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Evaluating an Overall Experience of Virtual Learning in Meeting the Continuing Education Needs of Rural Nurses in North Carolina

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Abstract

Background. Rural nurses in North Carolina (NC) face several barriers to accessing face-to-face continuing education (CE) opportunities.

Objective. The purpose of the project is to connect to rural nurses in NC by designing accessible and flexible CE programming that includes virtual learning activities.

Methods. System Usability Scale (SUS) and the Usability Metric for User Experience short version (UMUX-Lite) tools were used. to predict whether participants will use or adopt a new technology following a North Carolina Area Heath Education Center (NC AHEC) hosted virtual conference.

Findings. Of the 103 participants who attended the CE conference, 93 completed the program evaluation survey. The average overall SUS score was statistically significant at 75.9 out of 100, falling above the average of 68 (Yes: 77.3, No: 64.1; p=.004). The average overall UMUX-Lite score was statistically significant at 82.8 out of 100, falling above the average of 68 (Yes: 83.7, No: 75; p=.025).

Conclusion. The rural nurses indicated high perceived usability of Zoom virtual platform overall. Although close to half of the rural nurses from this conference preferred obtaining CE through virtual learning, 31% of the participants would rather attend in person. Further study is recommended to learn more about the attitude and values of face-to-face CE learning than virtual learning related to knowledge retention and other benefits associated with different types of learning modalities

Keywords: Continuing education, professional development, competency requirements, virtual learning, asynchronous learning, rural nursing.

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Evaluating an Overall Experience of Virtual Learning in Meeting the Continuing Education Needs of Rural Nurses in North Carolina

Nurses working in rural settings are considered generalists who must acquire and maintain knowledge of all aspects of specialized care areas, ranging from patients with acute and chronic health illnesses to locating scarce community resources for patients in preparation for hospital transfers to higher acuity medical centers or discharge home (McCoy, 2009). These nurses face many challenges in maintaining their competency that differ from their urban and suburban counterparts.

A registered nurse has a professional and moral obligation to engage in lifelong learning and ongoing training, which influences nursing practice and ultimately impacts the quality of care that patients receive (McMaster, 2017). This requirement for lifelong learning is clearly stated in the Nursing Code of Ethics (American Nurses Association Code of Ethics, 2010). According to the American Nurses Association's Nursing's Social Statement Policy (2010), nurses are expected to maintain current knowledge, skills, abilities, and competence through formal academic, professional development classes or certification in their specialty areas with a goal of ensuring the delivery of high quality, competent care under the nursing scope of practice for public safety. This is especially important today with the fast-paced healthcare environment. Thirty-eight states' boards of nursing require that nurses maintain their continuing competency through obtaining Continuing Education (CE) hours for licensure renewal. North Carolina is one of those states. Specialty certification from professional organizations also require CE for periodic recertification. In the nursing literature, we often see the

terms lifelong learning, continuing education and continuing competence used interchangeably.

Nurses working in rural and underserved areas face many challenges that differ from their urban and suburban counterparts. The CE and continuing professional development (CPD) opportunities in rural settings are fewer due to limited employer resources and other barriers (Holuby et al.; 2015; McCoy, 2009; Ziebarth, 2013). Barriers include geographic isolation, travel, cost of CPD, lack of perceived administrative support, lack of financial, and/or technological resources, lack of time due to inadequate staffing and lack of relevant CE topics (Curran et al., 2006; Dyck & Kim, 2018; McCafferty et al., 2017; Schweiter & Krassa, 2010; Shahhosseini & Hamzehgardeshi, 2015). Barriers pose an extra burden on their professional growth. Provision of relevant CPD is a vital part of maintaining a highly competent nursing workforce, which helps drive practice change leading to better patient care (Fairchild, et al., 2013). In addition, rural nurses are often isolated both geographically and professionally, one of the disadvantages not faced by urban nurses. Experiencing collegial support and access to professional education are associated with job satisfaction and retention (Curran et al., 2006).

Needs Assessment

The need for increased access to CE for rural nurses came to the attention of the North Carolina Area Heath Education Center (NC AHEC) in an annual review of feedback from state-wide CE events. AHEC's feedback review received from customers of each regional AHEC found only 15% of total attendees were from rural counties. The

AHEC staff conducted statewide needs assessment surveys and led a focus group in conjunction with rural healthcare professionals who voiced similar concerns to those found in the literature. Barriers such as cost, distance to travel and limited staffing reducing opportunity to leave work to attend the CE programs were found to be significant contributing factors which keep them from attending programs. Due to the rapid and constant changes in today's healthcare environment, rural nurses must acquire new knowledge and skills across a broad range of areas and expanded roles to ensure patient safety and high-quality care through continuing professional development (Robert Wood Johnson Foundation, 2010).

Problem Statement

Rural nurses in North Carolina (NC) face several barriers to accessing face to face CE opportunities. Since the on-set of the COVID 19 pandemic, all face-to-face CE opportunities have been suspended due to travel and social gathering restrictions which were put in order by the State. In the 2019 NC AHEC study of health professionals consisting primarily of nurses, approximately 23.3% of the total respondents reported attending 0-2 CE programs. NC AHEC programs were cited by 74.5% of respondents as a source of their CE. According to AHEC internal data in 2019, 66% urban nurses attended 1-2 CE programs as compared to 34% of the rural nurses' living in Tier one which is the most economically distressed counties in NC. Improving access to CE for all Registered Nurses is necessary to maintain nursing competency and provide quality care for patients served in any healthcare setting including rural communities.

Literature Review

Nurses are the largest healthcare workforce in NC and play important roles in patient safety, patient advocacy, disease prevention, and health promotion (American Association of Colleges of Nursing [AACN], 2019). To enhance skills, alter our thinking and action, and maintain clinical competency, nurses need to continue seeking continuing learning opportunities throughout their careers to keep up with the fast-paced and ever-changing work environment.

Continuing Education (CE) or CPD is recognized as a mandatory nursing licensing requirement for most of the United States (US) (AMN Healthcare, 2019). Many studies were done to identify perceived barriers impacting rural nurses' participation in CE opportunities in the US and other countries. Geographic distance, travel, costs of CPD, lack of perceived administrative support, lack of financial, and/or technological resources, lack of time due to inadequate staffing, and lack of relevance of CE topics were the key barriers to nurse participation in CPD (Curran et al., 2006; Dyck & Kim, 2018; McCafferty, et al., 2017; Schweiter & Krassa, 2010; Shahhosseini & Hamzehgardeshi, 2015). To increase the accessibility of CPD, e-learning education modalities have been recommended as an alternative to face-to-face learning opportunities to facilitate lifelong learning (Karaman, 2011; Lahti et al., 2014).

