems change was greater development of 4-H STEM career pathway and cross-scale evaluation was conducted to provide valuable positive feedback for cocreation of the pathway (Donaldson and Franck, 2021). Donaldson and Franck (2021) found the developmental evaluation model effective for the complexity of Extension 4-H programs with impactful results.

Conclusion for Assessment and Evaluation

Research on assessment and evaluation for online learning and distance education is important to provide evidence of participant and program quality and development, aid in any revisions needed for success with formative and summative

assessments and evaluations, and accountability of the program for administrators and stake holders. There is limited research on Extension programs online learning and distance education assessment and evaluation with more literature coming forth since the COVID-19 pandemic where everyone was forced to go online due to the virus and to help contain the spread. Research states institutional differences are found when looking at assessment and evaluation with no set best practices and standards for online learning that programs follow consistently (Chua and Lam, 2007; Crews, Wilkinson, & Neill, 2015). Research points out the need for best practices and standards for online courses with formative assessments conducted throughout the course that are clearly communicated to enable quality of student learning with developed skills to provide revision of material when needed to ensure students and program are meeting outcomes for an effective course (Martin et al., 2019; Peterson, 2016; Moore and Kearsley, 2011). Research found Institutions use various tools for assessment and evaluation: Quality Matters, logic models, and developmental evaluation. Quality Matters cost additional money and logic models typically need experienced staff to design and facilitate leading to developmental model being the best fit for Extension programs with the added ability to allow for new measures when needed due to the complexity of the programs (Patton, 2016, 2018).

Research suggests courses must be designed with clear outcomes for the program and participants with a variety of assignments for diverse learners, open communication with clear expectations using rubrics and timely feedback, with

strategically organized formative assessments along the way to enable revision if needed to achieve the perceived learning or skill, and summative evaluation concluding for final course assessment or evaluation. Martin et al. (2019) researched award winning online learning professors and determine online teaching best practices. A conceptual framework was developed for teaching effective online courses with detailed important areas: online course design, online course assessment and evaluation, and online course facilitation. Martin et al. (2019) stated "the courses are carefully designed before, facilitated with intention during, systematically evaluated after, and revised accordingly to support learning objectives." When participants had positive self-efficacy about online learning, technology, professor and student monitoring, will power, attitude, motivation, and the online program they were more successful (Hongsuchon et al., 2022). Online courses require an extensive commitment by professors due to the time it takes to design the course effectively with built in assessments and detailed rubrics, the complexity of facilitating it effective with clear communication, and expectations of making the virtual environment as real as possible with students needing to know the professor is there even though they are not always be (Martin et al. (2019). The research conducted by Martin et al. (2019) provides a guiding best practice to follow as we look at Clemson University Extension Services online programs. Evaluation of the online programs current condition and assessments or evaluation are needed to determine current state, compare with researched best practices, and determine any revisions if needed to follow researched practices.

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CHAPTER FIVE

PROCEDURES OF THE STUDY

This chapter includes the following: purpose and objectives of the study, summary of review of literature, design of the study, population of the study, participants in the study, instrumentation, data collection procedures, and methodology.

Purpose and Objectives of Study

This was an observational study that took place during the COVID-19 pandemic. Responses and analysis were done retrospectively. This study took a comprehensive review of commonly used terminology and best practices for online learning and distance education and sought to apply them to Clemson Extension Services online programs. Findings provide a framework and better understanding of the ideal program structure for the greatest impact of the on-line programs offered through Extension. A review of literature was done to determine the terms used in online education or learning and how they apply to Clemson Extension Services virtual programs.

The pandemic brought a need for everyone to develop new skills for online platforms to be able to communicate and have a sense of normal life. There are various terms used that may be difficult or confusing to understand. The current project attempted to analyze terminology used in online learning and distance education obtain a standardized definition to define online learning for Clemson Extension Services programs; evaluate and identify through literature strengths, weaknesses,

opportunities, and challenges (SWOC) of online learning; determine and identify online learning competencies for instructors, assessment and evaluation; and analyze and evaluate response data from virtual extension agents delivering online programs in Extension.

The research objectives of the study were to:

1. Analyze terminology for online learning through thorough literature review to determine a common definition for online learning in Extension.
2. Evaluate and identify through literature review strengths, weaknesses, opportunities, and challenges (SWOC) for online learning.
3. Determine and identify online learning competencies for instructors, assessment and evaluation.
4. Analyze and evaluate response data collected from Virtual Agents delivering online programs comparing to literature review on SWOC, instructor competencies, assessment and evaluation to identify online learning policies that can be implemented in Extension for efficient and effective Extension Programs.

Review of Literature – Definitions, SWOC, Competencies, Assessment and Evaluation

Based on literature review for research on terms and definitions, Clemson University Extension Services defines distance education as: an institutional-based learning experience delivered through internet with no geographic constraints using either a synchronous environment (instructor and participants meet at a specific

day/time simultaneous but not dependent on physical location to interact through communication and active environments), or an asynchronous environment (instructor loads material to a platform and students access it at their convenience to engage and learn the material), for means of communicating knowledge, skills, and materials to participants.

Review of literature on SWOC for Extension Services provides a strong justification for online learning program delivery in today's society. Extension's priority is to reach people locally and globally to disseminate research-based knowledge that is accurate and innovative with materials, technology, and programs. Zobrist (2014) research team developed online learning modules testing participants and identified SWOC finding a need for online programs to reach audiences who expect information to be online with the ever-evolving information communication technology and for convenience with the mindset of being able to access information and programs when they want with participation at their own pace. Research shows Extension professionals see the need for online programs and have the capabilities and support to develop these programs which is the biggest time commitment (Zobrist, 2014; Martin et al., 2019). Extension professionals see the strengths of saving time and money for traveling and hosting workshop, location flexibility, can reach a larger and more diverse audience, versatility of course content, and can have immediate feedback (Dhawan, 2020). Dhawan (2020) stated weaknesses to consider are technical difficulties, learner's capability and confidence level, and time management. Opportunities are the

innovation and digital development, designing flexible programs, strengthen skills for problem solving, critical thinking, and adaptability, users can be of all ages, and innovative pedagogy. Challenges that may occur are distribution of information communication technology infrastructure, digital illiteracy, digital divide, and technology cost and obsolescence (Dhawan, 2020). From the metanalysis, Dhawan (2020) developed a list of strengths, weaknesses, opportunities, and challenges (SWOC) demonstrated in table 9 with examples.

Table 9

Strength, Weakness, Opportunity, and Challenges Table

SWOC Table	
Strength = capabilities • Saving time and money for traveling and hosting workshop • Location flexibility • Reach a larger and more diverse audience • Versatility of course content • Have immediate feedback	Weakness = challenges • Technical difficulties • Learner's capability and confidence level • Time management
Opportunity = prospects • Innovation and digital development	Challenges = issues

• Designing flexible programs • Strengthen skills for problem solving • Critical thinking • Adaptability - users can be of all ages • Innovative pedagogy	• Distribution of information communication technology infrastructure • Digital illiteracy • Digital divide • Technology cost and obsolescence

(Dhawan, 2020)

Examination of online learning and distance education instructor competencies highlight the skills that are vital to creating and conducting a successful online program. Any program can be online however creating one that is dynamic and reaches the students with active learning and engagement is key to its success. Instructors need to take an active role in seeking out and learning new technology and methods for online programming. This will assure engagement of students because communication methods will meet the desired needs of the learners (Arend, 2009; Haber & Mills, 2008; Mazolini & Maddison, 2007; Ward et al., 2010). The instructor must take on various roles compared to traditional teachers due to the complexity of online learning environments. Martin et al. (2019) found key roles to be: facilitator, course designer, content manager, subject matter expert, and mentor. Martin et al. (2019), International Society for Technology in Education (ISTE) (2023), and Borah and Devarani (2021) all provide evidence of similar competencies that make a difference in creating and facilitating a successful online learning environment. Martin et al. (2019) summarized

competencies by stating competencies of online instructors to be technical skills, willingness to learn, knowledge of how people learn, content expertise, course design skills, and student learning assessment skills. When looking at creating or reevaluating an online program, instructors need to meet these minimal competencies to ensure they are creating the most successful program for both the instructor and the student to learn and engage together. Researchers have found that faculty felt more motivated, rewarded and were more attracted to teaching online when positive learning, high-quality training, program support, mentoring, or professional development for new technology was offered to help them grow and learn more intellectually (Chapman, 2011; Green et al., 2009; McQuiggan, 2012; Pandra & Mishra, 2007; Seaman, 2009; Alsofyani et al., 2012; Chao et al., 2010; Shea et al., 2005; Wang & Wang, 2009).

Strong skills in assessment and evaluation for online learning is vital to provide evidence of participant and program quality and development, aid in any revisions needed for success with formative and summative assessments and evaluations, and accountability of the program for administrators and stake holders. Research points out the need for adopting best practices and standards for online courses with formative assessments. Formative assessments need to be conducted throughout the course and clearly communicated to the students to enable quality of student learning and the ability to developed skills. Formative assessment feedback provides revision for material when needed to ensure students and programs are meeting outcomes for an effective course (Martin et al., 2019; Peterson, 2016; Moore and Kearsley, 2011). Findings suggest

that institutions should use multiple tools for assessment and evaluation: Quality Matters, logic models, and developmental evaluation. Quality Matters cost additional money and logic models typically need experienced staff to design and facilitate leading. The Developmental model is likely the best fit for Extension programs because it has the added ability to allow for new measures when needed due to the complexity of the programs (Patton, 2016, 2018).

Literature review of suggested courses must be designed with clear outcomes for the program and participants using a variety of assignments for diverse learners, open communication with clear expectations using rubrics and timely feedback, utilizing strategically organized formative assessments along the way to enable revision if needed. This will assist in achieving the perceived learning or skill while summative evaluation should be used for final course assessment or evaluation. Martin et al. (2019) used award winning online learning professors to research and determine online teaching best practices. A conceptual framework was developed for effective online courses with detailed important areas: online course design, online course assessment and evaluation, and online course facilitation. Martin et al. (2019) stated “the courses are carefully designed before, facilitated with intention during, systematically evaluated after, and revised accordingly to support learning objectives.”

