Virtual Program Delivery: Learning Through Extension Nutrition Educators’ Experiences During the COVID-19 Pandemic
Alyssa Anderson, PhD, RDN, LD1; Susan Barcinas, EdD2

ABSTRACT
Objective: To describe and analyze how Extension nutrition educators in one state system transitioned from primarily face-to-face to virtual nutrition education programming.
Design: This exploratory case study gathered data through nutrition educator interviews, virtual program delivery guides, and nutrition educators’ program impact statements.
Setting: Southeastern State Extension system in late 2022.
Participants: The sample included 15 participant interviews, multiple virtual program delivery guides, and 43 program impact summaries.
Phenomenon of Interest: The use of Cultural Historical Activity Theory as a framework to explore educators’ learning process with virtual program delivery and how this learning influenced community nutrition program delivery choices.
Analysis: Qualitative data was analyzed with ATLAS.ti using a priori coding.
Results: Two key findings emerged from the data: educators were more likely to deliver programs in a virtual setting when the programs aligned with their values and skills, and educators preferred flexible program curricula and delivery guides because it allowed them to address their community’s specific needs.
Conclusions and Implications: Educators plan to continue to deliver certain community nutrition programs virtually. Future research is needed to explore additional perspectives on virtual delivery, such as program participants and state program managers.
Key Words: nutrition education, community nutrition, CHAT, virtual education, online education

INTRODUCTION
Extension education and services are available to citizens across all 50 states and the US territories and provide direct educational experiences to adults and youth. Within that scope, the National Extension Association of Family and Consumer Sciences supports nutrition education, with educators drawing on state and national guidelines and practices to serve local audiences.1 Nutrition education is a vital community service offered through Extension, addressing systemic issues related to poverty, food insecurity, and diet-related chronic diseases.2-4 Examples of nutrition education programs offered by Extension nutrition educators vary by state and include Supplementation Nutrition Assistance Program-Education (SNAP-Ed) programs, which is an educational program reflecting a multilevel partnership that benefits from research about the veracity of nutritional education delivered in multiple formats.5

During the onset of coronavirus disease 2019 (COVID-19), nutrition educators working within the Extension system were faced with sudden shifts to fully online nutrition education, at the same time as navigating increased community members’ uncertainty and need for support. This prompted what appear to be permanent changes in how nutrition programming is delivered with increased virtual educational programs. Over the past decade, there has been an increase in research focused on online/virtual adult nutrition education.6-8 Studies indicate barriers to virtual programming. For instance, there is still an income differential regarding access to the internet, and the use of public internet is still a delivery consideration.9

Although most adults now have

1School of Health Sciences, College of Education, Health and Human Services, Kent State University, Kent, OH
2College of Education, North Carolina State University, Raleigh, NC
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Address for correspondence: Alyssa Anderson, PhD, RDN, LD, School of Health Sciences, College of Education, Health and Human Services, Kent State University, Nixson Hall, 1225 Theatre Dr, PO Box 5190, Kent, OH 44242; E-mail: Aander45@kent.edu
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access to the internet via cellphones (91%), 30% of adults still have difficulty associated with home-based internet. Interestingly, certain platform options for virtual delivery, such as Twitter, Tumblr, Pinterest, and Instagram, are not always of interest to target audiences. In contrast, platforms such as Facebook, text messaging, and blogs are appealing to young and middle-aged adults and are encouraged for programming use in the national SNAP-Ed Toolkit. The exponential expansion of technology-driven nutrition apps, webpages, and artificial intelligence-driven programs are creating significant changes in the field of nutrition education, making research on nutrition education and technology a high priority.

Issues of trust specific to nutrition education are difficult to interpret—data demonstrates that with face-to-face delivery of information, facilitators who are from outside of the given community they serve see building trust as a barrier to delivery. Community ambivalence is an additional trust factor if the source is online health education or government-sponsored. Considerations of synchronous and asynchronous options factor into engagement and interactions as well.

Positive benefits of virtual nutrition education include added flexibility for transportation, work schedules or child care issues, and opportunities to increase reach. Organizational benefits for Extension include resource sharing, potential increased collaboration, division of labor, and integration of engaging pedagogies. Of concern, existing research on virtual nutrition education lacks racial and ethnic diversity, drawing primarily on White female participants.

It is challenging for educators to sustain engagement and tap into participant motivations via online education. Resource requirements include web-based curriculum development, instructional design, media production, and application of technology that guide step-by-step virtual teaching of cooking, recipes, and nutritional information. There are 7 virtual SNAP-Ed interventions available in the national educator toolkit, with programs that are backed by research and evaluation data.