Due to the digital world that we are living in, new learning technologies are readily available to support and facilitate learning (synchronous or asynchronous). Synchronous learning is defined as a group of learners who participate in learning at the same time. Participants can be physically in a classroom together or in an online

environment, such as web/virtual conference, live webinar, videoconference, or teleconference. They can interact with the instructors and participants in real-time. A benefit of synchronous learning occurs when knowledge and experience is exchanged between participants and instructors in real-time, whether through in person or virtual instruction. Participants can get real-time feedback from the instructors and peers. There is no geographical boundary that hinders participants from learning. However, the educational event does take place on a specific scheduled date and time (Higley, 2013). Opposite of synchronous learning, asynchronous learning happens when instructors, learners, and participants are not participating in the learning process at the same time. There is no interaction taking place between participants and instructors in real-time. This type of learning can be delivered through pre-recorded videos, slideshow presentations, or reading assignments. An asynchronous learning method offers a certain degree of flexibility, the learners can choose their own schedule to progress through their learning in any place and at any time. Similar to synchronous learning, there are no geographic and time zone restrictions. One drawback of asynchronous learning is that participants are not able to ask questions and receive instant feedback from the instructors or peers.

Many studies were conducted to demonstrate the effectiveness of a variety of learning modalities to improve knowledge and skills of nurses (Cook et al., 2008; Sleeg et al., 2013). Gould et al. (2014) pointed out that asynchronous online learning designed for learning alone without interaction and support from others is limited in value. They argued that this learning model restricted the learner's opportunity to reflect on the

material with his or her peers in real time, and therefore lessened the opportunity for deep learning.

With the COVID 19 pandemic, the traditional face to face learning has been disrupted, forcing K-12 education, college education, CE providers, and professional organizations to re-evaluate and deploy the most convenient and accessible learning methods to the audience due to social distancing and shelter in place restrictions. This drastic change has created a need of rapid development and implementation of a timely CPD through use of innovative technology, therefore virtual conferencing has exponentially expanded overnight. Technological capabilities are no longer the main concern, even for people who live in rural and underserved areas. Providing access, saving money, time, and resources are some of the advantages when using virtual conferencing (Rubinger et al., 2020). It is important to understand the attitude towards online learning between rural and urban nurses when assessing appropriate learning methods for rural nurses. The results from Xing et al. (2018) found that nurses in rural hospitals had more positive attitudes toward online learning than those working in urban hospitals. Rural nurses who could access the internet in their workplace reported more positive attitudes than those who could not. This indicates that developing online learning programs accessible through the employer's internet access can provide support to fulfill learning needs of the rural nurse.

The study by Lahti et al. (2014) demonstrated that online learning improves accessibility, flexibility, cost savings, and is a convenient way for nurses to obtain CE. It increases learning opportunities and offers a unique learning environment for nurses

outside of traditional learning methods. Many studies also showed that online or web-based learning demonstrated equal learning outcomes and greater satisfaction than traditional face-to-face learning (Horiuchi et al., 2008; Lahti et al., 2014). The study of Horiuchi et al. (2008) identified three advantages in web-based group learning. First, the dropout rate for the web-based learning groups is lower than face to face. Second, the participants enjoyed the flexibility of web-based learning. Third, the web-based learning was affordable and attractive to nurses of various ages. Karaman (2011) had similar findings, that nurses' ages or length of work experience did not show a significant difference related to the positive perception of online programs. Also, there was no significant difference between perceptions about online learning for nurses living in urban areas and those living in rural areas, therefore offering CE through online learning modalities can be used as an effective substitution for face-to-face learning in both settings.

The meta-analysis conducted by Pei and Wu (2019) found no evidence that offline learning was better than online learning. They also found that online learning enhanced the knowledge and skills of undergraduate students, supporting that it a potential method for undergraduate medical teaching. Another systematic review evaluated the effectiveness of online learning versus alternative learning methods, such as face-to-face workshops or supplemental study with manuals, for teaching clinical interventions with licensed health care professions (HCPs) including nurses. This review demonstrated that a workshop or lecture in person was not superior to online learning for knowledge and clinical behavior. It is likely that online methods may be as effective as

alternative methods for training HCPs in clinical interventions for the outcomes of knowledge and clinical behavior (Richmond, et al., 2017).

Target Population & PICOT Statement

Since 2007, NC has used a three-level system for designating community development tiers. The tier calculation is based on an average unemployment rate, median household income, population growth, and assessed property value per capita in relationship to the total population in that county. There are 40 Tier 1 counties (lowest tier), 40 Tier 2 counties, and 20 Tier 3 counties in NC. Tier 1 includes the smaller and more impoverished counties, representative of many rural areas, and Tier 3 is considered most prosperous counties, which is representative of many urban/metropolitan areas. For example, the counties of Anson, Cleveland and Rutherford are categorized as Tier 1 counties. Mecklenburg and Cabarrus counties are Tier 3 counties. Within these Tier 1 rural counties, the healthcare facilities consist of 20 critical access hospitals, 71 rural health clinics, 154 federally qualified health center sites located outside of urbanized areas, and 38 short term hospitals located outside of urbanized areas which all require healthcare teams including nurses to care for the residents (Rural Health Information Hub, 2018). The NC AHEC is committed to designing and developing CE classes to meet the educational needs of rural nurses in NC, considering the many barriers and challenges that rural nurses face.

PICOT – (P population) NC rural nurses; (I intervention) implementation of virtual learning modality (C comparison) perceived positive experience (O outcome) meet their educational needs and increase their CE participation. Restated as the Project Question:

Do NC rural nurses perceive a positive experience when participating in virtual learning that meets their educational needs and increases their CE participation?