When participants had positive self-efficacy about online learning, technology, professor and student monitoring, will power, attitude, motivation, and the online program, they were more successful and engaged in the program demonstrating

learning objectives achieved (Hongsuchon et al., 2022). Online courses require an extensive commitment by professors due to the time it takes to design the course effectively with built in assessments and detailed rubrics, the complexity of facilitating it effectively with clear communication, and expectations of making the virtual environment as real as possible as if the professor was in the same room (Martin et al. (2019). Table 10 describes Martin et al. (2019) findings on needed competencies of online instructors and Table 11 provides Martin et al.'s (2019) conceptual framework of best practices for designing an effective online course.

Table 10

Martin et al. (2019) Competencies of Online Instructors

Competencies of Online Instructors	
Competency	Description
Technical skills	• Ability to design and teach the course effectively using a learning management system (LMS) • Effectively use technology skills (E-mail, navigate browser windows, file upload and download, and PDF creation) • Ability to create audio and video materials, screencasting, use microphones, Powerpoint with voice over, uploading videos • Provide online feedback

	• Successfully working in collaborative online platforms • Writing for web and audience when conveying materials
Willingness to learn	• Be a life-long learner • Search out how to effectively teach online and stay current with research and trends • Knowledge of various learning styles and design with these in mind • Learn various technology to reach students • Look at material from the learner's perspective to design appropriately • Have a desire to teach and assess student learning to know knowledge gain and is it effective • Be willing to put extra time in to interact with students
Knowledge of "how people learn"	• Knowing the different learning styles and designing the course with this in mind to reach all participants • Assess to ensure accurate knowledge is being learned
Content expertise	• Be an expert in the field • Ability to learn and deliver the content so students can learn
Course design	• Learn instructional design skills to be able to design and navigate the online course with regulations effectively

	• Use learning objectives • Have a logical sequence • Build content that is filed together and in manageable size for students to learn • Create appropriate assessment of students
Assess student learning	• Ensure accurate knowledge transfer • Reflect to see if students learned what was intended • Provide timely constant feedback to students to keep them motivated and learning

Table 11

Martin et al. (2019) Conceptual Framework Description

Martin et al. (2019) Conceptual Framework Description Feedback from Award-Winning Faculty on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation	
Conceptual Framework	Description
Online Course Design	• Systematic approach to content design • Backwards design • Course organization • Meeting learner needs

	• Student interaction
Online Course Assessment	• Variety of course assessments • Using traditional and authentic assessments • Using rubrics
Online Course Evaluation	• Quality assurance process • Student and peer feedback
Online Course Facilitation	• Timely responses and feedback • Availability and presence • Periodic communication

(Martin et al, 2019)

The research conducted by Martin et al. (2019) provided a guiding best practice to follow as we examined Clemson University Extension Services online programs. Evaluation of the online programs current condition and assessments or evaluation are needed to determine the current state, compare it with researched best practices, and determine if any revisions are needed to follow researched practices.

Design of the Study

A retrospective evaluation of programs delivered online during COVID 19 pandemic was conducted. Recruitment for the pilot study was based on a set of inclusion and exclusion criteria, which included each of 10 program teams, approved to include 1 agent in the project per team. Any agent who met the inclusion/exclusion criteria were given the opportunity to be included in the study as a “Virtual Extension

Agent". Eligible agents were invited to apply, then their application was sent through an approval chain: Program Team Director (PTD) was the first level of approval and recommendations, District Extension Director (DED) was the second level of approval, and Extension Administrative Team (EAT) was the final approval. Figure 1 below is the EAT Evaluation Matrix. This figure shows the criteria the Extension agents had to meet to qualify for application. Figure 2 is the approval letter to the agent to be a virtual agent for this study. This figure shows the letter that was sent to accepted extension agents to be a virtual extension agent. Agents applied for the opportunity and four were selected based on final approvals.

Figure 1

Criteria for the Extension Administration Team (EAT) Evaluation Matrix

EAT Evaluation Matrix

Agent has served as an Extension agent for more than **12 months**	X	X	X	X	X
Agent has been through at least **one full evaluation cycle**	X	X	X	X	X
Agent has demonstrated successful performance and has been **rated Successful, Exceptional, or Top Performer** on all previous evaluations	X	X	X	X	X
Agent has access to an appropriate remote office space that has a professional, uninterrupted atmosphere and adequate broadband for program delivery (a hot spot is available as needed)	X	X	X	No	X
Agent has a **record of success** in recruiting, enrolling, and delivering programs to a diverse clientele through virtual platforms (objective data to support evidence of success)					
• Demonstrated success measured by number of programs, number of participants, change in knowledge, and change or intent to change in skills/behaviors/or practices at the completion of the programs delivered	X	X	X	X	X
Agent has a **recommendation** from the PTD and DED to fill the role					
• Applications to participate in the pilot phase of this initiative must retain **consent** of the applicable Program Team Director and District Director	X	X	X	X	X
• Each team has the **capacity** to allow 1 existing agent to work from a remote location as deemed appropriate by the PTD and the DED	X	X	X	No	X
• Appropriateness will be evaluated based on agent's ability to work in a remote work location without significant **hardship** on the program team, in the county or in the county office because of physical absence	X	X	X	No	X
Agent agrees to meet monthly for project progress reports and complete monthly surveys for pilot study **data collection**					

Figure 2

Letter of Acceptance

Dear __,

On behalf of the Extension Administration Team, I would like to congratulate you on your acceptance into the pilot study for the Virtual Extension Agent position. The final candidate pool consisted of 8 agents and 4 have been selected for final participation. All were good candidates however the final decisions were based primarily on the ability for the county you currently work in or the project you work on to lose ***your in-county presence***. At this time, it has been decided that you may participate as a Virtual Extension Agent, working in a remote location delivering virtual programs.

The term for this role will be 1 evaluation cycle that will begin October 1, 2021 and conclude August 31, 2022. If at any time during that period it is determined that you are needed back in the office, you will be expected to return to daily operations in the Extension office you left while continuing to provide virtual program delivery. At the completion of the 1-year trial, the role will be re-evaluated to determine if this will be a permanent working option for you. This determination will be based on the needs of the county office from which you left, the needs of your Extension Program Team and on your demonstrated productivity and quality of program delivery during the trial phase of the project. If it is determined that you will need to return to the office at the conclusion of the project, you will be expected to report back to the office September 1, 2022.

The goal of the project was:

- to demonstrate the ability of an extension agent to be highly productive in a remote office setting
- to demonstrate that on-line Extension programs can be equally effective at transferring knowledge and influencing behavior/skill adoption as programs delivered face-to-face

Expectations for participation:

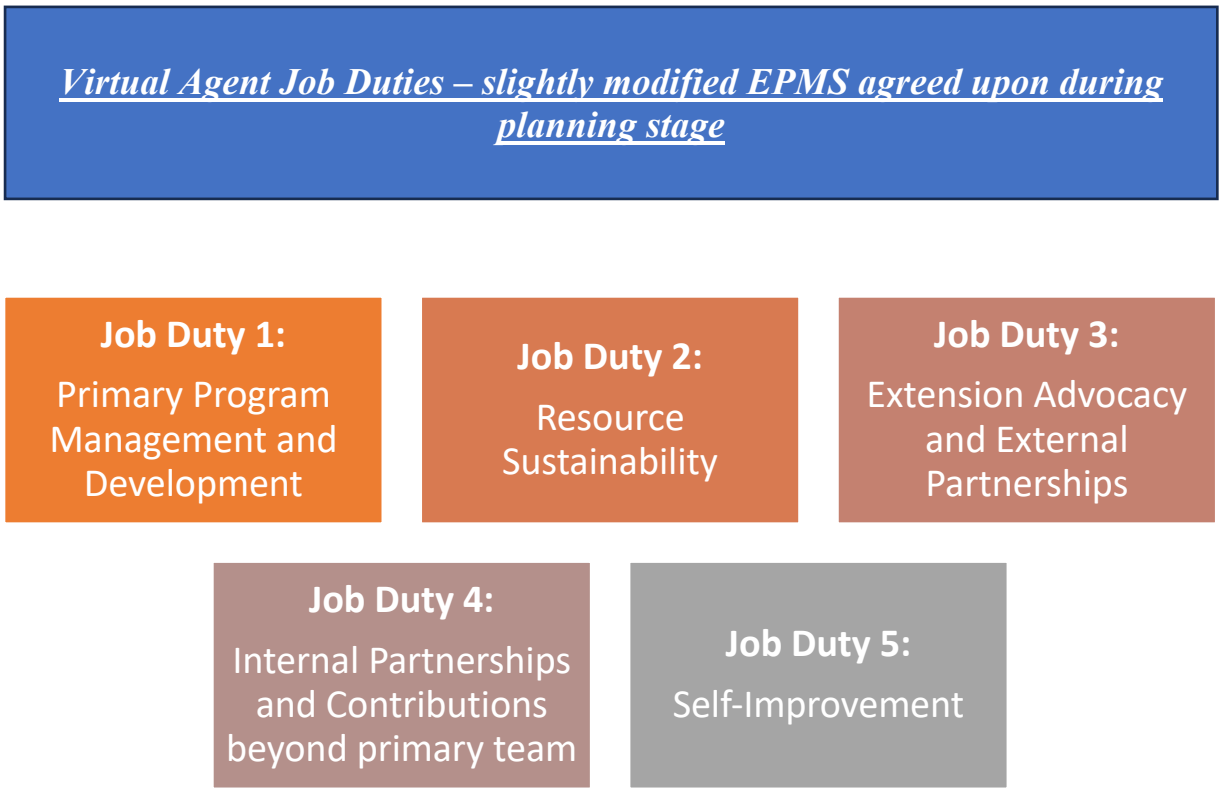
- attendance at the Virtual Agent introductory training scheduled for September 29th (Complete the doodle poll to identify a common time that all can meet via Zoom)
- monthly Zoom meetings with pilot study investigators to discuss opportunities, barriers, and short-term outcomes
- submission of short, weekly, Qualtrics survey reports to highlight progress toward productivity and success
- a signed agreement that outlines in-county and out-of-office expectations corresponding to your job duties
- consistent evaluation of your virtual programs to ensure quality of programs delivered through a virtual platform

The virtual agents for this study had slightly modified performance standards with tailored success criteria through the Employee Performance Management System (EPMS) to allow for successful completion of job duties needed for this study. Figure 3 shows slightly modified Employee Performance Management System (EPMS) job duties for the Virtual Agent.

