Assessing Awareness and Competence of Best Practices in Synchronous Online Instruction During the COVID-19 Pandemic for Clemson Cooperative Extension Professionals

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Abstract. Traditional delivery of Extension programming changed overnight in March 2020, when the COVID-19 outbreak forced switching traditional methods to virtual delivery. Extension professionals across South Carolina quickly adapted to online delivery. Concerns over instructor preparedness to use online tools, including functions to assure accessibility, did arise. Findings from this non-experimental, descriptive research study suggested Extension professionals used online tools (primarily Zoom). The majority were not comfortable using many of the features that would enhance instruction, including polling, file transfer, and live-streaming media platforms. Additionally, Microsoft Word and PowerPoint skills to assure accessibility for clientele were lacking.

INTRODUCTION AND THEORETICAL FRAMEWORK

The outbreak of COVID-19 suddenly put the world on lockdown in 2020. On March 11, 2020 the International Health Regulations Emergency Committee of the World Health Organization (2020) declared the Coronavirus outbreak a pandemic. This situation challenged education systems across the world and forced educators to shift to an online mode of teaching overnight (Dhawan, 2020), asking them to become both instructional designers and tutors and to use tools which few have fluently mastered (Rapanta et al., 2020).

The sudden outbreak of the pandemic forced many schools, businesses, and government agencies to move normal operations online to limit in-person contact. Immediately, a reliance on synchronous web-based software developed to facilitate operations. Although multiple videoconferencing programs have existed for years, many individuals experienced a learning curve while adapting to the new normal (Fawcett et al., 2020).

Synchronous online class sessions, where everyone joins a meeting at a scheduled time, are one way to create engagement when students are remote (Harvard University, 2020). The success of Extension programming is often predicated on in-person events, and numerous Extension programs are planned and scheduled well in advance of the anticipated programming date (Stokes et al., 2020). Although in-person Extension events are common in South Carolina, Lobley and Quellette (2017) identified videoconferencing as a means to create an authentic online learning experience for volunteers by reducing the need to rely on face-to-face training. Other Extension studies have identified synchronous learning platforms, such as Zoom, as having engaging, easy-to-use formats (Scanga et al., 2018) when best practices deliver effective virtual meetings or webinars (Robinson & Poling, 2017). Since March, Extension county offices have not been accessible to the public per protocols set by Clemson University and public health officials. Many agents transitioned to digital platforms to continue providing valuable resources and educational programs (The Newsstand, 2020). Rapidly developing technology has facilitated distance education in all disciplines, proving to be popular among students for various reasons, including the convenience and equal opportunities provided (McBrien, 2009). As discussed in the revised ADA 508 standards, agents must provide equal opportunities for those with disabilities through accessibility accommodations that provide assistance in viewing documents and presentations during online instruction (*U.S. General Services Administration*, 2020).

Additionally, following the mission of Cooperative Extension, Master Gardeners in South Carolina earn certification by providing 40 hours of educational service through

volunteer activities (Cooperative Extension, n.d.). However, due to COVID-19, all South Carolina Master Gardener in-person volunteer activities were suspended (Cooperative Extension, n.d.). The Greenville Master Gardeners continued their service activities by initiating the Online Speakers Bureau in October 2020, allowing the certified volunteers to share their expertise through Zoom using an extensive catalog of free online presentations, many of which had multiple sessions (Greater Greenville Master Gardeners, n.d.). These activities warranted the volunteers' training on synchronous delivery features and ADA 508 standards (U.S. General Services Administration, 2020).

To assess the needs of Extension educators, the human capital theory was used to frame this study. Human capital theory aims to evaluate the current knowledge (Schultz, 1961) required for developing career-related skills (Smith, 2010). Furthermore, Smith (1776/1952) noted that not all labor inputs into an economy are quantitative, as they include "the acquired and useful abilities of all inhabitants or members of the society" (p. 119). Schultz (1961) noted that one form of education in human capital theory is on-the-job training, which allows for purposeful knowledge development that furthers an individual's job-specific abilities. Therefore, assessing Extension educators' needs for online delivery technology and accessibility skills informs stakeholders, allowing for opportunities to develop specified human capital that is essential during the pandemic.

The purpose of this study was to assess Clemson Cooperative Extension educators' knowledge and self-perceived competence levels of common synchronous online instruction platforms (i.e., Zoom, Google Meet, Microsoft Teams, and WebEx); their knowledge of features that enhance formal and informal instruction; and their ability to apply accessibility tools to allow all learners equal access to content. For this study, Extension educators included Extension Agents, Extension Specialists, and Master Gardeners in South Carolina. The objectives supporting this purpose were to 1) identify the demographics of Extension educators in South Carolina, 2) determine the most common synchronous learning platform used by Extension educators in South Carolina, 3) identify Extension educators' knowledge and self-perceived competence levels of synchronous learning features related to effective instruction, and 4) identify Extension professionals' knowledge and self-perceived competence levels of best practices for ensuring accessible Microsoft PowerPoint and Word files.