Coronavirus disease 2019 led to a sudden change from primarily face-to-face nutrition education delivery to online or virtual learning formats in many, if not most, states. This left educators without time to consider their technological competence, comfort, and resources. Optimal planning was set aside, and educators adapted and offered community education through Extension as quickly and professionally as possible. Extension Family and Consumer Sciences programs began to assess consumer needs and supported the development and delivery of video and technology-driven programming. However, there were few evidence-based tools to draw on and nutrition educators faced the same COVID-19 context as their community members, with barriers in working from home, closed schools and daycare centers, and financial, stress, personal, or emotional challenges.

Thus, this case study research aimed to describe and analyze how Extension nutrition educators in a southeastern state system transitioned from primarily face-to-face to virtual nutrition education during the COVID-19 pandemic. This research contributes to the overall literature base in virtual nutrition education and to the practical development and improvement of online adult nutrition education programming. Specifically, it offers educators information to guide their decision-making and practice relative to the use of technology in community-based nutrition education.

METHODS

Design

This inquiry is based on a constructivist worldview steeped in understanding how human experiences situated in local contexts are sites of learning and how experiences serve as a source of knowledge to inform and guide our future experiences. Further, the research framing assumes that virtual community education offered by a state organizational system to complex, local audiences can best be studied by highlighting and considering how system dynamics may influence localized, specific thoughts, actions, and responses. The research question in this exploratory qualitative case study was as follows: How do nutrition educators working with adult nutrition education programs in a statewide system navigate shifts to a virtual teaching environment?

Case studies are often used in educational research and offer context-specific data that serves applied audiences well, offering rich description, analysis, and understanding of a given situation. There are many approaches to the case study method, and this study was designed on the basis of the interpretation of 5 stages of design by Merriam and Tisdell; conducting a literature review, constructing a theoretical framework, identifying a research problem, crafting and sharpening research questions, and selecting the sample (purposive sampling). Our approach aligns with the view that research is constructed from the process, allowing for multiple perspectives rather than attempting to guide data and findings into a singular perspective.

This study is designed to be exploratory because of the relatively sparse existing research in the field.

Theoretical and Conceptual Framework

Cultural Historical Activity Theory (CHAT) lends itself well to this research inquiry design. Often used for applied research in informal learning contexts, CHAT allows for the examination of situated cognition and the analysis of shared dynamics—conceptualizing learning by doing in context. In short, we learn by doing. The theory has evolved to include 3 main iterations, known as generations, and this study uses Engeström’s third generation of CHAT as the guiding study framework. The third-generation model highlights how multiple activity systems interact to shape learning. Tensions between the different components of the systems represent barriers to learning, and when addressed, these tensions promote innovative changes to improve
learning within the system. The CHAT framework shapes the research conceptually, through design, and as a guide to the research protocol, analysis, and expression of data and findings. There are 6 components to CHAT, and they are often expressed in a diagram similar to Figure 1.

To think about how these CHAT categories might be reflected in this study, the context of the study was conceptualized into CHAT categories: tools, subject, rules, community, division of labor, and object. Descriptions of each category are provided in the Table. The findings are presented on the basis of these CHAT categories.

Extension’s rich history at both a national and state level strongly influences the system in which educators learn to deliver programming to their community. The sudden and drastic changes from COVID-19 safety precautions went beyond a change of delivery and created a change in the entire system in which educators learned to deliver programming. Therefore, the different activity systems used for analysis grouped findings on the basis of the timeline of COVID-19 restrictions. The 3 activity systems in this study represent the traditional activity system (pre-COVID-19 safety precautions), the virtual activity system (mandatory COVID-19 safety precautions), and then an emerging hybrid system (removal of mandatory COVID-19 safety precautions). Although the interaction of CHAT categories differed among these activity systems, the systems share the same objective of adult nutrition education program delivery.

**Data Collection**

A Southeastern state with a large, established Extension system and a mix of rural, suburban, and urban demographics was chosen as the site. Educators were recruited via an email sent to the Family and Consumer Sciences (FCS) Agent listserv, which reached approximately 70 educators. During the time of the study, turnover and retirement rates among FCS agents increased. To participate in the study, educators had to have taught adult nutrition programming with Extension for at least 3 years and actively be teaching. Because of the limited potential sample size based on criteria, we invited all 16 educators who expressed an interest in participating. One educator dropped out of the study before the interview because of a busy schedule.

The 15 educators who volunteered to participate met the basis of the 3-year experiential benchmark and represented a balanced distribution of the Extension districts in the state. This sample is consistent with tenets by Fusch and Ness and Patton, ensuring that the participant sample represents the context being studied with the goal of generating rich, thick data rather than creating generalizability. The North Carolina State University Institutional Review Board’s blind review process classified and approved this study as exempt. All participants were adults, and oral consent was obtained before the interviews.