- **Job Duty 1:** Primary Program Management and Development
- **Job Duty 2:** Resource Sustainability
- **Job Duty 3:** Extension Advocacy and External Partnerships
- **Job Duty 4:** Internal Partnerships and Contributions beyond primary team
- **Job Duty 5:** Self-Improvement

Figure 3

Virtual Agent Job Duties



Study Sample

The study sample consisted of two Human Nutrition Youth Development Agents (one from 4-H and one form Rural Health and Nutrition teams), two Agriculture Natural Resource Agents (one from Horticulture and one from Forestry and Natural Resources teams). The Virtual Agent groups were split between hybrid and synchronous format for program delivery. Table 12 shows the Virtual Agent's programs and duties each had.

Table 12

Virtual Agent Programs and Duties

2 from HNYD Division – 1 from 4-H and 1 from Rural Health and Nutrition	2 from ANR Division – 1 from Horticulture and 1 from Forestry/NR teams
• Agents' primary jobs were to *PROVIDE ONLINE PROGRAMMING* or hybrid programs • Programs *HAD ACCOMPANYING CURRICULUM* • Most programs were *FACILITATED IN GROUPS* • These agents *HELPED TEAM MEMBERS*, but did not necessarily serve as team resources to other agents	• Educational sessions delivered synchronously online were *WEBINARS* or training sessions • Agents *MANAGED SOCIAL MEDIA AND WEBSITES* • More educational opportunities were *1 ON 1 INTERACTIONS* • Agents served in a *SUPPORT ROLE* for the whole team

Participants in the Study

Agents included in the pilot study fell into the following program teams: 4-H, Rural Health and Nutrition, Horticulture, and Forestry and Natural Resources. Their responsibilities were as follows:

Virtual Agent 1 - 4-H (provided online programming or hybrid programs)

Virtual Agent 2 - Rural Health and Nutrition (provided online programming or hybrid programs)

Virtual Agent 3 – Horticulture (provided synchronously online programs)

Virtual Agent 4 – Forestry and Natural Resources (provided synchronously online programs)

Additionally, all PTDs and DEDs (“Supervisors") that shared accountability for agent success were asked to participate in the monthly process evaluation listening sessions that were conducted online to ensure agents were on track and showing productivity. These sessions also highlighted any obstacles and potential barriers to success. Barriers that were identified in discussions were immediately addressed in an attempt to avoid future delays in full productivity. Supervisor feedback was collected through a summative survey in Qualtrics at the completion of the project. Supervisors for each Virtual agent participating in the study included:

Supervisor 1 – Program Team Director for Food Systems and Safety

Supervisor 2 – District Director for Upstate

Supervisor 3 – Program Team Director for Rural Health and Nutrition

Supervisor 4 – Program Team Director for 4-H Development

Supervisor 5 – Program Team Director for Agronomic Crops

Supervisor 6 – Program Team Director for Horticulture

Supervisor 7 – District Director of Coastal

Supervisor 8 – District Director of Piedmont/Midlands

Supervisor 9 – District Director of Savannah Valley

Supervisor 10 – Program Team Director of Natural Resources

Instrumentation

Virtual agents completed weekly survey's and Virtual Agent Supervisor's completed a final survey in Qualtrics. Survey questions were completed using a combination of Likert scale, discreet variable responses, and open-ended responses.

The Virtual Agent instrumentation design for this study consisted of: agent name, week reporting, if formal education was delivered (if so the audience, program type, method used, hours of instruction, number of participants, how many gained knowledge, how many applied knowledge), how many people or interactions were provided informally (email, telephone, one-on-one consultations and/or site/farm visits) and hours spent, open-ended goals completed for week, open-ended barrier if goals were not completed, and open-ended goals for next week. The study was reviewed by the Clemson University Human Subjects Institutional Review Board and determined to not require protocol approval. Informed consent was confirmed by participants' willingness to complete the online survey.

The Virtual Agent Supervisor instrumentation design for this study consisted of: supervisor name, role in Extension, virtual agent overseen, virtual agent's evaluation rating for year 2020-2021 (rationale for rating, rating expected for 2021-2022 cycle, anticipated rationale for previous cycle 2020-2021), potential reason for formalizing the

virtual extension agent role, most compelling reasons to discontinue any form of a virtual agent role in Extension, do you support the agent's continued role of virtual extension agent in a remote office location (if maybe what is proposed solution or compromise that could be met to allow for flexibility with virtual programming and/or remote office), open-ended additional input about the virtual extension agent role working in remote office locations. One question addressed potential reasons for formalizing the virtual extension agent role while another addressed most compelling reasons to discontinue any form of a virtual agent role in Extension. These questions were measured on a 3-point Likert scale (1=bad reason, 2= insignificant reason, and 3=good reason). Another question addressed the topic of support the agent's continued role of virtual extension agent in a remote office location being measured with a 3-point Likert scale (1=yes, 2=no, 3=maybe with an additional open-ended response).

Review of the Instrument

The instrument was developed by an expert panel of online learning and distance education Clemson University Faculty looking at the online Extension Service Virtual Agent program during COVID-19 using Qualtrics survey software. Two instruments were developed with several open-ended statements for weekly process evaluation for the Virtual agent's and summative assessment for Supervisors at the end. The instruments were reviewed for applicability by appropriate colleagues and directors to ensure clarity of wording tailored to the target population to maximize valid and

reliable results (McCoach et al., 2013; Sullivan, 2011). The instrument was completed by Virtual agents on the last day of each work week.

Data Collection Procedures

The data was collected using Qualtrics software. This pilot study was conducted from October 1, 2021 through August, 2022 year of evaluation. The study was determined to be a program evaluation not needing an IRB application by the Human Subjects Committee, Office for Research Compliance, Clemson University because it was an evaluation of employee job functions versus interventional. Supervisors completed one summative Qualtrics survey at the completion of the study. The surveys can be found in Appendix A and Appendix B.

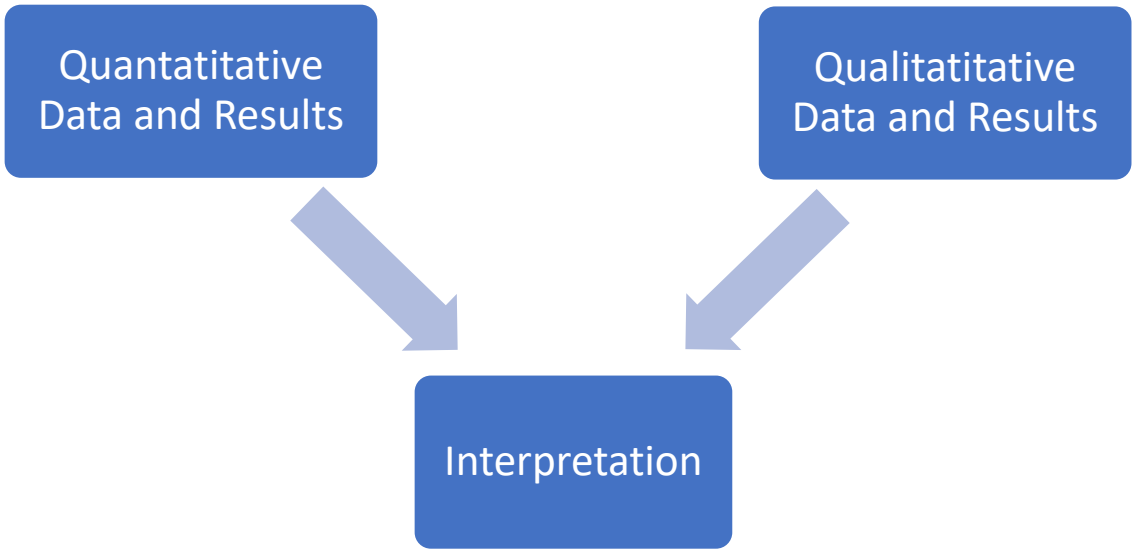
Methods

This study is a descriptive study retrospectively looking at data collected during the COVID-19 pandemic. The evaluation of the data collected during the pilot study timeline was reviewed and determined to not require protocol for approval by the Clemson University Human Subjects Institutional Review Board (IRB). Stored data obtained through the online survey instruments (Virtual Agent weekly summaries and Supervisor's summative survey) was included in the evaluation. Data was retrieved from Qualtrics for analysis with mixed-method quantitative and qualitative formats for the purpose of breadth and depth to understand the data in its entirety (Burke-Johnson et al., 2007). Qualitative research helps gather information about experiences, perceptions, behaviors, social structures, and generating theory (Glesne, 2016). A

literature review was completed that provided best practices to look at when analyzing data from Qualtrics surveys for qualitative data and coding it. Atlas.ti coding software was used to code data. Saldaña (2014) states methodology for analyzing data for coding with the first code considered inductive with open codes, the second looks back at the initial codes for grouping similar codes, the final phase termed selective coding with groups by categories if possible. Descriptive coding is appropriate for open-ended questions that look at data collected across various time periods for comparison and analysis (Saldaña, 2014). This study includes non-experimental descriptive study data that is quantitative research. Non-experimental descriptive study data uses survey data with no experiments or manipulation of variables during data collection (Asenahabi, B. M., 2019). Qualitative research presents data from open-ended non-predetermined responses to data and quantitative is closed-ended data (Creswell, 2014). Creswell & Plano-Clark (2011) state data is then analyzed in sequential and/or simultaneous manner for complete understanding. Triangulation design is a mixed-method design looking at quantitative data results and qualitative data results and then interpretation of them below demonstrated in Figure 4.