Sponsor and Stakeholders

The North Carolina Area Health Education Center (NC AHEC) program began in 1972 to address national and state concerns with the supply, distribution, and retention of health care professionals. In 1974, the State of North Carolina's General Assembly supported a plan to create a statewide network. Today, with the federal and state legislative support, the NC AHEC program consists of the NC AHEC program office, a network of nine regional AHECs, and the Duke AHEC program (NC Area Health Education Center [NC AHEC], 2020) to serve 100 counties in NC. The NC AHEC Program provides and supports educational activities and services with a focus on primary care in rural communities and those with less access to resources to recruit, train, and retain the workforce needed to create a healthy North Carolina (NC AHEC, 2020). NC AHEC has a long history of building reputable relationships and partnerships with the State Board of Nursing, state and local health departments and professional nursing organizations to meet the mission of the NC AHEC.

The NC AHEC Rural Nursing Conference is designed to meet the learning needs specific to rural nurses in NC. A statewide educational needs assessment was conducted in 2019 to determine topics and all the nine AHECs are involved with the planning process. The benefit of collaboration with all AHECs to reach out to rural nurses in NC is to leverage the close relationships that each AHEC has with their constitutes and local partners in their region. This program is funded and sponsored by the NC AHEC.

Mission Statement

The NC AHEC Program provides and supports educational activities and services with a focus on primary care in rural communities and those with less access to resources to recruit, train, and retain the workforce needed to create a healthy North Carolina.

Vision Statement

NC AHEC envisions a state where every North Carolinian is healthy and supported by an appropriate and well-trained health workforce that reflects the communities it serves.

Values

Excellence – We deliver quality activities and services that our customers and partners value.

Diversity – We promote equity and inclusivity.

Integrity - We act with fairness, transparency, and the highest level of ethics.

Collaboration - We value partnerships and support interprofessional approaches.

Improvement - We continuously innovate and improve our work.

SWOT Analysis

An in-depth organizational assessment on Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is conducted and detailed in Figure 1. Many strengths are identified through the assessment. The NC AHEC has a unique infrastructure which utilizes all nine AHECs to connect with rural nurses in the counties they serve. The NC AHEC values the important role that rural nurses play in providing safe and quality care for the NC residents. To mirror the mission of the NC AHEC, it is vital for all AHECs to

improve and increase CE access to meet the learning needs of rural nurses, foster their lifelong learning, and support them with maintaining their competency which is required by the licensing and specialty nursing certification bodies. Due to the COVID-19 pandemic (a threat), some of the weaknesses include competing priorities and job responsibilities of rural nurses may negatively affect their participation. Unlike the face-to-face CE programming, virtual learning may limit individual interaction and networking opportunities due to the large number of participants. Due to many people having "smart" phones, a majority of nurse should have no difficulty with internet access, there may still be a potential threat of rural nurses experiencing poor internet connectivity in remote areas. Competing with external CE providers to offer CE programming to rural nurses can be perceived as an additional threat.

Many opportunities were identified through the assessment. Marketing strategies are an opportunity to reach out to rural nurses. Since this is a collaborative AHEC with a goal of attracting rural nurses to participate in this CE event, each AHEC is fully invested in this project. Every effort will be made by each AHEC to connect with their constituents and local partners to help spread the word about this event. Another opportunity is to submit and publish an article in NC Board of Nursing Bulletin magazine to emphasize the NC AHEC mission and our support of rural nurses. This article was submitted and approved by NC Board of Nursing and was published in NC Board of Nursing Bulletin magazine in summer 2020 issue. Engaging with rural nurses is also a top priority for this event, therefore, ice-breaking and interactive activities will be added to the event. Tools such as social media or poll will be used. On a positive note, this

educational event will be recorded and made available for those who will not be able to attend on the day of the event but wish to review the content later and earn CE contact hours. Using emerging technology such as Zoom or Adobe Connect platforms in delivery of synchronous learning, our goal is to reach out and connect with rural nurses in NC and to build long-lasting relationships to meet their professional needs.

Figure 1

SWOT Analysis

Strengths	**Weaknesses**
• Partnership with all nine AHECs including Duke AHEC to offer the NC AHEC Rural Nursing Conference – leveraging the strong relationships each AHEC built with their local constituents, partners, and community to reach out to the rural nurses in all counties NC. • Funding of this program is sponsored by the NC AHEC. Registration fee is feasible and minimal. • Strong technology team will support this event. • Early planning process has begun since August 2019. • Allow time for NC AHEC to conduct statewide educational needs assessment of rural nurses. • Use technology to connect with rural nurses. Live webinar mitigates a geographical restriction and travel expense. It is deliverable even though we are experiencing the COVID 19 pandemic. • The event will be recorded and available for rural nurses who will not	• Individual interaction and networking opportunities are limited due to the large number of participants. • Some rural primary care clinics may have limited numbers of devices for access to CE during working hours.

be able to participate in the live webinar event.	
Opportunities • Allocate times for each AHEC to connect with their constituents and local partners to help spread the word about this event. • Submit and publish an article in NC Board of Nursing Bulletin magazine to emphasize the NC AHEC mission and our support of rural nurses. • Increase the visibility of NC AHEC. • Market the live webinar event in NC Board of Nursing Bulletin magazine. The BON magazines reach out all nurses in NC. • Develop strategies to engage rural nurses during live webinar. For example, ice breaking, and interactive activities will be added to this event. Tools such as social media or poll will be used.	**Threats** • The COVID 19 pandemic will reduce rural nurses' participation due to work obligations • Although many people have access to internet, there may still be a potential threat of experiencing poor internet connectivity in remote areas. • Competing priority and responsibilities of rural nurses. • Compete with other external CE organizations to offer CE.