The interviews were guided by a semistructured protocol intended to invoke detailed discussion and follow-up questions as necessary. One group of early questions focused on contextual and basic orienting questions, and the second group of questions focused specifically on the nutrition educators’ perceptions of their experience in a transition to virtual nutrition education, organized conceptually around the 6 CHAT categories of rules, division of labor, community influence, process, and resources/artifacts. In addition, virtual program delivery guides were analyzed, and the statewide Extension system’s program impact summaries from 2020–2022 were collected and screened as primary documents. This type of source is one “in which the originator of the document is recounting firsthand experience with the phenomenon of interest.” In all, the data sources included 15 participants with 19 hours of interview data, multiple virtual program delivery guides, and 43 program impact summaries that were analyzed for their descriptions of nutrition educator reports of successful programs in nutrition education.

**Data Analysis**

The data sources were analyzed via *a priori* coding strategy and using analysis strategies to guide thematic coding, analysis, and network
display. ATLAS.ti (version 22.2.3, ATLAS.ti Scientific Software Development GmbH, 2022) was used to organize, sort, retrieve, and display the transcripts, program summaries, and guides. As a part of the process, participant profiles were developed, as well as a contextual profile of the site—allowing us to analyze the data in a situated manner. With this in mind, the categories of data and properties of the coding categories are presented in the Table. Program impact summaries and participant interviews contributed data for all of the CHAT categories. Because the program guides were developed through state Extension specialists, this data supported the context-specific CHAT categories: tools, rules, community, and division of labor. The data collected through the interviews elicited the richest descriptive data compared with the primary documents.

**Rigor**

The study relied on triangulation and member checking. Member checking allowed participants the opportunity to view their transcripts and make any necessary corrections or clarifications. Triangulation occurred by using the 3 data sources in tandem to facilitate comparing, contrasting, and adding credibility to data and findings. Four components of trustworthiness, as described by Krefinger, served as guides during the research process in terms of study credibility, transferability, dependability, and confirmability.

**RESULTS**

Demographic information was voluntarily shared by the FCS agents during the interviews. The educational backgrounds of participating educators included public health, nutrition and dietetics, early childhood education, and FCS. Interviewees ranged from 4 to 20 years of experience within the state Extension, with many working for different organizations prior. A few of the interviewees were bilingual and taught in both English and Spanish. FCS agents represented through interviews and program impact

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<tr>
<th>Category</th>
<th>Description</th>
<th>Property</th>
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<tr>
<td><strong>Subject</strong></td>
<td>Nutrition educators’ implicit attitudes, values, and predisposition to program delivery</td>
<td>Comfort level with technology</td>
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<td>Uncertainty of a pandemic</td>
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<td>Time management</td>
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<td><strong>Tools</strong></td>
<td>Technology, training, program curriculum, and supporting videos that impact program delivery</td>
<td>Physical tools used for delivery</td>
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<td>Professional development related to technology and virtual delivery</td>
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<td>Guidelines, rules, policies, and implicit and explicit norms that influence program delivery</td>
<td>Organizational culture</td>
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<td>Grant guidelines</td>
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<td><strong>Community</strong></td>
<td>Organizational, local, and programmatic level people who share the desire for successful program delivery</td>
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<td>Local community members</td>
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<td>Program participants’ traits, engagement, feedback, and need for adaptations</td>
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<td><strong>Division of Labor</strong></td>
<td>Division of tasks related to roles within the organization that related to program delivery</td>
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<td><strong>Object</strong></td>
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summarized in a mix of urban, suburban, and rural communities and represented 49% of counties across all regions of the state.

The results are presented on the basis of the a priori coding of the CHAT categories. Although the 6 CHAT categories are nonlinear in relation to each other, to facilitate the presentation of findings, they will be presented as follows: subject, tools, rules, community, division of labor, and object.

Subject

Nutrition educators, all with the organizational title of FCS Agent, frequently mentioned personal skills, values, and attitudes shaping their experience in shifting to a virtual environment. Traditionally, delivery of adult nutrition programs required few technological skills. One program impact summary highlighted how the shifting environment changed their required skills:

I, the FCS Agent have been somewhat lacking in technology savvy. When I needed information posted or sent out, I would ask our administrative assistant to take care of it. However, working from home due to COVID-19 helped me realize I was going to have to depend much more on myself. [Program Impact Summary, 2020]

Although educators had access to the tools needed for virtual delivery before COVID-19, these tools often required a robust technological skill-set. Many participants described a lack of personal motivation to develop this skill set. They felt comfortable with traditional face-to-face delivery methods. However, the changing environment pushed many educators outside of their comfort zones:

I would think I speak for many different people, especially my age, is because of COVID, it certainly pushed me out of my comfort zone to learn all these things now and have to learn how to do it. [Participant 1]

Coinciding with many societal changes that occurred because of COVID-19, this stage of transition was drastic and sudden for educators both personally and professionally.