Figure 4

Triangulation Mixed Method Design. Adopted from Creswell and Plano-Clark, (2007)



The mixed-method study allows for data to be gathered and information compiled about the Virtual Agents online experience with the online-learning programs along with supervisor's summative data results. This helped determine if the programs were meeting goals, objective, barriers, and determine if the online-learning program was successful in the online environment.

The Virtual Agents weekly survey quantitative data was compiled to determine agent's hours worked for the population reached. The data is not associated specifically with each program area making it difficult to tell specifically how many hours per program and participants were reached. The data was very broad with a variety of

different programs and work tasks. The qualitative research data is formatted with open-ended questions allowing for deeper evaluation of the information through descriptive coding.

Qualitative research must be examined further to look for experiences, perceptions, behaviors, social structures, and generating theory (Glesne, 2016). One way to examine qualitative data is by coding it and looking for themes emerging that continue to tell the story and not lose the meaning (Glesne, 2016). “Qualitative researchers code to discern themes, patterns, and processes; to make comparisons’ and to build theoretical explanations” (Glesne, 2016, p.195). Saldaña (2014) states “Coding is not just labeling, it is linking” (p.8). Sorting for themes and defining for understanding (Glesne, 2016). Saldaña (2014) defined code as a “word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldaña, 2014, p.4).

The literature review indicated important best practices and concepts for online distance education that are considered codes to look at when analyzing data for emerging themes. These codes are categorized using semantic domains which represent codes that share common meanings and are considered theory-driven (theory or concepts based); data-driven (emerge from raw data); and from research questions meaning structural to analyze the data set (Ryan & Bernard, 2003). Saldaña (2014) states methodology for analyzing data for coding and when interpreted by a lone ethnographer (solo coded) needs member checking for validity. The lead researcher

followed this methodology using Atlas.ti software to analyze the data with member checking with another researcher working on coding projects for validity. Researchers worked together to have an agreement on semantic domains and codes then worked together to set up data in Atlas.ti for coding. The lead researcher completed first and second codes. Both researchers met for agreement for final coding and discussion of codebook. Once data is coded, a codebook will be created to help view the semantic domains, codes, definitions, and examples for further analysis and understanding (Saldaña, 2014).

In the current study, the data was analyzed using thematic analysis or themes that emerged in the literature review of important best practices and concepts for online distance education: strength, weakness, opportunity, and challenges (SWOC) table (Dhawan, 2020); competencies of online instructors table (technical skills, willingness to learn, knowledge of "how people learn", content expertise, course design, assess student learning); and best practices for effective online course design, assessment and evaluation, and facilitation table (Martin et al, 2019). This type of coding is considered first round coding and called descriptive coding. Descriptive coding is applicable for content-based or conceptual phrases, possibly relating to research questions to enable coding and categorizing the data looking for commonalities, differences, and relationships (Saldaña, 2014). Once data is coded according to the review of literature for online learning and distance education, second round coding looked at the first round codes for compiling with a third round completed for

developing categories that emerged. Third round coding was completed to look for grouping similar codes and semantic domains. The final phase is selective coding. Finally, a code book was developed for better understanding of the codes that emerged with the data analyzed. The code book was then compared and contrasted with the literature review for online learning and distance education programs to determine program success following the literature's identification of barriers or needs and applying it to the online programs in Clemson Extension Services. The outcomes from coding were used to determine if programs used researched best practices for conducting online programs for Clemson Extension Services and to identify best practices for future program development.

The Supervisor summative survey consisted of a mixed method survey with two sets of quantitative questions using the 3-point Likert scale (1=bad reason, 2=insignificant reason, and 3=good reason) and one mixed method using 3-point Likert scale (1=yes, 2=no, 3=maybe with an additional open-ended response). The open-ended question was analyzed for commonalities and evaluation of themes. This data was examined to determine how Supervisors' perceptions about online Extension programs and potential for continuation.

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CHAPTER SIX

DATA ANALYSIS AND FINDINGS

The COVID-19 pandemic brought online learning and distance education to the forefront with the need to define online learning with best practices. Clemson University Extension Services conducted a retrospective observational study compiling survey data from virtual extension agents and supervisor's conducting online programs.

The research objectives of the study were to:

1. Analyze terminology for online learning through thorough literature review to determine a common definition for online learning in Extension.
2. Evaluate and identify through literature review strengths, weaknesses, opportunities, and challenges (SWOC) for online learning.
3. Determine and identify online learning competencies for instructors, assessment and evaluation.
4. Analyze and evaluate response data collected from Virtual Agents delivering online programs comparing to literature review on SWOC, instructor competencies, assessment and evaluation to identify online learning policies that can be implemented in Extension for efficient and effective Extension Programs.

A literature review analyzed terminology for online learning to obtain a standardized definition to define online learning and distance education for Clemson Extension Services programs; evaluate and identify through literature strengths, weaknesses, opportunities, and challenges (SWOC) of online learning; determine and

identify online learning competencies for instructors, assessment and evaluation; and analyze and evaluate response data from virtual extension agents delivering online programs in Extension.

Population of the pilot study was based on a set of inclusion and exclusion criteria, which included each of 10 program teams, approved to include one agent in the project per team. Any agent who met the inclusion/exclusion criteria was given the opportunity to be included in the study as a "Virtual Extension Agent." Eligible agents were invited to apply, then their application was sent through an approval chain: Program Team Director (PTD) was the first level of approval and recommendations, District Extension Director (DED) was the second level of approval, and Extension Administrative Team (EAT) was the final approval. The study sample consisted of two Human Nutrition Youth Development Agents (one from 4-H and one form Rural Health and Nutrition teams), two Agriculture Natural Resource Agents (one from Horticulture and one from Forestry and Natural Resources teams). The Virtual Agent groups were split between hybrid and synchronous format for program delivery. Supervisors for each virtual agent participating in the study included: Supervisor 1 – Program Team Director for Food Systems and Safety, Supervisor 2 – District Director for Upstate, Supervisor 3 – Program Team Director for Rural Health and Nutrition, Supervisor 4 – Program Team Director for 4-H Development, Supervisor 5 – Program Team Director for Agronomic Crops, Supervisor 6 – Program Team Director for Horticulture, Supervisor 7 – District Director of Coastal, Supervisor 8 – District Director of Piedmont/Midlands, Supervisor 9

– District Director of Savannah Valley, Supervisor 10 – Program Team Director of Natural Resources.

Virtual agents completed weekly survey's and virtual agent supervisor's completed a final survey in Qualtrics. Survey questions were completed using a combination of Likert scale, discreet variable responses, and open-ended responses. The literature review provided important and guiding best practices and concepts for online distance education through strength, weakness, opportunity, and challenges (SWOC) table (Dhawan, 2020); competencies of online instructors table (technical skills, willingness to learn, knowledge of "how people learn," content expertise, course design, assess student learning); and best practices for effective online course design, assessment and evaluation, and facilitation table (Martin et al, 2019). The data was analyzed using thematic analysis or themes that emerged in the literature review of important best practices and concepts for online distance education. Qualtrics survey data was analyzed using mixed-method quantitative and qualitative data for interpretation.

Data Analysis for Virtual Agent's Weekly Summaries

Quantitative data collected for Virtual Agent's weekly summaries in Qualtrics provided 44 weeks of data and showed: agents averaged eight hours of formal and informal direct education each week utilizing synchronous and asynchronous education, reached an average of 225 people each week (range from 0 to 1370 reached) and served an average of 32 people per hour of instruction.

Qualitative data collected for Virtual Agent's weekly summaries used open-ended qualitative questions and was analyzed by the lead researcher using methodology by Saldaña (2014) with line-by-line coding and descriptive statistics to analyze the data for deeper understanding of the statements. During the first cycle, the data was organized into categories from the literature review of best practices that emerged (Strength, Weakness, Opportunity, and Challenges (Dhawan, 2020), Competencies of Online Instructors (Martin et al., 2019), and Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation (Martin et al., 2019)). Looking at these categories for initial coding, categories that emerged were SWOC - strength, weakness, opportunity; Competencies of Online Instructors - technical skills, willingness to learn, content expertise, course design, assess student learning; and Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation – online course design, online course evaluation, and online course facilitation.