Assess Available Resources

The NC AHEC recognizes meeting the educational needs of healthcare professionals living in rural and underserved areas is a worthwhile effort. A grant proposal to request for one-time funding was submitted and approved by the NC AHEC. The full amount of $38,760 was granted for this initiative. The original plan was to offer the NC AHEC Rural Nursing Conference on the same day at seven geographically spread hosting sites across NC as a face-to-face event. Most of the AHECs had already secured the hosting sites in partnership with the universities and community colleges to host the event. The advantages of using universities and community colleges as hosting sites are

that schools are well equipped with the advanced technology and audio video (AV) support teams to serve their students, therefore, the internet connectivity for broadcasting the keynote speakers is not a foreseeable issue. Each AHEC would gather their planning committee to identify regional topics that would meet the needs of the rural nurses in their region. The AHEC nurses started planning for this event one year in advance. The monthly conference call was coordinated with all AHEC nurses from the nine AHECs, to establish a timeline for this project, selected speakers based on the needs assessment and discuss marketing strategies and each AHEC's responsibilities. Through the conference call in May 2020, the planning committee of all AHEC nurses decided that we need an alternate plan to substitute for an original plan of offering this event face-to-face because of the COVID 19 pandemic. The big concern was the pandemic may still linger through the end of the year and many individuals may not be able to travel due to a corporate travel restriction and social distancing rule mandates by the state government for public safety. The information technology (IT) director of the NC AHEC was consulted. The suggestion was to move forward with the original date of the event by using web-based learning (live webinar) instead of a face-to-face method. Social networking is recognized by the rural nurses as a valuable connection with their collegial peers (MacPhee & Scott 2002). A taskforce of AHEC nurses was formed to brainstorm creative ways to engage the rural nurses.

The NC AHEC has a robust registration system to support nurses who want to sign up for the event. They will get a reminder with the live webinar link and instructions on accessing the program handouts. NC AHEC utilized a marketing team to help design

an electronic invitation for this event. The fund allowed us to market this event in the June 2020 issue of the NC Board of Nursing Bulletin magazine. The magazines will be distributed to approximately 164,419 nurses (142,185 RNs and 22,234 LPNs) currently licensed in NC (NC Board of Nursing, 2020). In addition, an article about NC rural nursing that was authored by this author and two AHEC nursing colleagues and submitted to the NC Board of Nursing for publication. The article was accepted and will be published in the June 2020 issue of the NC Board of Nursing Bulletin magazine. This will bring visibility and more awareness to the public about the mission of the NC AHEC.

Team Selection

The team for this initiative includes all the NC AHEC nurses, about 25 in total, the Associate Director of Interprofessional Education at NC AHEC who is an RN and with an earned a Doctor of Philosophy degree, a UNC Chapel Hill School of Nursing & AHEC liaison who is also an RN with an EdD degree, a Duke AHEC liaison, the Information Technology (IT) director of NC AHEC, a marketing team of NC AHEC and administrative assistants from all nine AHECs who will be providing logistical support for this event.

Cost/Benefit Analysis

Since the NC AHEC sponsored this event and received grant funding, regional AHECs are not obligated to generate revenue from this event. The intent is to offer high quality and relevant content to the rural nurses in NC. The budget proposal has been revised after the decision was made to offer this event through a live webinar. The cost

of delivering the educational event through a live webinar format is substantially lower compared to the cost of offering face-to-face educational events. The study of Maloney, et al. (2012) examined the economic efficiencies of web-based education and traditional face-to-face educational approaches under randomized control trial (RCT) conditions. It demonstrated that the break-even analysis for web-based educational approach was superior to face-to-face education, because it required a lower number of participants for the program to reach the break-even point. The barriers that the rural nurses face support the notion that web-based learning has the potential to enhance their CE accessibility. It is also important for the AHEC nurses to consider sustainability is the key for developing future programs for rural nurses as funding may not be guaranteed in the future. This study also supports the cost savings of web-based learning as compared to face-to-face education. The budget for face-to-face conference was estimated to be $38,760 as opposed to $15,460 for a conference offered through a virtual learning. The details of the cost and benefit analysis for face to face and live webinar of this event can be found in Appendix A.

Define the Scope of Problem

It is important for the NC AHEC and AHECs to know whether providing CE through live webinars would help increase CE opportunities and attendance of healthcare professionals, including rural nurses, to combat some of the underlying barriers which may deter them from attending face-to-face educational events. Multiple studies identified web-based education as being more cost effective and cost beneficial than face-to-face education (Maloney, et al., 2012). Both web-based education and face-to-face

education have their strengths and weaknesses. With the constant changes in today's working environment, rural nurses face difficulty taking time away from work to attend workshops and conferences. Tight staffing on their jobs often jeopardizes their learning opportunities. It is critical for rural nurses to continually acquire up-to-date knowledge and competence in their perspective nursing field and to keep abreast of the healthcare trends as they are devoted to providing optimal care for their patients. Therefore, innovative ways of delivering continuing education are being developed to meet these needs and the ideas of offering continuing education through web-based learning appears more desirable than the traditional face-to-face learning.

The primary mission of NC AHEC is to recruit, train, and retain healthcare professionals with a focus on areas in NC that are underserved and lack resources. AHEC staff are committed to serving all healthcare professionals in rural areas by enhancing CE opportunities and delivering high quality and cost-effective CE programs to meet their learning needs.

Goals of Project

The purpose of the project is to make a concerted effort to connect and reach out to the rural nurses in NC by designing accessible, targeted, and flexible CE programming to meet their ongoing learning needs. Unlike the traditional face-to-face learning opportunities that each AHEC offered in the past, the unusual circumstances that are brought on by the COVID 19 pandemic have limited nurses' travel capability and prevented mass gathering at one place. This CE event is using the strength of each

AHEC to establish relationships with rural nurses to meet their learning needs and support their professional growth.

SMART Objectives

NC AHEC will deliver at least one non-traditional NC AHEC Rural Nursing conference through a live webinar to reach as many rural nurses as possible using collaborative efforts of all nine AHECs to meet the educational needs of rural nurses in NC by the end of 2020.

Specific – Design CE programming specific to rural nurses.

Measurable – Develop at least one large CE program specific to rural nurses using live webinar format. Success can be measured by 1) the number of rural nurses attending this event and 2) how many rural nurses attending are from Tier 1 and Tier 2 counties. Participants will be asked to rate their virtual learning experience, usability of the virtual platform AHEC is using for the CE program, and whether their learning needs are met through virtual learning format. It is valuable information to gather from the participants to evaluate whether live webinars can meet the professional needs of rural nurses by offering convenient, flexible, accessible, and cost-effective CE programming.

Attainable – All nine AHECs collaborate with an effort to reach out to as many rural nurses as possible in this event.

Relevant – Connect and build ongoing relationships with an intent to serve the underserved and under resources of rural nurses in NC.

Time-specific – The educational activity will be carried out by the end of 2020.