“You had so many things on your plate: your family, your health, you know, and then trying something new [Participant 2].”

The pandemic has changed the way I work, learn, and interact as social distancing guidelines have led to a more virtual existence, both personally and professionally. [Program Impact Summary, 2020]

This sudden need for change shifted the traditional environment and allowed educators to express greater levels of creativity in their teaching, which some saw as a strength.

“I guess I’ll say it was probably one of the...one of the most creative times in my life probably [Participant 3].”

“With the stay-at-home order, agents [nutrition educators] had to be creative in how to deliver programming to the community [Program Impact Summary, 2020].”

Educators discussed how, over time, their skills and comfort with virtual delivery improved. As examined in the upcoming sections, this changing skill set influenced the tools that they chose for programming, changed their sense of community, altered division of labor, and ultimately shaped their decisions with virtual programming once COVID-19 restrictions were lifted.

Tools

Virtual program delivery requires access to certain tools, such as technology-related equipment and platforms, along with the appropriate training to develop personal skills. As one interviewee summarizes:

I would say the training behind those materials is the key, because you can hand me a phone, right? You can hand me a smartphone, but it’s only going to be as smart as you are. So, having those trainings on how to use the equipment really was really key in the things that we do. [Participant 4]

Before COVID-19, “we [nutrition educators] had tools in place, but we weren’t really utilizing them” [Participant 5]. The tools mentioned by most educators included digital delivery platforms such as Zoom, mass email systems, social media, and program registration platforms. Another common tool, the county teaching kitchen, has historically provided a space for program delivery within organizational office space. Interviewees described varying county-level resources that supported these educational kitchen spaces. Resources mentioned ranged from an “amazing kitchen equipped with the cameras and everything” [Participant 6] to “one of my offices I don’t even have a kitchen” [Participant 7]. In a virtual world, educators’ value of educational kitchen spaces in aiding in delivery differed on the basis of their office kitchen set-up and the technology available.

Recognizing the differences in access to technology and individual skill sets, one of the virtual program guides requested that educators “decide which virtual tools and platforms to use for presenting/sharing the components of your class series.” Many educators viewed the traditional adult nutrition programs as adaptable because of the already existing slide decks. However, all programs also incorporated hands-on cooking or taste test opportunities within the curricula. These adaptations required greater creativity in delivery. One educator program summary explained this experience:

As part of this program, the agents [nutrition educators] provided educational presentations using the curriculum provided from [University], as well as created and shared video recipe demonstrations to show participants how simple it is to cook these delicious and satisfying meals, and to educate them on various food preparation techniques. [Program Impact Summary, 2020]

Although those individuals created videos, others provided live cooking demonstrations or had everyone cook synchronously from their home kitchen.
To help educators make delivery-related decisions, program delivery guides explained to educators the different online platforms, supporting technology, delivery options, and training available to assist with the shift in delivery. When discussing her experience with one of the program delivery guides, an interviewee shared:

*It gives you the opportunity to do it as a cooking class, it gives you the opportunity to do it as a demo, it gives you the opportunity to do it as a taste test. I've done all of those and that's what made it really versatile, I think that's the right word, as far as being able to easily pick that up and make it virtual because it is so flexible in how you can teach it.* [Participant 8]

With different options available, educators learned the benefits and barriers to each format.

**In-person is different because what happens will, you know, happen. One time I was doing with a colleague an in-person canning class, and it was her time to share. And her canner - all of a sudden the safety valve went out and it was steaming all over. That canner is not good anymore. So, it was a teaching moment. But when you are doing video to present, you have to cut the video.** [Participant 9]

Some educators preferred synchronous virtual learning opportunities and viewed imperfections in demonstrations as valuable. A few felt stressed when editing videos because of the time-consuming process and pressure for perfectionism, although many saw videos as a valuable tool because they allowed them to share longer cooking demonstrations in a shorter period. These videos could also be reused in other classes, shared on social media, and shared between educators.

Adapting traditional program evaluation tools challenged many educators. In an effort to address this, one program guide encouraged using tools associated with social media or Google Forms. In contrast, the SNAP-Ed program guide promoted the Program Evaluation and Reporting System platform that was in place across certain states nationally before the shift to virtual delivery. Despite these efforts, program evaluation in a virtual setting continued to be a challenge:

*We have done [Zoom] polls, but I do think that the Google Form is a little bit... it's definitely more streamlined as far as getting all the information. But, folks may not be as likely to do it as they would be a poll at the end of the program lesson.* [Participant 10]

Other educators described getting more responses from participants using live Zoom polls as opposed to pre-post or retrospective program evaluations. However, the depth of data decreased because of asking fewer questions.