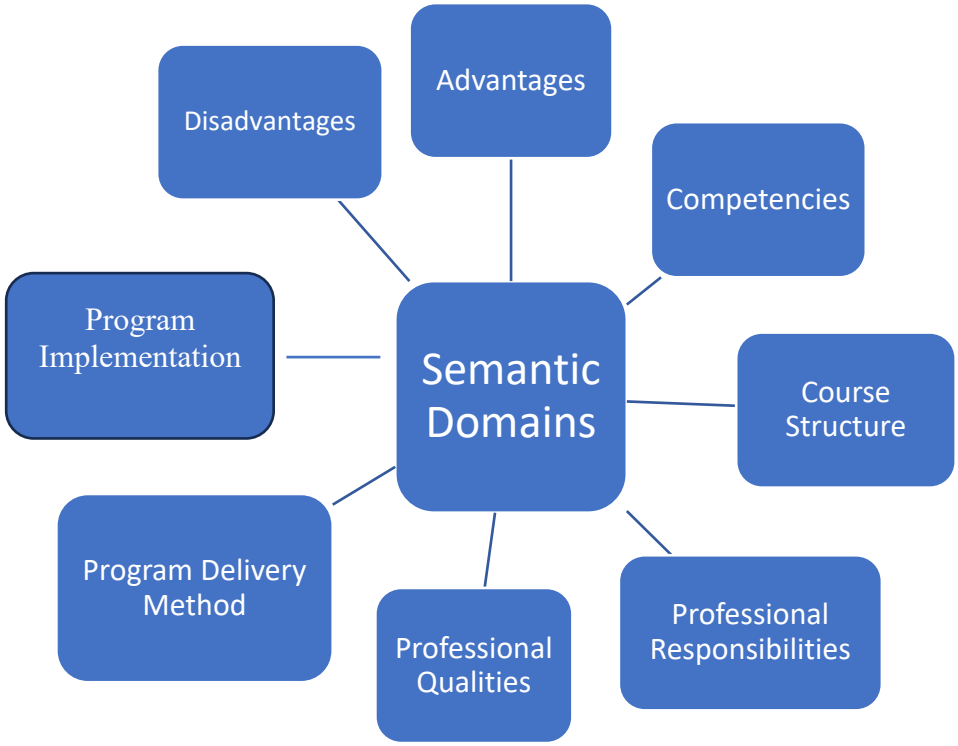
According to Saldaña (2014), solo researcher coding needs agreement from another researcher to ensure codes are being interpreted to attempt unbiased and accurate meaning for codes and themes that emerge. Discussing these codes with another researcher for agreement lead to the following second round codes being developed that emerged in the data: strength, opportunity, time management, work/life balance, competencies of online technical skills, course structure (assess student learning, course design, course evaluation, and course facilitation),

administrative work, content expertise, professional qualities, program delivery method and program implementation.

Third round coding, with agreement between both researchers for coding, led to final codes creating the code book. Semantic domains, another name for main categories or common meanings, are used to organize second round codes, subcategories, for better understanding. There are eight semantic domains with subcategories: advantages (flexibility for program design, larger audience/recruiting, and time management), disadvantages (time management and work/life balance), competencies (online technical skills and willingness to learn), course structure (assess student learning, course design, course evaluation, and course facilitation), professional responsibilities (administrative work and content expertise), professional qualities (collaboration and professional development/ scholarly work), program delivery method (asynchronously, synchronously, hybrid, and in-person), and program implementation (delivered or not delivered).

Figure 5

Eight Semantic Domains (main categories)



Virtual agent weekly summary responses were initially divided into codes advantages and disadvantages. There were an assortment of additional codes emerging making the meanings hidden and unclear for advantages and disadvantages proving the need to take another look at these code categories. Researchers developed additional codes using semantic domains with subcategories for codes underneath for clearer understanding of the code meanings as themes emerged. Table 13 provides the code book developed with semantic domains, subcategory (code), and definition of code.

Table 13

Code Book

Code Book		
Semantic Domain	Code - Subcategory	Definition
ADVANTAGES:	Flexibility for Program Designing	Innovation and digital development, designing flexible programs and new programs, innovative pedagogy, adaptability - users can be of all ages (Dhawan, 2020).
	Larger Audience/Recruiting	Reach a larger more diverse audience; recruiting opportunities.
	Time Management	Ability to be able to manage personal time when needed.
COMPETENCIES:	Online Technical Skills	Ability to design and teach the course effectively using a learning management system (LSM), effectively use technology skills (E-mail, navigate browser windows, file upload and download, and PDF creation), ability to create audio and

		video materials, use microphones, powerpoint with voice over, uploading videos, provide online feedback, successfully work in collaborative online platforms, writing for the web and audience when conveying materials (blogs, websites, articles) (Martin et al., 2019).
	Willingness to Learn	Be a lifelong learner, seek out opportunities to learn through meetings, professional development, certification, courses, stay current with research in field and effective online teaching, be willing to put in extra time to interact with learners (Martin et al., 2019).
COURSE STRUCTURE:	Assess Student Learning	Ensure accurate knowledge transfer when speaking with learners, reflect to see if students learned what was

		intended, provide timely constant feedback, graduation for learners (Martin et al., 2019).
	Course Design	Online format is organized, systematic approach to content design, creating webinars, professional meeting content, meeting learner needs, student interaction, logical sequence, skills to be able to design and navigate online course effectively (Martin et al., 2019).
	Course Evaluation	Quality assurance process through evaluations, learner and peer feedback (Martin et al., 2019).
	Course Facilitation	Effectively run the course, timely responses and feedback, ability and presence, periodic communication (Martin et al., 2019).

DISADVANTAGE:	Time Management	Participant is having trouble managing time and getting all goals accomplished.
	Work/Life Balance	Participant is having trouble managing work task with personal/family balance.
Professional Responsibilities:	Administrative Work	Filling and organizing online files, hard copy files and office; moving and packing for storage in office, delivering materials to site, documenting finances and receipts, travel, organizing meeting schedule.
	Content Expertise	Be an expert in the field, ability to learn and deliver the content so learners can learn, creating articles and material (Martin et al., 2019).
	Collaboration	Spoke with colleague about topics

PROFESSIONAL QUALITIES:	Professional Development/ Scholarly Work	Gaining new skills through continuing education or career training. Completed extra work for certification, credits, presentations, and manuscript edits.
PROGRAM DELIVERY METHOD:	Asynchronously	Programs were delivered with asynchronous homework with no in-person interaction.
	Hybrid	Programs were delivered with a hybrid format of in-person and synchronous education.
	In-person	Programs were delivered in-person.
	Synchronously	Programs were delivered synchronously with no in-person interaction.
PROGRAM IMPLEMENTATION:	Delivered	Educational programs were delivered.
	Not Delivered	Educational programs were not delivered.

Literature review provided evidence supporting researched practices for Strength, Weakness, Opportunity, and Challenges (SWOC) by Dhawan (2020) as an important aspect of online learning. SWOC emerged in the data as semantic domains advantages and disadvantages. The advantages were flexibility for program design, larger audiences and recruiting possibilities or opportunities, and time management. Comments supporting flexibility for program design topics were: “new heart health curriculum research and draft outlines for sessions”, “met with Danielle and Virginia (intern) to brainstorm + discuss WalkSC progress; provided input for direction”, and “prepare programming schedule for 2023” which supports program design with the ability for agents to make programs innovative to the educational changes and population changes. Comments supporting larger audience and recruiting were: “developed two online registration forms for spring programs and registered 16 classrooms for spring virtual visits”, “Delivered classroom (teacher-led) kits and e-mailed virtual resources to classrooms serving approximately 751 youth for our butterfly program and 303 for embryology. These classes will participate in these self-directed programs (hatching chicks/growing butterflies) for approximately 3 weeks. All classes were sent resources (activities, related videos, etc) via e-mail and will be offered virtual visits related to their project(s) of choice” which support reaching larger audiences and recruiting by providing materials to vast populations through virtual and email opportunities. Comments supporting time management were: “House fire, relocated to friend's apartment in the meantime. Was still able to complete work and

proud of work completed. Very grateful and I wouldn't have been able to continue doing my job without this virtual agent position," "Catch up on emails and classes after returning from 2 week vacation/work trip," "Get HED participants caught up with make-up sessions" providing evidence of being able to manage time while virtual. The disadvantages were time management and work/life balance being issues. Time management did show up as an advantage at times and a disadvantage at others depending on agents and situations. Comments supporting time management were: "I did not complete the Mystery Challenge for the 4-H Engineering Event, Ran out of Time" and "Completed most, but just ran out of time" demonstrating the time management being an issue. Comments supporting work/life balance were: "wanted to get caught up on CUMIS data entry, but didn't have time because I got sick and had to take leave today :(," "Work/life balance is not even close to being achieved" and "Actually take the leave that I submitted (I worked while on leave). Work/Life balance" providing evidence of work/life balance being a struggle being virtual.

Literature review provided evidence supporting researched practices for Competencies of Online Instructors by (Martin et al., 2019) as an important aspect of online learning. Competencies of online instructors emerged in the data as semantic domains: competencies, course structure, and professional responsibilities. In competencies group provided support for online technical skills and willingness to learn. Within course structure, assess student learning and course design were present. Professional responsibilities supported researched best practices for being a content

expert in the field. Comments supporting competencies for online technical skills were: “continued work on 4-H Engineering Challenge including proofing all challenge documents/updating volunteer forms/updating eventbrite registration page”, “Developed graphic and started slide deck for virtual Engineering Challenge training sessions” and “Complete content for county newsletter, Develop graphics for Wild about Wildlife Program and market program through newsletter and social media, Send virtual program newsletter” prove knowledge of online technical skills are an important competency for online courses. Comments supporting competencies for willingness to learn were: “personal trainer exam - passed! yay! ,” “complete large masters assignment due next week before spring break,” “Find Professional Development Training on Percipio” and “Complete Pre-collegiate Programs training (2)” provide evidence that virtual agents have a willingness to learn. Comments supporting course structure for assess student learning were:” Judged photography challenge entries,” “Followed up with 4-H Senior Weekend participants” and “follow up with school garden participants to schedule deliveries” demonstrating the use of assessing student learning. Comments supporting course structure for course design were: “Prepared for and provided Coding/STEM training for 4-H TEAM,” “Met with Pam Ardern to assist with planning for Military STEM clubs in Spring” and “Spent time developing coding challenge for Engineering Challenge in April” verifying the use of course design. Comments supporting professional responsibilities as a content expert in the field were: “Met with Pam Ardern to assist with planning for Military STEM clubs in Spring,” “met

with Newberry agent related to Virtual Field Trip Collaboration and Calendar" and "Spent time developing coding challenge for Engineering Challenge in April, Contacted teachers about Spring programming."