Theoretical Framework

The teaching-learning process has evolved considerably from a traditional face-to-face learning environment to a combination of traditional and online learning over the years. Advanced internet technology has generated innovative ideas for all types of education to create convenient, flexible, and accessible learning models for all ages of learners (Karama, 2011). Widely accessible devices such as iPads, laptops, or smartphones, along with many applications free to learners, have opened another great opportunity to meet the leaning needs of learners with geographical or time zone restrictions. Although online learning is not a new concept, it was not, until recently, used as a primary source of teaching. The COVID-19 pandemic has made a huge impact literally overnight for all types of learning institutions from kindergartens, K-12 education, higher education including community colleges and universities, business sectors, and continuing education on how they should deliver education to the learners without stopping the pace of learning (Pal & Vanijja, 2020). To prevent spread of the deadly virus social distancing was a top priority resulting in severe travel restrictions across and within the states and even within businesses and educational institutions. Thus, all the learning institutions were completely shut down when the COVID-19 pandemic initially erupted, which led the institutions to quickly adopt an online only learning delivery model to meet the learning needs of students.

The Technology Acceptance Model (TAM) was originated by Fred Davis in 1989. This theoretical framework has become one of the most widely used models to explain how users come to accept (information) technology (Lah et al., 2020). People form

attitudes and intentions to learn to use a new technology prior to initiating effort directed at using. According to Davis (1989), people make a cognitive decision and create a bias without ever interacting with a piece of technology first. People bringing in a certain attitude with two main factors such as ease of use and usefulness of that technology or if the technology can serve their intended purpose. The TAM theory pointed out that individuals vary their predisposition to use a certain type of device, like a computer or tablet or to use different types of technology applications based on their experience.

These predispositions lead an individual creating two sets of concepts to evaluate if an approach to technology is personally useful. These are labeled perceived usefulness (PU) and perceived ease of use (PEU) of the technology. Perceived Usefulness is defined as a user thinks that the technology is useful to his/her daily life and will enhance his/her job performance. Perceived Ease of Use is defined as how much training is needed for a user to operate that piece of technology to attain his/her desired outcomes. For example, does it require a user to read a training manual to start using that piece of technology? From there, PEU would influence PU. If something is difficult to use that would certainly influence a person's understanding of how useful something is. In general, most people cognitively would like to be able to use a new piece of technology right away without having to learn how to use it. Subsequently, both PU and PEU will create a specific attitude toward using that piece of new technology. The attitude can be a positive or negative which would lead a user to behavioral intention (BI) to use. Behavioral intention is associated with positive use of the technology if a user thinks that it is going

to be useful and easy to use which leads them use it. If there is a negative intention, then a user is not going to use it.

As time has evolved, the TAM model has been revised for deeper understanding. The TAM model revision dives deeper with many factors which may influence PU and PEU, such as subjective norm, image, job relevance, output quality, voluntariness, and result demonstrability (Davis et al., 1989). The subjective norm is related to whether a user finds it useful in general. Image implies to what image do the users have in their mind about this new piece of technology. Job relevance is the impression of whether it is relevant to a user's job or intent purpose. Output quality is whether the technology produces higher quality content to meet his/her expectations. Does a learner seek similar or higher results? Social norm refers to who is currently using the technology such as peers, friends, or family, which may impact the perception of a user's attitude toward using that piece of technology.

Practicality of Using the TAM Theory

The mission of the NC AHEC is to provide and support educational activities and services for those who have less access to resources with a focus on recruiting, training, and retaining the healthcare workforce to create a healthy North Carolina. Supporting the professional growth of healthcare professionals including rural nurses is one of the AHEC missions. Because of the COVID-19 pandemic, all traditional face to face educational activities offered by the nine AHECs were completely suspended due to travel restriction and social distancing in place. The commitment of the NC AHEC to offer the Rural Nursing conference was strong to meet the educational needs of rural

nurses. Leading to a majority decision to pursue a live webinar instead of cancelling the event altogether. Before the COVID-19 pandemic, each AHEC used varied virtual learning platforms, like Blue Jean, Adobe Connect, and WebEx to deliver some of their CE programs. Amid COVID-19 pandemic, AHEC decided to unite to use one platform to adapt using a virtual platform across the date to deliver the continuing education to all ages of students and learners.

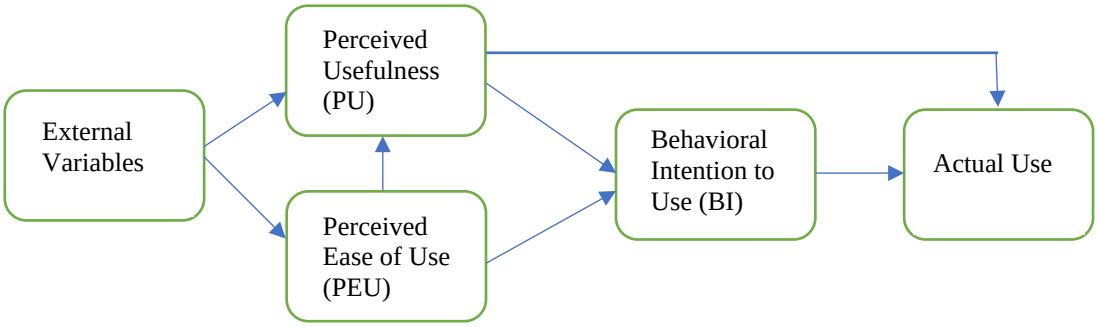
The NC AHEC made an executive decision to purchase Zoom licenses for all AHECs to use in delivering CE activities to all healthcare professionals. To help participants use the new virtual learning platform to meet their educational needs, AHEC considered these factors in choosing Zoom: Would the participants find it easy to use of the Zoom virtual platform? Secondly, how much training will be required for the participants prior to participate in the CE activities? Thirdly, will the participants find the Zoom virtual learning platform useful to receive or enhance their knowledge for their professional and/or personal growth? Fourthly, what potential attitudes may be developed by the participants during implementation? Finally, what influence can we use to promote positive behavior intentions for participants? Zoom appeared to meet all criteria.

The reality is that the virtual learning is here to stay. All AHEC staff needed to understand how the chosen virtual learning platform would meet the educational needs of rural nurses for their professional competency. The NC AHEC values the virtual learning experiences of rural nurses through the non-traditional face to face CE events designed especially for them. The responses and feedback of rural nurses' experiences from the

conference would help determine if the virtual delivery mode of learning is meeting the CE needs of the rural nurses and whether it can be used as a new avenue to offer convenient, accessible, and feasible CE to rural nurses in the future. Figure 2 illustrates the Conceptual Theoretical Empirical Diagram for Technology Acceptable Model which will be used for this project.