This experience continued to shape educators' delivery preferences as COVID-19 safety precautions lifted. Although videos and synchronous cooking demonstrations are useful tools, they have limitations. One educator described how:

*The only thing that, of course, is a miss, as somebody who does nutrition education, is that food demo piece. It really doesn't hit home the same way, because you're not in person. They can't smell it. They can't experience it. But they can watch you cook it.* [Participant 11]

Although in-person education enhances participant experience, another interviewee pointed out how educators' benefits may also influence the use of tools. She explained that virtual is “easier for me to do as an instructor because I mean if I’ve got my slides there, we’re not doing the hands-on meal, we eliminate all that, I’m clicking my slide, and I’ve got notes” [Participant 3].

Looking into the future, educators’ views on tools are evolving. Overall, the organization's technology specialists help guide educators' platform choices. An interviewee shared, “unless like a really cool program or format comes out, I think I’m pretty okay with using Zoom in that setting” [Participant 12]. Educators often choose tools on the basis of convenience. “It was just easier for me to use my phone or computer” [Participant 1] as opposed to using the more complex videography kits that were distributed to different county offices. However, having an updated teaching kitchen helped make the use of high-quality technology more convenient for agents. Most educators interviewed lacked access to an updated teaching kitchen and did not see this tool becoming available to them soon. Although there is a need for “better spaces in terms of technology available, the equipment to do either videos or virtual,” this was not likely going to get addressed soon because “that means money most of the time” [Participant 9].

**Rules**

More than 100 years of organizational history influences Extension's culture. The organizational culture was so entrenched in everyday actions that often direct questions about organizational culture resulted in little feedback. However, additional components of the culture often came up when answering questions related to daily activities and when asking for participants to pretend to coach a new employee. For instance, when talking about the image Extension strives to portray to the community, one interviewee shared, “they [the community] still need that, you know, handshake” [Participant 6]. Educators described Extension as a social and hands-on organization. Values were often placed on participant reach. For instance, one interviewee shared that “for Extension numbers speaks very loud” [Participant 5]. Likely influencing this is the funding structure. As an interviewee acknowledges when discussing the reporting of outcomes and reach:

*That's when you can really say, and you can really connect the dots for folks particularly stakeholders, where we put this [program] out here. People are definitely accessing it. Here's all the numbers that prove it, and it's from every single, you know, folks from every single group in our county.* [Participant 11]
Educators often reflected on the culture of the organization when discussing their decisions around program delivery. Virtual was typically seen as a strength because, as an interviewee stated, “it helps me with those with those numbers” [Participant 2]. However, organizational values did not always align with educators’ values.

“The numbers are not why I do what I do. I do what I do because I care about people’s relationships with food” [Participant 11].

The rules tied to various funding sources at the county, state, and national level creates a complex environment with varying needs and expectations for educators to navigate. The COVID-19 pandemic starkly highlighted these competing demands. When state government mandates were in effect, educators adapted to a virtual environment so they could reach their communities and follow a clear set of rules. As the mandates were lifted, some educators faced contradictory rules and social mandates were lifted, some educators and follow a clear set of rules. As the

One interviewee recounted,

We had specialist saying “it’s not a good idea, don’t do this.” Then we would have people in our county that were in full blown meetings, doing things, you never knew anything was happening. What do I do? Then we had somebody else say, “technically, you need to do what your county is doing.” But if your county is like, “let’s do this, this is what they want,” that’s what you need to do. So, there was that battle going back and forth. That just about did me in because that was real stressful. [Participant 13]

Program curricula guides provided educators with additional rules and expectations around program delivery. For instance, SNAP-Ed followed specific US Department of Agriculture-led national guidelines that differed from other state programs that were created to reach a general audience. Overall, educators respected these rules, and an interviewee shared, “you have to have certain fidelity to the program” [Participant 9]. However, to meet participant needs, the majority of interviewees discussed different program adaptations in both the traditional and virtual settings.