Literature review provided evidence supporting researched practices for Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation by (Martin et al., 2019) as an important aspect of online learning. Conceptual framework emerged in the data as semantic domains under course structure. Course structure provided support for course design, assessment, evaluation, and facilitation. Course structure for course design and course assessment of student were also found in competencies. Additional comments supporting course design were: "continue schedule and preparing for 2023 programs - especially want to focus on new strength curriculum," "Update PowerPoints and develop new presentations; Plan for future workshops; Prepare for following week's workshop ((1)SCACAA Professional Development Webinar, (2) Half and Half Nov. Webinar, (3) 2 Critters/1 Workshop webinar)" and "Work on more blog posts; HGIC blog posts; Web updates; Update old PPT Presentations" showing agents used course design when developing virtual programs. Additional comments supporting the use of course assessment were: "Phone Calls/E-mails related to Eng Challenge," "Provide virtual visits for classrooms who requested them, meet with interested teacher via Zoom," and "HED graduations and exit surveys." Comments supporting virtual agents use of course structure for course evaluation were: "Create Evaluation tool for Wild about Wildlife Week 1," "send Derrick

update list for eval responses” and “Applied for SAF, ISA, and SC Pesticide Credits for Pine Health Workshop w/ Dr. Dave Coyle for (4/21/2022) .” Comments supporting course structure for course facilitation were: “presented "Eggs-ray" vision (candling) program PowerPoint to 4th grade at LES, Created "Project Preview: Gardening" PowerPoint for virtual session and presented to 3 people,” “provided first of Virtual Field Trip Series - Around the World” and “We survived the EC! :) The Engineering Challenge was held in person at the Fairgrounds on 4/8. 7 challenges were offered to youth, 2 virtual and 5 in person. All five days were spent packing kits for challenges, finalizing scoring documents, purchasing supplies, fielding last minute questions from participants, setting up in Columbia and leading program.”

Additional codes emerged from the data that was not found in the literature review of best practices for (Strength, Weakness, Opportunity, and Challenges (Dhawan, 2020), Competencies of Online Instructors (Martin et al., 2019), and Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation (Martin et al., 2019)). Additional semantic domains and codes that emerged were: professional qualities (collaboration, professional development/scholarly work), and routine work (administrative work). Comments provided for collaboration were: “Met with Midlands 4-H Team for Annual planning day that included summer camp planning and regional duty coordination,” “then check in with CU Online team about what's left on their end to finalize the program” and “Video Meeting w/ Dr. Dave Coyle on planning for Pine Pests and Hardwood Pests Webinars

for April and May 2022." Comments representing professional development or scholarly work were: "Attend Art and Science of Health Promotion Conference in San Diego & deliver poster presentation about Health Extension for Diabetes Community/Clinical Partnership," "finalize ADCES poster and prepare for conference presentation + travel", "Salesforce Training," "Work on Red-shouldered Hawk article with Anthony Keinath" and "Get Numbers for TJ's Abstract." Comments provided for administrative work were: "Completed monthly reporting for financials," "complete position request for summer intern" and "pack up office for Greenville move and move program items to storage." The additional codes that emerged are an important aspect representing the vast responsibilities involved that each agent must perform as well as provide efficient and effective virtual or hybrid program creation and delivery.

Virtual Agent's Weekly Survey/Summaries

Virtual agents' quantitative data showed 44 weeks of virtual agent job performance showed agents reached an average of 225 people each week (range from 0 to 1370 reached) with an average efficiency of 32 people per hour of instruction served for an averaged 8 hours of formal and informal direct education each week utilizing synchronous and asynchronous education. Research literature review for effective online course development and delivery found evidence leading to best practices for (Strength, Weakness, Opportunity, and Challenges (Dhawan, 2020), Competencies of Online Instructors (Martin et al., 2019), and Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation (Martin et

al., 2019). Virtual agent weekly summaries coded for themes using Atlatis.ti coding software specified 8 semantic domains with subcategories (codes) that were then compared to researched best practices to determine if the virtual agents used these best practices when providing online programs. The 8 semantic domains with subcategories were: advantages (flexibility for program design, larger audience/recruiting, and time management), disadvantages (time management and work/life balance), competencies (online technical skills and willingness to learn), course structure (assess student learning, course design, course evaluation, and course facilitation), professional responsibilities (administrative work and content expertise), professional qualities (collaboration and professional development/ scholarly work), program delivery method (asynchronously, synchronously, hybrid, and in-person), and program implementation (delivered or not delivered). The semantic domains program delivery method (asynchronously, synchronously, hybrid, and in-person) and program implementation (delivered or not delivered) did not present any additional evidence for this study but showed they were present in the summaries from virtual agents reports.

When compared to researched best practices, evidence supported researched practices for Strength, Weakness, Opportunity, and Challenges (SWOC) by Dhawan (2020) as an important aspect of online learning and was present in semantic domains advantages (flexibility for program design, larger audiences, recruiting possibilities or opportunities, and time management) and disadvantages (time management and work/life balance); Competencies of Online Instructors by (Martin et al., 2019) was

present in semantic domains competencies (online technical skills and willingness to learn), course structure (assess student learning and course design), and professional responsibilities (content expert); and Conceptual Framework on Best Practices for Effective Online Course Design, Assessment and Evaluation, and Facilitation by (Martin et al., 2019) was present in semantic domain course structure (assess student learning, course design, course evaluation, and course facilitation). The additional codes that emerged, professional qualities (collaboration, professional development/scholarly work) and routine work (administrative work), represent additional responsibilities each agent must perform while providing efficient and effective virtual or hybrid program creation and delivery. Barriers for the virtual agents were found in the disadvantages, semantic domain, with codes for time management and work/life balance. Advantages were also present, in the advantages semantic domain, for being able to create flexible program design and incorporate new ideas depending on population, being able to reach a larger more diverse audience through online capabilities, and time management with being able to create own schedule.

When looking at triangulation mixed-method design, quantitative data supported agents can reach a vast amount of population with virtual programs while qualitative data from literature review of best practices for online programs provided evidence that agents used best practices without knowing it. Virtual agents need to know best practices prior to designing online courses for improved design, assessment, evaluation and facilitation for efficient and effective online course design and delivery.

Agent's lessons learned from practice/monthly meetings:

- People expect online programs to be free,
- Free programs lead to higher numbers of registration compared to paid, programs, but attendance is not necessarily higher – about 44% attendance rate,
- Programs need to have catchy names using target audience language,
- Flyers and promotional materials need to be visually appealing to serve as "click bait,"
- Indicators of success for online programs: attendance rate, good evaluations, return viewers, and
- Virtual audience is drawn in by cross-team collaborative programming.

Suggested roles of "Virtual Agent":

- Plan, develop, deliver and evaluate on-line programs, and
- Oversee social media, websites, team events and program promotion for whole team.

Data Analysis and Findings for Virtual Agent's Supervisor Summary

Data for virtual agent's supervisor survey was pulled from Qualtrics and results analyzed. Population for survey consisted of six Program Team Director's and five District Directors. Supervisors were asked about potential reasons for formalizing the virtual extension agent role with data showing results were: allows reach into other states for program participation and national recognition as insignificant reason with 44.44%, allows programming in counties where office space is not available showed

good reason with 55.56%, agent job satisfaction proved good reason with 66.67%, agent retention proved good reason with 77.78%, easier to supervise was insignificant at 77.78%, provides a resource for the whole team/district as a good reason with 77.78%, and two participants choose other as a good reason. Table 14 shows each topic result with percentage of agreement. Table 15 provides statistical results of top potential reasons for formalizing the virtual extension agent role as agent retention and provides a resource for the whole team/district providing with means of 2.78.

Table 14

Q9 - Please rate the potential reason for formalizing the virtual extension agent role results?

#	Field	bad reason to formalize	insignificant reason to formalize	good reason to formalize	Total
1	agent job satisfaction	0.00% 0	33.33% 3	66.67% 6	9
2	agent retention	0.00% 0	22.22% 2	77.78% 7	9
3	allows programming in counties where office space is not available	11.11% 1	33.33% 3	55.56% 5	9
4	allows reach into other states for program participation and national recognition	22.22% 2	44.44% 4	33.33% 3	9
5	easier to supervise	22.22% 2	77.78% 7	0.00% 0	9
6	provides a resource for the whole team/district	0.00% 0	22.22% 2	77.78% 7	9
7	other	0.00% 0	0.00% 0	100.00% 2	2

Table 15

Q9 – Results

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	agent job satisfaction	2.00	3.00	2.67	0.47	0.22	9
2	agent retention	2.00	3.00	2.78	0.42	0.17	9
3	allows programming in counties where office space is not available	1.00	3.00	2.44	0.68	0.47	9
4	allows reach into other states for program participation and national recognition	1.00	3.00	2.11	0.74	0.54	9
5	easier to supervise	1.00	2.00	1.78	0.42	0.17	9
6	provides a resource for the whole team/district	2.00	3.00	2.78	0.42	0.17	9
7	other	3.00	3.00	3.00	0.00	0.00	2

Supervisors were asked about most compelling reasons to discontinue any form of a virtual agent role in Extension with data showing results were: difficult to supervise was the least reported reason for discontinuing the job role at 44.44%, doesn't provide enough people in the office to maintain open offices 8-4:30 Monday through Friday as insignificant, doesn't allow for county presence for stakeholders proved good reason, unfair to other agents showed insignificant at 44.44%, and finally agents don't have the technology equipment or expertise to fulfill the role proved most common negative reason at 55.56%, doesn't maintain the in-person relationships in the counties showed good reason at 66.67%. Table 16 shows each topic results with percentage of agreement. Table 17 provides descriptive statistics results for most compelling reasons to discontinue any form of a virtual agent role in Extension with top results stating

doesn't allow for county presence for stakeholders and doesn't maintain the in-person relationships in the counties providing means of 2.56.

Table 16

Q20 – what do you think are the most compelling reasons to discontinue any form of a virtual agent role in Extension?