Figure 2

Conceptual Theoretical Empirical Diagram for Technology Acceptable Model (TAM)



The Technology Acceptance Model (TAM), Davis, 1989

Work Planning Timeline

Figure 3 depicts the timeline for tasks that were completed before and during implementation of the project.

Figure 3

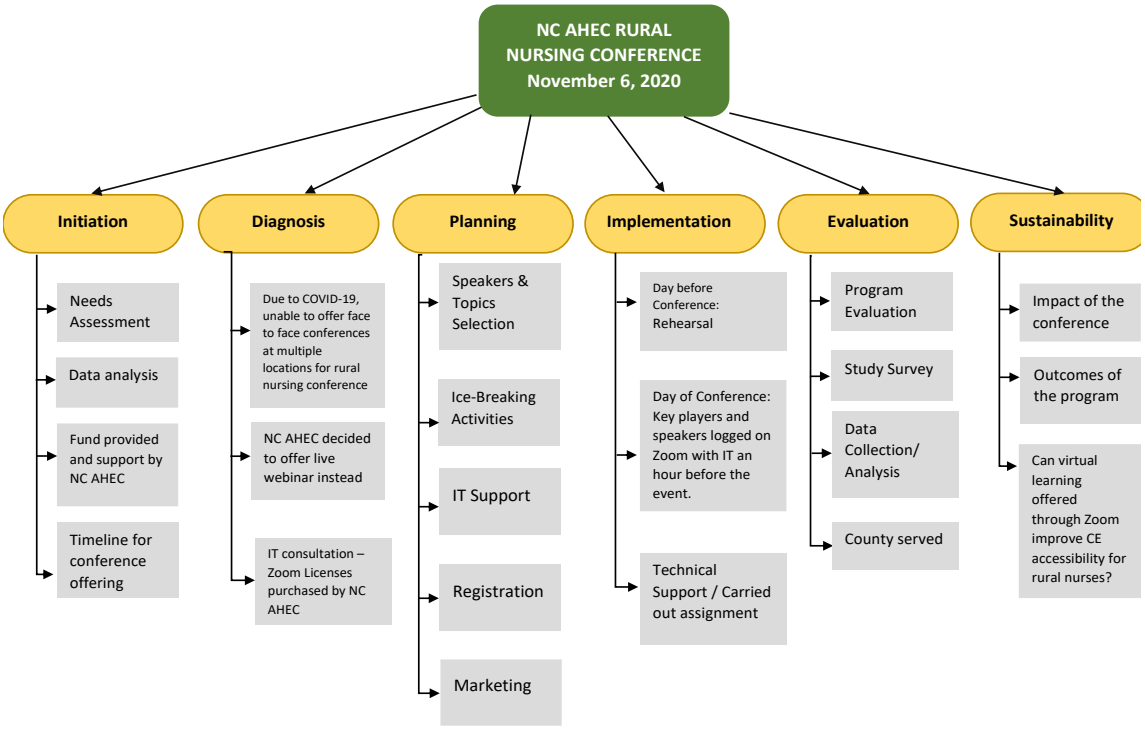
Gantt Chart – Timeline for Planning and Implementation of the Project

Work Breakdown Structure

Figure 4 explains a breakdown of the tasks that were completed prior to and during implementation of the project.

Figure 4

The Work Breakdown Structure



Program Budget

The program budget for a live webinar is attached in Appendix A which shows the breakdown of the projected expenses for the conference.

Project Design and Population

This project was conducted using a nonexperimental, descriptive, quantitative design. This project was designed as an educational intervention by delivering a live CE webinar using a Zoom learning platform to evaluate an overall experience of virtual

learning in meeting nurses' continuing education needs of rural nurses. Convenience sampling was used to obtain eligible participants registered for the Rural Nursing conference offered through NC AHEC. Through the monthly planning calls with the NC AHEC nursing colleagues, marketing strategies were established and outlined. NC AHEC has its comprehensive registration system including contact information of the past participants for communication like marketing. In addition, NC AHEC also purchased an email list of both Registered Nurses and Licensed Practical Nurses from the NC Board of Nursing for marketing of the Rural Nursing Conference. The NC AHEC also worked with the publishing company for the NC Board of Nursing to develop an advertisement for the Rural Nursing Conference. An electronic flyer was designed by the NC AHEC graphic designer for the AHEC marketing campaign. Each AHEC was responsible for marketing this CE event to their serving counties by using the NC Board of Nursing email list and emails of the target audience from the NC AHEC registration system. Three dates were determined and agreed by the NC AHEC nurse colleagues for electronic marketing. The marketing manager of the NC AHEC also advertised this event through the NC AHEC's social media and regional AHEC's social media platforms. The NC AHEC maintains ongoing relationships with the NC Department of Human and Health Services and state health department. The leaders of both organizations were approached to help with disseminating the conference information and flyer by their staff. In addition, each AHEC also reached out to its local stakeholders and constituents about this CE event.

Method

An informed consent with the purpose of the project was disclosed to the participants when they click on the electronic evaluation link. The evaluation link will be emailed to the participants of the virtual rural nursing CE conference through the automated SurveyGizmo evaluation system which is integrated with the AHEC registration system. Participation in this project was voluntary. To measure the outcomes of this DNP Project, this project included four parts of data as shown below:

1. Participants' demographic information was collected at the time of their registration for the nursing CE conference to determine rural nurse participation rates. Participants were required to register either online or send in the paper registration form. The demographic information collected on the Charlotte AHEC Registration Form included Last Name, First Name, Middle Name, Prefix, Nickname, Last Four Digits of Social Security Numbers, Race, Gender, Degree, Employer, Specialty, Cell Phone, Home Address, Work Address, Home Phone, Fax Number, and Email address. Participant's information was entered into the NC AHEC registration system for this event by AHEC registration staff. Only the relevant demographic data pertinent to this project including as gender, credentials, specialty areas, and subject's residing city and zip code were filtered and de-identified before input to maintain confidentiality of the participants. The stored information was password protected and stored in electronic format for data analysis.