It's really helpful when the program developer has kind of like “go, whoa, slow” kind of deal with, or like “red light, green light, yellow light” of what we can adapt with still keeping the validity of the program. [Participant 12]

Community

In this setting, the term community is expansive. It includes the community receiving nutrition education along with the community of Extension colleagues learning successful program delivery together. When discussing how the community shapes choices around program delivery, almost all program impact stories focus on diet-related chronic diseases. For example, one program impact summary shared:

In [Rural] County, 30 percent of adults are obese, compared to the national benchmark of 25 percent. Contributing to this epidemic are poor nutrition and physical activity. 66 percent of residents in Eastern [State] consume fast food each week. More consume sugar-sweetened beverages daily (60%) than the recommended fruits and vegetables (18%). [Program Impact Summary, 2021]

However, during interviews, most educators discussed other community-related social factors that influenced program decisions. One interviewee shared:

I go and consult the Advisory Board. So, we have about 8 to 10 folks on the FCS Advisory Board in [rural county], and they are from different organizations, but they usually make recommendations about what they would like to see, what type of program they would like to see, and the community that would be best to receive that. [Participant 10]

In interviews, educators mentioned various challenges faced with traditional programs delivery. One main challenge related to the length and frequency of meeting times. An interviewee described:

It might not work for my group in their allotted time or their amount of time, so it could go longer or it needs to be shorter. It just it’s... I would just say that time isn’t specific like, you know, um surgery must start now [laughter]. So, it’s not that stringent for sure. Because we’re working with families and communities, and just being nimble in that regard. [Participant 14]

Generally speaking, as programming went virtual, the number of people reached increased. Many educators have noted increased flexibility with delivery time. As one interviewee shared, “I’ve been surprised by the number of folks who watch the recordings later, and I guess it’s because it doesn’t work out with their schedule to come in person” [Participant 10].

A virtual environment also meant the community reached became broader, expanding outside of the typical county boundary. Highlighting this increased reach, a program impact summary shared, “we were able to reach 4 international, 4 out of state, and 2 out of county participants” [Program Impact Summary, 2020]. Similarly, another interviewee mentioned, “we were talking to people all over the country essentially” [Participant 15]. However, not all educators noted the same ease of growing their program audiences. In a program impact summary, an educator in a rural county pointed out that some “counties are rural with unstable internet services” [Program Impact Summary, 2020]. Although this limited synchronous education, the educator provided asynchronous learning opportunities. In addition to this, the SNAP-Ed virtual guidelines promoted participant recruitment and sign-up through community partners to keep the program local.

Participant engagement shifted with virtual delivery.

“They [program participants] might come 20 minutes early and then I’m talking to them for that whole time, you know, and they get to know me, too” [Participant 10].
The hardest part was not being able to see folks’ faces. And then trying to still remain as personable in a virtual format. So that was a challenge, and that, I think, just takes practice. [Participant 11]

I feel like there’s an attention span on virtual formats that you really have to shorten even the recipe itself or skip ahead a few steps within the recipe to kind of hit that attention span when it’s online. [Participant 12]

In a traditional setting, nutrition educators felt it was easier to build trust and rapport and thus increase engagement with program participants. Although external shifts in the community were noted, so were internal community shifts. As programs transitioned to a virtual setting, educators’ learning communities strengthened. As one program impact summary highlighted, “the ability to offer virtual programming afforded agents the opportunity to work together across county lines” [Program Impact Summary, 2020]. Most educators noted this increased sense of community and support in interviews.

And for all the virtual programming, it made me realize that we are stronger together, because I think as a new agent, I really kind of wanted to do my thing and chart my path and this and that, but it made me realize that is not the best for me. I do think some people kind of want to do their own program and this and that. But I’ll tell you, the virtual made me realize that I need my fellow agents and we really do create stronger programs together. [Participant 5]

This increased ability to work together was also noted in a guide for virtual programming. The guide referred to a Google Spreadsheet that encouraged educators to “share ideas and requests for [Extension Nutrition Program] online programming collaborations.”

Moving forward, educators see value in virtual delivery expanding community reach. Specifically mentioned populations that would benefit from this method include individuals with incomes below the federal poverty threshold and professionals who cannot easily attend weekday programs during work hours. With an organizational culture that values community reach, one interviewee finds that she is now asking herself, “do I do it for 15 people, 2 hours? Or, do I do it for 45 people and just do the demonstration?” [Participant 2].

Division of Labor

Division of labor in Extension is hierarchical in structure. One interviewee described this structure and her role as an educator as follows, “I basically do food-based programming. That takes research-based evidence-based programming from [University] and brings it to the communities” [Participant 12]. The division of labor creates varying levels of power dynamics between state and county positions. One interviewee shared how this power dynamic shifted throughout her time with Extension:

If I really have a question, I feel comfortable. I used to be so scared of them [State Program Specialists], but not anymore. No. But now I feel comfortable if I really need something, or if I’m trying to do an adaptation or something, I’m not sure if that’s appropriate, I will. Especially because my...I don’t have a background in nutrition. [Participant 6]