#	Field	bad reason to discontinue	insignificant reason to discontinue	good reason to discontinue	Total
1	difficult to supervise	33.33% 3	44.44% 4	22.22% 2	9
2	doesn't provide enough people in the office to maintain open offices 8-4:30 Monday through Friday	0.00% 0	66.67% 6	33.33% 3	9
3	doesn't allow for county presence for stakeholders	0.00% 0	44.44% 4	55.56% 5	9
4	doesn't maintain the in-person relationships in the counties	11.11% 1	22.22% 2	66.67% 6	9
5	unfair to other agents	33.33% 3	44.44% 4	22.22% 2	9
6	agents don't have the technology equipment or expertise to fulfill the role	55.56% 5	22.22% 2	22.22% 2	9
7	other	0.00% 0	0.00% 0	0.00% 0	0

Table 17

Q20 - Results

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	difficult to supervise	1.00	3.00	1.89	0.74	0.54	9
2	doesn't provide enough people in the office to maintain open offices 8-4:30 Monday through Friday	2.00	3.00	2.33	0.47	0.22	9
3	doesn't allow for county presence for stakeholders	2.00	3.00	2.56	0.50	0.25	9
4	doesn't maintain the in-person relationships in the counties	1.00	3.00	2.56	0.68	0.47	9
5	unfair to other agents	1.00	3.00	1.89	0.74	0.54	9
6	agents don't have the technology equipment or expertise to fulfill the role	1.00	3.00	1.67	0.82	0.67	9

Supervisors were asked if they support the agent's continued role of virtual extension agent in a remote office location with results stating: 50% maybe, 40% yes, and 10% no. If maybe was answered, the participant was to give a proposed solution or compromise that could be met to allow for flexibility with virtual programming and/or remote office. These results offered solutions of:

- "The position should operate as a statewide or regional support position with no specific county obligations. (i.e. operate outside of the county/district model).
- The opportunity for conflicts between county office duties and programming demands are too great.
- The greatest potential for virtual positions is to a) deliver statewide (and beyond) programs regardless of county borders, b) assist county agents in coordination and delivery of local virtual programs, c) develop resources and digital assets to enhance total program promotion, branding, and delivery.
- The HGIC's remote work model and overall function is perfectly suited to this type of position and building virtual programming out of HGIC is the most logical next step in the HGIC's growth.
- To me a true virtual position is someone that creates online programming for the entire state or program team. They would handle all social media and help in marketing programs of the other agents. This current role is putting too much on the current agent if they still have county duties.

- We need to finalize a description related to an agent providing virtual programming and an agent working virtually/remotely. To me these are 2 different things but at times it seems like we are trying to make them 1 thing. I think an agent providing virtual programming can be effective working in an office or working remotely. At the same time, I think existing county agents can be effective working the same way."

Supervisors were asked to provide additional input about the virtual extension agent role working in remote office location. These results were:

- "I need agents in the office functioning as part of the team. If we are going to allow purely remote work, then that should be something considered in a larger context, under very specific policies with clear expectations. I do not see much value in this current arrangement because I see no reason why this person cannot conduct webinars and other virtual engagements as part of their overall program in a conventional setting.
- I support selected agents being virtual. I value and want to see in person programming. My support of virtual agents should NOT be interpreted as endorsement of ending all in-person programs. Nor should it be interpreted as endorsement of all agents being virtual. I definitely encourage this model when it is right for the situation. But it won't work well for all agents in all places. I want to add---if this model continues, I endorse utilizing an application process

for a limited number of spots to be filled based on program team/county office needs/public demand.

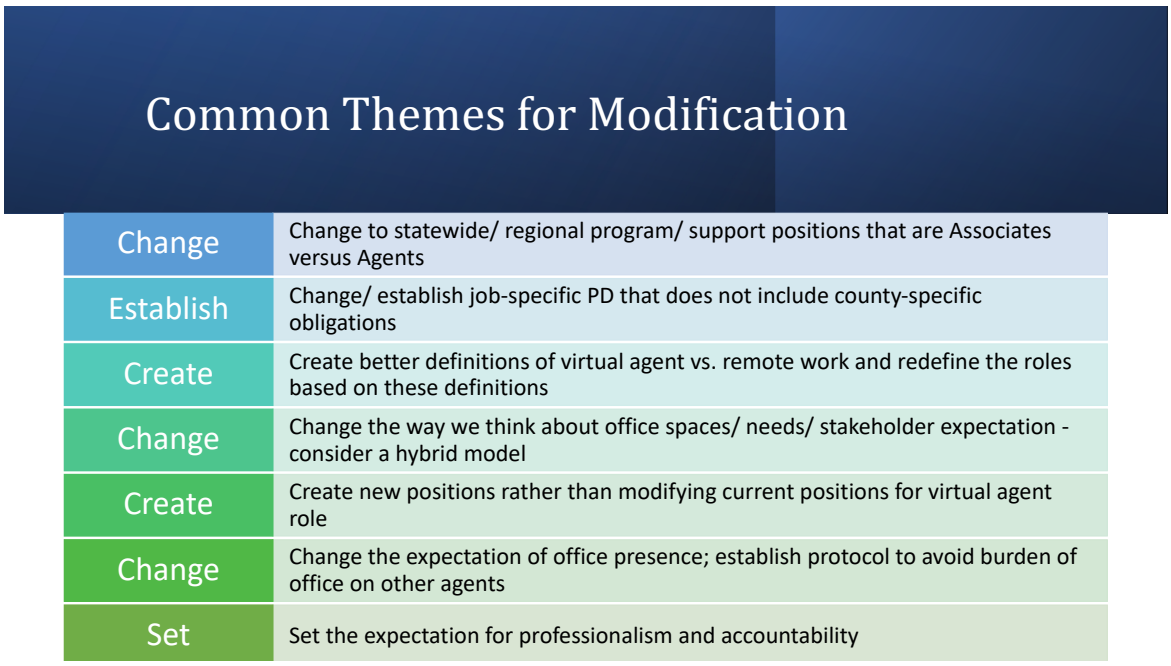
- PROS - strong program impacts numbers, collaboration, employee flexibility, administrator flexibility, program proof of concept, employee satisfaction. CONS - lack of virtual operating standards, differential value versus traditional agent, office coverage. EXPECTATIONS - maintain professional decorum, accountability, long term policy / plan. ADAPTATIONS - consider making roles associate versus agent, apply to new positions with new PD exclusively, ensure that other agents don't bear the burden of office.
- Our agents all work in remote locations at some time right now. Working remote from the office can include in a field or at any facility other than an Extension office. I do think that we as an organization need to rethink how our offices operate and what is most important to our stakeholders. I'm not sure sitting in an office is what our stakeholders still want. I think we can have a hybrid staffing model for the offices that would work. I believe that we are looking at two different positions. With my recent experience, my recommendation would be: Virtual programming - Hire two Extension Associates that would report to the division leaders. These positions would coordinate statewide virtual programming in the two-division areas. Then as funding permits, we could increase Extension Associate positions to Program Teams based on need. Remote work - If you look at the Extension system, our Agents have always been

encouraged to work outside of the office to meet the needs of our clientele. As I see it, we have just never called it "working remotely." However, if we are to keep County Extension offices open, it is critical that we set the expectation of committed time in the office. It is also essential that we develop a protocol on the front end to have clear guidelines of what working remotely looks like. But again, this is a remote working agreement rather than a virtual agent in my mind."

Figure 6 provides common themes for modification from the Supervisors survey.

Figure 6

Common Themes for Modification from the Supervisors Survey



Virtual Agent's Supervisor Survey/Summary

Supervisor survey/summary showed data using a 3-point Likert scale with top pros and cons for the role. Top pros were agent job satisfaction/retention, programming despite office space, and all-team resources. Top cons were stakeholder access, consumer in-person access and unfair to other agents. When looking at open-ended comments provided asking should the virtual agent role continue, nine supervisors stated yes or maybe with to continuing modification with only one stated no to continuation.

Top pros to the role:

- Agent job satisfaction/retention
- Programming despite office space
- All-team resource

Additional/other: operations cost-savings, efficiency, broader audience reach

Top cons to the role:

- Stakeholder access
- Consumer in-person access

  Unfair to other agents

Should the role continue?

- nine said yes or maybe-with modifications to continuing
- one said no to continuation

Common themes that emerged from the open-ended data represented: Change to statewide/ regional program/ support positions that are Associates versus Agents; Change/ establish job-specific PD that does not include county-specific obligations; Create better definitions of virtual agent vs. remote work and redefine the roles based on these definitions; Change the way we think about office spaces/ needs/ stakeholder expectation - consider a hybrid model; Create new positions rather than modifying current positions for virtual agent role; Change the expectation of office presence; establish protocol to avoid burden of office on other agents; and Set the expectation for professionalism and accountability.

When looking at triangulation mixed-method design, quantitative data in the form of 3-point Likert scale with top potential reasons for formalizing the virtual extension agent role as agent retention and provides a resource for the whole team/district providing with means of *M* = 2.78 and most compelling reasons to discontinue any form of a virtual agent role in Extension with top results stating doesn't allow for county presence for stakeholders and doesn't maintain the in-person relationships in the counties providing means of *M* = 2.56. When looking at open-ended qualitative data, comments provided asking should the virtual agent role continue, nine supervisors stated yes or maybe with to continuing modification with only one stated no to continuation. Virtual agent's supervisors found potential reasons for formalizing the virtual extension agent role along with compelling reasons to discontinue the role. When asked the questions "should the role be continued?" supervisors agreed and

provided modifications for improving the role for detailed position descriptions and to ensure stakeholders understand this is to broaden Extension's role and not change the current roles.

Conclusion

This paper analyzed terminology used in online learning and distance education to obtain a standardized definition to define online learning for Clemson Extension Services programs; evaluate and identify through literature strengths, weaknesses, opportunities, and challenges (SWOC); determine and identify online learning competencies, assessment and evaluation; and analyze and evaluate response data from virtual extension agents delivering online programs in Extension.

The research objectives of the study were to:

1. Analyze terminology for online learning through thorough literature review to determine a common definition for online learning in Extension.
2. Evaluate and identify through literature review strengths, weaknesses, opportunities, and challenges (SWOC) for online learning.
3. Determine and identify online learning competencies, assessment and evaluation.
4. Analyze and evaluate response data collected from Virtual Agents delivering online programs comparing to literature review on SWOC, instructor competencies, assessment and evaluation to identify online learning policies that can be implemented in Extension for efficient and effective Extension Programs.