METHODOLOGY

This non-experimental descriptive research study of Clemson Extension educators included 155 agents and specialists and 122 Master Gardeners in South Carolina. A survey was developed by a research team of agricultural and Extension

educators to evaluate participants' knowledge and self-perceived competence using common synchronous learning platforms and accessibility aspects of Microsoft Word and PowerPoint. Proficiency and accessibility questions used a four-point Likert type scale (i.e., not competent to highly competent) to assess awareness and competency levels using meeting tools. The synchronous learning technology questions were divided into five categories: scheduling/meeting tools, meeting/presentation tools, communication tools, security tools, and recording/transcription tools. Additionally, demographic questions gathered pertinent information about age, gender, highest degree earned, use of synchronous learning before the COVID-19 pandemic, access to equipment, and internet availability.

Before distribution, the survey was evaluated for face and content validity (Privitera, 2017) by five faculty members in agricultural and Extension education, two Extension specialists, and one Master Gardener. The researchers distributed the survey to 277 individual email addresses with a Qualtrics Survey link following the recommendations of Dillman et al. (2014). After the initial email, two reminder emails were sent to non-respondents to increase participation per Dillman et al. (2014). Data analysis evaluated descriptive statistics using SPSS Version 27. Although the survey was evaluated for face and content validity, the survey was not pilot tested prior to distribution due to the urgent need to support Extension educators during the pandemic. Although this research is timely, the lack of a pilot test is a limitation of the study, and the context of the research should be taken into account.

FINDINGS

The first research objective aimed to identify the demographics of Extension educators in South Carolina. Participants included 71 Extension Agents, 17 Extension Specialists, 55 Master Gardeners, and eight Extension educators who delivered statewide programming spanning 32 counties, resulting in a 51.6% (n = 143) response rate for this study. Participants ranged from 23 to 80 years of age, had degrees spanning from bachelor's to doctoral, and represented first-year professionals through those with 42 years of Extension experience (see Table 1).

Extension educators represented various specialization areas from 4-H youth to agribusiness, plant science, animal science, entomology, food systems and safety, forestry and wildlife, health and nutrition, water resources, and rural development.

Determining the most common synchronous learning platform for Extension educators in South Carolina was the second objective of this study. Of the 143 respondents, 142 of them reported primarily using Zoom for synchronous learning. The one other respondent relied on Microsoft Teams for the delivery of synchronous learning. The third

Table 1. Personal and Professional Demographics of Extension Educators in South Carolina

	f	%
Gender		
Male	24	16.8
Female	91	63.6
Prefer not to respond	28	19.6
Age		
23 to 29	19	13.3
30 to 39	20	13.9
40 to 49	15	10.5
50 to 59	18	12.6
60 to 69	30	21.0
70 or older	12	8.4
Did not respond	29	20.3
Highest Degree Earned		
Bachelor's degree	25	17.5
Some master's work	15	10.5
Master's degree	53	37.1
Some doctoral work	7	4.9
Doctoral degree	14	9.8
Did not respond	29	20.3
Years in South Carolina Extension		
0 to 5	35	24.4
6 to 10	12	8.4
11 to 15	11	7.7
16 to 20	4	2.8
21 to 25	3	2.1
26 to 30	2	1.4
31 or more	6	4.2
Did not respond	70	49.0

objective evaluated Extension educators' knowledge and self-perceived competence levels of synchronous learning features related to effective instruction based on their primary technology choice. Table 2 outlines the percentage of participants unaware of features/tools and their competence with each of the identified features/tools in Zoom represented by a mean and standard deviation. The features/tools identified in Table 2 are organized by level of competence, where 1 = not competent, 2 = somewhat competent, 3 = competent, and 4 = highly competent.

The one Extension professional utilizing Microsoft Teams felt competent in using the desktop app, scheduling a meeting, inviting people to a meeting, enabling chat, raising a hand, removing someone from a meeting, muting participants, and recording a meeting. In contrast, they did not feel competent in locking down the meeting, assigning pre-

senters, creating a poll, sharing files, using a whiteboard, or using a web browser to access meetings for Microsoft Teams. Although they were aware of all identified features, they only felt somewhat competent in sharing their screen, using the mobile app, and changing their virtual background.

The final research objective sought to identify Extension educators' knowledge and self-perceived competence levels of best practices for ensuring accessibility to Microsoft PowerPoint and Word files. Many participants were not aware of accessibility features in Microsoft Word or PowerPoint. Table 3 outlines the accessibility features, along with the percentage of respondents who reported they were unaware of each feature. Means and standard deviations are reported for each, and features are sorted based on the educators' perceived levels of competence (see Table 3).