In addition, educator positions are funded through a combination of local government, state government, and federal government support. An interviewee highlighted how she was “hired for a specific county to make a difference” [Participant 12]. This made it difficult for educators to navigate in a virtual setting as their reach often expanded beyond their assigned county. As a result, one interviewee felt, “we need to be able to report the impact that we have so that our stakeholders understand why we’re important, and you know stakeholders help us get funded” [Participant 11]. The reporting of virtual programming looks different from that of traditional programming. When those stakeholders are concerned about county-level changes, educators feel there is a need for improved metrics to show funders that they can still reach people locally but in a virtual setting. One interviewee summarized this need:

It’s not enough to be like one hundred people watch this video, but we actually don’t know how many of them are from [Rural] County. We’re just assuming. Just to have a little more transparency on those numbers there. [Participant 11]

The transition to a virtual environment impacted the division of labor. At the start of the transition to virtual, there appeared to be more disconnect between state and county positions. One interviewee shared that when making this transition, “unfortunately, one of the big answers that we always got was, ‘we’re in the process of trying to figure out how to get this done!’” [Participant 4]. Another interviewee acknowledged that each level within the organization faced different challenges, but overall, “they’ve been on that with trying to see us and meet us as agents” [Participant 11].

During the transition, a division of labor between agents appeared because of increased collaboration. An interviewee compared facilitating virtual education on her own to being a DJ.

You’re trying to juggle, or you know, you have the plates turning, and you’re trying to just keep it going and make it as smooth as possible, I think, for the audience and participants, and to help it be engaging at the same time. [Participant 14]

Most interviewees enjoyed collaboration because these different tasks could be divided among the different educators.

It works great when you work with other agents to make it lighter on yourself. Always have a backup to help you with the IT part of managing the chat, managing the attendance, if you can’t do it all. [Participant 2]

Object

The different categories within the activity system work together to
influence how educators approach program delivery in both a traditional and virtual setting. As COVID-19 safety precautions were lifted and rules around programming changed, a new object of program delivery emerged that combined both virtual and traditional elements. Moving forward, educators see value in having the option of multiple delivery methods. An educator shared that they are now “more inclined to host and teach a class virtually” [Program Impact Summary, 2020]. Another educator shared:

You know, for a while we’ve needed that push to transition into the virtual world just because everything is online and while I do believe that there is a place for hands on, I also believe that there’s a place for virtual and quality videos and having the flexibility. [Participant 8]

The trial and error of different technologies and platforms allowed educators to find which tools they felt most comfortable using. One interviewee described how she “knew too much information” related to technology used for virtual programming, and now “half that stuff I don’t even use anymore” [Participant 15]. Meanwhile, one of the interviewees who had a recently updated teaching kitchen with built-in cameras explained how helpful this tool was for virtual delivery and, as a result, “I plan to continue using it” [Participant 6].

Educators valued the time saved through virtual delivery. As a program impact summary described, “by adapting to virtual programming, we, Area Agents, have been able to serve all counties we cover with one program meeting, saving time and resources” [Program Impact Summary 2020]. This resulted in a greater sense of balance:

And like, you know, you’re only one person and being able to go to all of these different places and be everywhere...it’s so hard. And I feel like I felt so much more balanced when I can do things virtually. [Participant 8]

Another interviewee felt that “agents in my area will continue collaborating for virtual programming because it’s very convenient to work together” [Participant 10]. When reflecting on the future of virtual delivery, an interviewee shared, “it’s still kind of early, I think, too. I think that the generational adaptations are just evolving” [Participant 8].

**DISCUSSION**

The data represented how the changing contexts and rules related to COVID-19 influenced the systems in which educators navigated. Three distinct phases of time-influenced responses: the traditional activity system (pre-COVID-19 safety precautions), the virtual activity system (mandatory COVID-19 safety precautions), and then an emerging hybrid system (removal of mandatory COVID-19 safety precautions). These phases and the related activity systems in which delivery was occurring are illustrated in Figure 2.

Two key findings emerged from the results and are highlighted through the dynamics of the emerging hybrid activity system; therefore, the subsequent diagrams will focus on the interactions between categories within this specific activity system. The different interactions between categories are represented through color-coded arrows. The arrow colors match the colors in the legend, which provides descriptions of each interaction.

The first key finding is that educators were more likely to deliver virtual programs when this delivery method aligned with their values and skills. Figure 3 summarizes the key interactions within the activity system related to this finding. During COVID-19, all educators viewed virtual as the only option for delivery because of rules related to safety precautions being in place. Once these safety precautions were lifted, educators regularly mentioned how their values and skills influenced their decision to continue some virtual program delivery.