2. The survey tools chosen for this project are the System Usability Scale (SUS) and the Usability Metric for User Experience short version (UMUX-Lite). The SUS

includes ten items (Appendix B) and UMUX-Lite (Appendix C) includes two items which were used to evaluate the overall experience of the Zoom virtual platform. Both the SUS and UMUX-Lite (a total of 12 questions) use a 5-point scale to measure for perceived usefulness and usability of the Zoom platform in delivering continuing education to rural nurses in NC. The SUS and UMUX are intended to predict whether participants will use or adopt a new technology.

The SUS is a widely used questionnaire and has been used for over 30 years in over 5,000 studies and cited in over 1,200 publications (Brooke, 2013). The SUS was created by John Brooke and is a free measurement tool which is in the public domain. The original SUS items have been modified to align with the language of the virtual event and have no impact on the scoring results. Research has shown that the SUS has desirable reliability (Cronbach's Alpha typically exceeds 0.90) (Sauro, 2011; Sauro, 2016). The SUS survey has gone through psychometric validation and sensitivity to a wide variety of independent variables. The SUS can be used on small sample sizes. (Sauro 2016). The survey of UMUX-Lite has shown content validity which has been used in many studies for measuring the overall usability experience (Cronbach's Alpha typically exceeds 0.8) with high reliabilities in research studies (Lewis et al., 2015). The UMUX-Lite was created by James Lewis, which is also in the public domain, and modifying the survey is permitted by the creator. The quantitative data from the SUS and UMUX-LITE will be analyzed based on the calculation recommended by the authors. Scoring for the SUS and UMUX is explained below.

3. Additional questions specific to the participant's learning experience for this CE event were part of the project survey questions.

4. Part of the routine program evaluation data related to "How did you learn about this program?" were filtered out from the program evaluation. The data collected, demographic, and survey results were reviewed and analyzed using means, scores, ranges, frequency, and percentages for the variables.

The short-term outcomes were to evaluate an overall usability experience of using Zoom virtual learning in meeting the professional development needs of rural nurses in NC, understanding the general characteristics of the convenient sample, number of counties represented, and specific participant's experience related to the CE offering. For the long-term outcomes, the NC AHEC commits to create a strong community network to support rural nurses in NC by offering convenient, accessible, timely, and affordable CE learning and resources to meet the rural nurses' professional development and competency needs.

Data Collection Procedures

Participants interested in the NC AHEC virtual CE opportunity must register and pay a fee for the event either electronically or by paper registration. Participants who register for this CE event were received instructions for accessing event handouts and Zoom logon information to participate in the virtual learning event on the assigned conference date approximately one week and one hour prior to the CE event. An email with the routine program evaluation link was sent to the participants within two business days after the CE event. The same email was sent as a second reminder on day seven

after the first reminder. Only participants attending the virtual conference received an email with the program evaluation link using the automated and integrated SurveyGizmo.

The information about the project and informed consent were included and placed at the beginning of the survey before the CE program evaluation and link to the CE certificate. Participants were able to access and complete the electronic evaluation link anonymously. Participants was informed that participation in the survey is voluntary. After reading the informed consent information, participants wishing to participate in the project survey was required to select "YES" to complete the survey. After the participants complete the project survey, they can proceed with completing the CE program evaluation survey. Participants who did not wish to participate in the project survey can select "NO" to skip the survey and proceed to complete the program evaluation survey and access to their CE certificate.

The survey data was password protected and only accessible by the team leader. There was no identifying information collected from the survey. The team leader did not have knowledge of which participants volunteered to complete the survey. The survey pulled one item from the program routine evaluation on "How they heard about this program?" as part of the project question. The survey took approximately three minutes to complete and was composed of three sections. Section one was System Usability Scale (SUS) which consisted of ten items that are scored from "Strongly Agree" to "Strongly Disagree" using a five-point Likert scale. Section two was the UMUX-LITE survey and consisted of two items that were also scored from "Strongly Agree" to

"Strongly Disagree" using a five-point Likert scale. Section three included four questions related to the CE learning experience.

After the completion of the survey, data was analyzed to evaluate the participant's overall experience using Zoom's virtual learning platform in meeting their educational needs. Demographic data, such as gender, credentials, nursing specialty and participant's residing zip code were retrieved from the registration system into a de-identified spreadsheet by an education specialist at Charlotte AHEC to maintain confidentiality of the participants for data analysis of the project. The result of a question related to "How did you learn about this program?" from the program evaluation was extracted into a spreadsheet for data analysis.

Data Analysis

The success was measured by multiple items. First, the attendance and number of rural nurses attending this educational event which indirectly evaluated the effectiveness and impact made by the partnerships of all AHECs. Second, the number of rural counties that AHEC served was important because the target audience of this educational event was rural nurses. The goal of this conference was to attract more rural nurses from Tier one and Tier two counties to attend. Descriptive statistics were used to analyze data from the demographic/background survey through SPSS. The quantitative data from the SUS and UMUX-LITE was analyzed using recommended methods.

To calculate SUS, participants ranked each of the 10 question items from 1 to 5, based on their level of agreement. Items 1, 3, 5, 7 & 9. Strongly disagree = 0 score and strongly agree = 4 Items 2, 4, 6, 8 & 10. Strongly disagree = 4 and strongly disagree = 0

All scores, multiply total by 2.5 is total score range from 0 -100. Based on research, SUS score above a 68 was considered above average and anything below 68 was below average.

Lewis (2018) provided a regression equation to predict SUS scores from the two items of UMUX-Lite. The regression equation is seen in Table 1.

Table 1

SUS Score Grading Based on Regression Analysis with UMUX-Lite

SUS Score	**Grade**	**Adjective Rating**
>80.3	A	Excellent
68 -80.3	B	Good
68	C	Okay
51 – 68	D	Poor
< 51	F	Awful

Intended Outcomes

This project was deemed successful if 200 rural nurses attended this conference representing at least 50% of Tier 1 counties (20 out of 40 Tier 1 counties). Participants was asked to rate their virtual learning experience, usability of the virtual platform used for this CE program, and whether their learning needs were met through virtual learning format through program evaluation. SUS score was reached at least 68 out of 100. For the content delivery, participants evaluated the learning outcome is 90% met. The data was used to evaluate whether a live webinar can meet the learning needs of rural nurses by offering convenient, flexible, accessible, and cost-effective CE programming. The logic model in Figure 5 illustrates the plan for evaluation for this project.