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The Extension educators who responded to this study (n = 143) included Extension Specialists and county agents representing 32 of the 46 counties in South Carolina. They were a valid representation of the Extension population in South Carolina based on their reported personal and professional characteristics. This study's findings suggested that Extension educators were actively using the synchronous online learning tools available primarily in Zoom post-COVID-19 but were not entirely comfortable with or aware of all available features. Previous studies identified Extension educators using online learning platforms such as Zoom effectively for local, state, national, and international webinars (Lobley & Ouellette, 2017; Robinson & Poling, 2017; Stokes et al., 2020), but we found participants used the online learning platforms somewhat ineffectively. While only 38.5% of participants reported using synchronous learning technology before the pandemic, all Extension educators in this study began utilizing a platform to deliver programming across South Carolina due to the COVID-19 restrictions. Unfortunately, we found a significant lack of competency in features that would enhance instruction and participant engagement, such as the use of polling, file transferring, and livestreaming media platforms, including YouTube. Perhaps these features should be further promoted and added to best practices for participant engagement in online learning platforms, such as those developed by Robinson and Poling (2017).

Furthermore, South Carolina Extension educators lacked knowledge and ability related to accessibility features available for virtual delivery within Microsoft Word and PowerPoint. Nearly one-third of the participants were not aware of the accessibility features available within Word and PowerPoint. Those who were aware lacked the competence to use the features effectively. The most significant competency was found with the proper use of hyperlinks in Microsoft Word,

Table 2. South Carolina Extension Educators Awareness and Competence of Zoom Features/Tools

Feature/Tool	Percentage Unaware	μ	SD
Chat	2.8	3.30	.91
Raise hand	3.5	3.28	.90
Invite participants to a meeting	2.1	3.19	.94
Schedule meetings	2.8	3.16	.92
Screen sharing	3.5	3.14	.99
Start a meeting (web browser)	2.1	3.13	.93
Start a meeting (desktop app)	4.9	3.11	1.00
Mute participant	3.5	2.98	.94
Start a meeting (mobile app)	7.0	2.85	1.01
Record meeting	7.0	2.79	1.09
Virtual backgrounds	6.3	2.69	1.00
Promote to panelist	11.2	2.64	1.10
Access recording and transcript	9.8	2.50	.93
Lock meeting room	14.0	2.46	1.02
Polling	17.5	2.41	1.01
Breakout rooms	15.4	2.36	.96
Remove participant	20.3	2.25	1.03
Annotation tools	23.1	2.21	1.03
Virtual whiteboard	27.3	2.13	1.03
File transfer	33.6	1.85	.90
Panelist practice sessions	38.5	1.73	.82
Broadcast (Livestream)	42.7	1.63	.73

Note. For mean, 1 = not competent; 2 = somewhat competent; 3 = competent; 4 = highly competent.

Table 3. South Carolina Extension Educators' Awareness and Competence of Accessibility Features in Microsoft PowerPoint and Word

Microsoft	Feature	Percentage Unaware	μ	S.D.
	Proper use of hyperlinks	29.4	2.14	1.13
	Adding alternate text for images	30.8	2.12	1.12
	Proper use of headings	33.6	2.06	1.14
	Proper use of tables	32.9	2.03	1.11
Word	Exporting to PDF (preserving accessibility)	31.5	2.02	1.13
	Proper use of lists	34.3	1.98	1.09
	Identify document language	39.9	1.83	1.02
	Using the accessibility checker	50.3	1.56	.85
	Built-in slide templates	32.2	2.07	1.20
	Export to PDF	32.2	2.03	1.21
	Unique slide titles	36.4	1.90	1.13
PowerPoint	Set reading order of slide contents	39.9	1.81	1.04
	Add alt text to visuals and tables	40.6	1.79	1.01
	Making hyperlinks and tables accessible	39.9	1.78	1.00
	Use the accessibility checker	51.0	1.50	.79

Note. For mean, 1 = not competent; 2 = somewhat competent; 3 = competent; 4 = highly competent.

but respondents were only *somewhat competent* with a mean of 2.14. This lack of competence is alarming, as using online learning platforms in combination with Microsoft Word and PowerPoint has become an everyday occurrence during the pandemic. Equal opportunities (McBrien, 2009) must be provided to all learners, as discussed in the revised ADA 508 standards. Therefore, agents must provide equal opportunities by making accommodations for those with disabilities to view documents and presentations during online instruction (*U.S. General Services Administration*, 2020). We recommend specific training related to the ADA 508 standards.

Moving forward, Extension educators should actively seek out in-service activities that explicitly address the knowledge deficit in using accessibility tools in Microsoft products and Zoom; understanding these features is essential to promote best practices in online synchronous delivery skills. Additionally, Extension education programs should consider this study's findings and incorporate the necessary training to prepare future Extension educators in South Carolina with these skills. To best serve the target audience, further investigation is recommended in South Carolina to qualitatively evaluate Extension educators to determine if the needs are specialization- and region-specific. Targeted professional development is necessary and will require identifying support personnel and existing resources. Additionally, this study should be replicated on a national level with other states' Extension personnel to better understand Extension educators' needs in other states. Agricultural education, communications, and leadership programs preparing future Extension educators should also consider the results of this study when designing and evaluating course content for undergraduate and graduate students. Finally, this study should be replicated in South Carolina in two years to determine the change in skill level related to virtual technologies following the heavy emphasis on virtual program delivery.

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