This study affirms past research on virtual nutrition programming with the Special Supplemental Nutrition Program for Women, Infants, and Children that highlighted how nutrition professionals found virtual education helped balance their busy work schedules.7 Similar to our findings, the Special Supplemental Nutrition Program for Women, Infants, and Children educators also chose to use direct, hands-on interaction with the community they served; virtual education was seen as one of many tools that could be used to reach clients.7 Using virtual delivery as a tool alongside face-to-face delivery allows educators to make meaningful connections that they find are most appropriate for the different settings and community members that they reach. This is relevant as limited staff capacity is currently recognized as a major barrier to the delivery of SNAP-Ed.31

Similar to educators having varying preferences for technology use, program participants also have individualized preferences. When interest in virtual delivery aligns between educators and participants, they have the potential to build meaningful relationships within this setting. This desire for educators to build personal connections aligns with past research that demonstrated that when nutrition educators were seen as outsiders to the communities they served, they often felt it was a barrier to delivering successful programs.14

Although resources and tools related to virtual education have been around before COVID-19,32,33 most educators in our study shared that they chose not to use this technology because of comfort. Those who considered themselves early adaptors to the technology expressed greater comfort and less fear in learning how to incorporate virtual delivery. Peer collaborative opportunities allow for in-action learning to occur between various educators with different comfort levels. This development of an informal peer learning community to learn how to integrate technology into teaching during COVID-19 is similar to research done within the kindergarten to 12th-grade setting.34

Ultimately, educators value the work that they do in enhancing community nutrition security. They feel it is important that the organization reports the outcomes and impacts made through program evaluation metrics. However, the virtual setting has created new barriers to evaluation because fewer participants are completing the program surveys. This aligns with the American Public
Human Services Association’s recommendations that the evaluation of virtual programs for SNAP-Ed needs to be strengthened.31

The second key finding is that educators preferred flexible program curricula and delivery guides because they allowed them to address their community’s specific needs. Figure 4 summarizes the various CHAT categories that influence this finding. Nutrition educators value the expertise of state specialists who develop community nutrition programs.

However, program adaptations were often influenced by educators’ varying degrees of access to high-quality technology. Similarly, subpopulations within counties have different preferences and access to virtual nutrition programs. Although smartphone use has increased access to virtual education in rural communities,11,35 some interviewees still mentioned internet and cell phone reception as a barrier for their community. Even with access, delivery preferences of audiences varied by county, and nutrition educators’ discussion on these differences illustrated that they are experts in navigating these delivery decisions. Past research has valued educators who work through Extension for the trust and rapport that they have established with their communities through various community nutrition programs such as the Expanded Food and Nutrition Program and SNAP-Ed.36 By using programs that embrace a flexible delivery model, educators are empowered to manage the competing demands of program adaptation and program fidelity.

The CHAT framework provided a valuable tool for viewing nutrition education within the system, and it occurs while capturing cultural, historical, and social elements. The third generation of Engeström’s26

Figure 2. Adaptation of the third generation of Cultural Historical Activity Theory26 model highlighting the different distinct systems in which educators learned to deliver programming. COVID-19 indicates coronavirus disease 2019.
CHAT features the voices of multiple groups impacted through virtual nutrition education. One limitation of this study is that it solely includes the voices of nutrition educators as the subject of the activity system. However, program participants and developers also play major roles in the delivery of virtual nutrition education. Another limitation is this study did not evaluate the effectiveness of the programs being delivered in a virtual setting. Because these programs were quickly adapted, the evidence-based research that is typical with the development of nutrition education may not be as strong.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

This study supports future research that considers additional views on virtual delivery. For example, data collection and analysis that includes program participants’ and program developers’ systems in which they learn could provide greater detail to the context, challenges, and future potential of virtual program delivery. One strategy to do this would be to focus on assessing virtual nutrition education for smaller, individual programs. The nature of the CHAT framework allows for future studies to capture the nuanced cultural and organizational aspects unique to their environment. In addition to this, a more comprehensive evaluation of the effectiveness of these programs that were quickly adapted to a virtual setting would help to ensure that populations are being positively impacted by the programs.

It is important that training and professional development continue to increase the technological comfort of practitioners. Curricula may consider ways to encourage and build peer learning communities. Future curricula development may facilitate delivery by being structured to encourage delivery flexibility while still providing clear guidance on how to maintain evidence-based quality.

Virtual community program delivery has been found to have many benefits, including creating healthy behavior changes in participants, organizational resource management, and increasing community participation. This study has demonstrated that at an organizational level, educators buy into using this valuable tool, which is important to consider when developing curricula and making sure that it is utilized when educators are given a choice of various tools. For practitioners, virtual delivery has the potential to help manage busy schedules, build a collaborative peer learning team, and
reach greater audiences within the community.

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ORCID

Alyssa Anderson: http://orcid.org/0009-0002-5032-5586