Based on the research on terms and definitions, Clemson University Extension Services defines distance education as: an institutional-based learning experience delivered through internet with no geographic constraints using either a synchronous environment (instructor and participants meet at a specific day/time simultaneous but not dependent on physical location to interact through communication and active environments), or an asynchronous environment (instructor loads material to a platform and students access it at their convenience to engage and learn the material), for means of communicating knowledge, skills, and materials to participants.

Research literature review for effective online course development and delivery found evidence leading to best practices for (strength, weakness, opportunity, and challenges (SWOC) (Dhawan, 2020), competencies of online instructors (Martin et al., 2019), and conceptual framework on best practices for effective online course design, assessment and evaluation, and facilitation (Martin et al., 2019). Data from virtual agent weekly summaries and virtual agent supervisor summaries were analyzed using mixed-method for quantitative and qualitative data for interpretation.

In conclusion, evidence was found supporting virtual extension agents used best practices found in literature research during virtual programs. Virtual agent supervisors agreed and provided modifications for improving the role for detailed position descriptions and to ensure stakeholders understand this is to broaden the Extension role and not change the current roles. Future state will need modifications for training the virtual agents on best practices from literature review to use best practices

(strength, weakness, opportunity, and challenges (SWOC) (Dhawan, 2020), competencies of online instructors (Martin et al., 2019), and conceptual framework on best practices for effective online course design, assessment and evaluation, and facilitation (Martin et al., 2019)) to develop and facilitate an effective course while evaluating student knowledge gained. This will enable researcher to better understand if implementing best practices during course development enables the agents to create a course that is truly evolving to changes with design to enable students to gain knowledge and assess learning and final evaluation for success. Supervisors agreed the virtual agent role will reach a population that is wanting this type of deliver but with modifications for improving the role for detailed position descriptions and to ensure stakeholders understand this is to broaden the Extension role and not change the current roles. This study needs to be replicated, with a larger sample size for accuracy in data, once modifications are in place to determine if these along with best practices make a difference in delivering a successful online Extension program. The instrument needs to be reviewed for additional needs if any and validated for accuracy in the question results. When giving Virtual agents the means to develop an effective course with best practices while implementing the supervisor's modifications, the virtual extension agent role can continue to improve for the population and citizens of Clemson University and South Carolina.

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APPENDICES

APPENDIX A
VIRTUAL AGENT WEEKLY SUMMARIES INSTRUMENT

Virtual Agent Weekly Summaries

Start of Block: Default Question Block

Q1 **Name** (first name only is fine)

_____

Q2 **Week:** let's report as: month/Monday's date/22 - example: 1/17/22 and that will mean it's for the week starting on the 17th and finishing on the 21st - even if it's MLK day or the like, just put Monday as the date for the week you're reporting on)

_____

Programs? Did you deliver **formal educational programs** this week to consumers/ stakeholders/ target audiences/ other employees for training purposes? (defined: programs with specific curriculum or formalized, discreet body of information to transfer) [example: delivery of "Journey to Mars"/"Master Gardener"/"Master Naturalist"/"HE for Diabetes"/training a new agent on Zoom basics, etc to a newly enrolled or ongoing group/person

- ○ Yes (1)
- ○ No (2)

Skip To: Q12 If Did you deliver formal educational programs this week to consumers/ stakeholders/ target audienc... = No

Q21 choose all **audiences** to whom you provided formalized education this week.

- ○ Consumers/target [diabetics, 4-H club members, producers, etc.] (1)
- ○ Employees [agents or staff] (2)
- ○ Other (3) _____

Q5 Describe program **types and methods** used to deliver the programs (select all that apply to describe all of the different programs you delivered over the week - trying to see all the different ways you might be transferring formal educational programs)

- ☐ I delivered programs that are structured as consecutive hours of delivery (5 hours delivered all on the same day) (1)
- ☐ I delivered programs that are structured as intermittent delivery (a weekly/monthly session for 8 weeks) (2)
- ☐ The above programs were delivered In person (physically present with a person or group) (3)
- ☐ The above programs were delivered Virtually (on-line delivery [includes all forms like Zoom meetings for education, hits on videos, blogs, factsheets, social media postings, etc) (4)
- ☐ The above programs were delivered part in person and part virtually (Hybrid) (8)
- ☐ Virtual programs were delivered Synchronously (only if virtual: did you meet on Zoom/similar and deliver or discuss information in real time?) (5)
- ☐ Virtual were delivered Asynchronously/self-paced (only if virtual programming: means that it was not delivered in real time - used pre-recorded series

of videos or talks, could include a combination of videos and readings like articles or factsheets) (6)

☐ Virtual programs that include some synchronous meetings + asynchronous homework (11)

☐ Other ways formal educational programs were delivered (7)
_____

Q7 How many **hours** of instruction did you deliver THIS WEEK during formal programs or workshops (total for all formal programs described above)?

_____

Q9 How many **people** attended the formal programs/workshops THIS WEEK (total for all programs - include people that ATTENDED, even if they are enrolled in an intermittent, series of lessons and attended last week too)?

_____

Q10 How many people **gained knowledge** from the formal programs/workshops this week (could assess by doing a verbal mini quiz after the session, a Zoom poll/quiz, or a formalized survey; could simply ask everyone to tell you one thing they learned today)?

_____

Q11 How many people **applied knowledge/skills** or plan to apply knowledge/skills from the formal programs/workshops this week (could assess by simply asking "what do you think you will work on after our session this week" or "what will you do with the information you gained this week" as a guided discussion at the end of your lesson - did

everyone answer/participate in that discussion? Then you have 100% of participants plan to apply the information learned)?

_____

Q12 To how many **people or individual interactions** did you provide **informal** educational information this week through email, telephone, one-on-one consultation and/or site/farm visits, etc. - Example: how many HGIC inquiries did you respond to?

_____

Q13 How many **hours** were spent delivering **informal** educational information this week through email, telephone, one-on-one consultation and/or site/farm visits, etc. - Example: how many hours did you spend responding to HGIC inquiries?

_____

Q18 What goals were you able to complete this week (address the goals you set for last week - did you meet those goals)?

_____

Q19 If you were unable to complete goals that were set last week, what were the barriers?

_____

Q20 What are your goals for next week (break down large project into what your goal is for THIS week that will help you reach the long term goal (ie: instead of saying "develop a water conservation program", set a goal to "develop lesson 1 objectives and associated activities")?

_____

End of Block: Default Question Block

APPENDIX B
VIRTUAL AGENT SUPERVISOR SUMMATIVE INSTRUMENT

Virtual Agent Supervisors Survey

Start of Block: Default Question Block

Q1 Your Name

_____

Q2 What is your role in Extension?

- ○ Program Team Director (list program team name) (1)
  _____
- ○ District Director (list your district) (2)
  _____
- ○ Other (provide your position title) (3)
  _____

Q3 Which of the current virtual extension agents do you oversee?

- ○ Virtual agent (1)
- ○ Virtual agent (2)
- ○ Virtual agent (3)
- ○ Virtual agent (4)
- ○ I do not oversee any of these agents as a DED or PTD (3)

Skip To: Q9 If Which of the current virtual extension agents do you oversee? = I do not oversee any of these agents as a DED or PTD

Q4 Provide the virtual agent's evaluation rating for last year 2020-2021

- ○ Top performance (1)
- ○ Exceptional performance (2)
- ○ Successful performance (3)
- ○ Developing performance (4)
- ○ Improvement needed (5)
- ○ Unsuccessful performance (6)

Q17 Please provide rationale for the virtual agent's rating in the previous evaluation cycle (2020-2021)

- ○ Did not meet the expected success criteria in several ways (7)
- ○ met the expectations and success criteria (4)
- ○ completed more than the expected success criteria (5)
- ○ blew away the expected success criteria (6)

Q16 What rating is expected for the virtual agent for this evaluation cycle (2021-2022)

- ○ Top performance (1)
- ○ Exceptional performance (2)
- ○ Successful performance (3)
- ○ Developing performance (4)
- ○ Improvement needed (5)
- ○ Unsuccessful performance (6)

Q19 Please provide the anticipated rationale for the virtual agent's rating in the previous evaluation cycle (2020-2021)

- ○ Did not meet the expected success criteria in several ways (7)
- ○ met the expectations and success criteria (4)
- ○ completed more than the expected success criteria (5)
- ○ blew away the expected success criteria (6)

Q9 Please rate the potential reasons for formalizing the virtual Extension agent role.

	bad reason to formalize (1)	insignificant reason to formalize (2)	good reason to formalize (3)
agent job satisfaction (4)	○	○	○
agent retention (5)	○	○	○
allows programming in counties where office space is not available (6)	○	○	○
allows reach into other states for program participation and national recognition (8)	○	○	○
easier to supervise (9)	○	○	○
provides a resource for the whole team/district (10)	○	○	○
other (11)	○	○	○

Q20 What do you think are the most compelling reasons to discontinue any form of a virtual agent role in Extension?

	bad reason to discontinue (1)	insignificant reason to discontinue (2)	good reason to discontinue (3)
difficult to supervise (4)	○	○	○
doesn't provide enough people in the office to maintain open offices 8-4:30 Monday through Friday (7)	○	○	○
doesn't allow for county presence for stakeholders (8)	○	○	○
doesn't maintain the in-person relationships in the counties (9)	○	○	○
unfair to other agents (10)	○	○	○
agents don't have the technology equipment or expertise to fulfill the role (11)	○	○	○
other (12)	○	○	○

Q8 In general, do you support the agent's continued role of virtual extension agent in a remote office location? If maybe, what is a proposed solution or compromise that could

be met to allow for flexibility with virtual programming and/or remote offices?

- ○ yes (1)
- ○ no (2)
- ○ maybe (please explain how you would modify the position) (3)

_____

Q21 Please provide any additional input about the virtual extension agent role working in remote office locations.

_____

_____

_____

_____

_____

End of Block: Default Question Block