Figure 5

Logic Model

Logic Model

Program: NC AHEC Statewide Rural Health Nursing Conference.

Goal: Improve an overall CE learning experience and accessibility for rural nurses in NC to provide convenient, affordable, and accessible CE opportunities to meet the educational needs of rural nurses.

INPUTS	ACTIVITIES		OUTCOMES		
What we invest	**What we do**	**Who we reach**	**Short-Term Results**	**Intermediate results**	**Long-term results**
☐ Staff ☐ Commitment and support from NC AHEC ☐ Time for planning ☐ Fund ☐ Needs Assessment ☐ Human resources ☐ Equipment ☐ Technology ☐ Partners ☐ Constituents (nurses who are working in rural and underserved areas)	Recruit ☐ Recruit high school students who are interested in health careers. ☐ Provide internship, preceptorship, and shadowing experiences for health sciences students to support healthcare workforce. Train ☐ Conduct CE workshops and conferences for all healthcare professionals to support their professional growth. ☐ Support state community colleges and universities for developing new clinical sites by offering funding to support their clinical needs ☐ Provide QI consultation for small rural clinics to meet meaningful use. ☐ Develop products, curricula, resources. ☐ Work with media. Retain ☐ Support and manage RN Refresher program across AHEC to provide didactic and clinical experience for nurses who wish to reinstate their nursing license – this initiative helps support to improve nursing workforce.	☐ Participants (rural nurses) at all levels. ☐ Agencies and community-based organizations (Office of Rural Health in NC, State /local Public Health, State/local health departments). ☐ Leaders and decision makers from various healthcare organizations to disseminate this event to their staff. .	*Learning* ☐ Positive learning experience for rural nurses. ☐ Provide live webinar instead of cancelling of face-to-face CE conferences due to COVID-19 pandemic. ☐ Test out whether virtual learning can be used to meet the CE needs of rural nurses. ☐ Quality of CE participants received from virtual learning.	*Action* ☐ All healthcare professionals who are working in rural communities are our primary focus. ☐ They tend to have less resources and large- scale conferences are usually being offered in metropolitan and central location to attract urban nurses.	*Conditions* ☐ Improve CE access for rural nurses ☐ Offer a variety of CE programming via different learning platform, i.e., face to face, virtual learning, online self-paced, and blended learning). ☐ Create a strong community support network for rural nurses in NC. ☐ Support ongoing professional development for rural nurses to meet their competency needs. ☐ Offer convenient and affordable CE learning for rural nurses.

Assumptions	External Factors
☐ Positive perception of easy to use and usefulness of Zoom learning platform to meet continuing education needs of rural nurses. ☐ Rural nurses agree that the cost of the conference is reasonable, and they would like to participate in future CE learning.	☐ Positive influence: Advanced Technology, many virtual learning platforms options are available for use. ☐ Unexpected negative influence: COVID-19 Pandemic.

Institutional Review Board (IRB) Approval

This project was reviewed and approved by both the Hunt School of Nursing's IRB and IRB at Gardner-Webb University. The Quality Improvement (QI) versus Research application was also submitted to Atrium Health's IRB for review. This project was deemed as a QI project by Atrium Health's IRB Committee and was granted approval for project implementation in October 2020.

Threats and Barriers

The rural nursing conference was originally planned to be in person at various rural locations in NC. Due to the COVID-19 pandemic, the plan of offering the in person face-to-face conference was halted. The planning committee with involved AHEC nurses continued to meet monthly and jointly decided to switch this conference from face-to-face to a live webinar format. The target date of the conference remains unchanged and took place in early November 2020.

To conduct a virtual learning event, the NC AHEC purchased the virtual technology platform licenses. Since the start of COVID, many of the educational activities initially were rescheduled or cancelled due to lack of skills set to operate the virtual learning platform. The NC AHEC made an executive decision to purchase Zoom licenses for all nine AHECs to use for their virtual continuing education programming. All the staff received Zoom training on operation of Zoom and practical tips for assisting faculty with their virtual presentations. Since the rural nursing conference was held virtually through Zoom, technology or internet connectivity could be a potential issue for the participants. An inclement weather threat like wind or rainstorm could potentially impact the internet connectivity for the participants on the day of the conference as well. It was difficult to mitigate this issue because the weather predicament was beyond human control. Fortunately, many people own a smart phone this day and they can easily log on to Zoom using their phone without any issue. However, in preparation for troubleshooting any technical difficulty participants may encounter on the day of the conference, we allocated three technical support staff to provide technical assistance for

the participants. There were some common technical issues that we have learned since the educational activities were offered through Zoom virtual platform. We proactively provided instructions to the participants about steps ahead of time that they should follow prior to the day of the conference. One of the recommendations was to visit the Zoom website to conduct Zoom testing prior to the event and update the latest version of Zoom. Another frequently known issue was that participants had difficulty with Zoom log in using their work computer and work browser. Part of the reason was due to a firewall that was installed in the work computers. Therefore, a recommendation of copying and pasting the Zoom link into a separate browser was strongly encouraged to the participants. All this information was incorporated into the email reminders that were sent to the participants a week prior to the educational event.

All the speakers were required to be familiar with a few of the Zoom features to make this educational event run smoothly. For example, speakers needed to know how to operate the “Share Screen” feature when sharing their slides presentation with the participants. The Zoom orientation meetings were scheduled with all the speakers. The meetings were scheduled by the AHEC Information Technology team one week before the conference. Additional practice sessions were offered to the speakers who had any questions or need extra time to practice the Zoom features.

For the Zoom business license, the NC AHEC owns two types of Zoom platform licenses. One is Zoom Webinar and the other is Zoom Meeting. They both have their unique features and differences. The Zoom Meeting can be used when there are breakout sessions for the conference and all the participants are visible on the screen if they choose

to turn on their device's camera. All the participants can unmute their own audio. Using the Zoom Webinar platform, the participants were able to see other participants on the screen in a gallery mode. Only speakers were spotlighted on the main screen when they present. Participants had an ability to interact through Q & A, Chat, and answering polling questions. Using the Zoom Webinar platform was necessary for this conference because the participants were not visible on the screen which maintains confidentiality for recording purposes.

Monitoring of Implementation

Meetings included a testing trial run which allowed reviewing of the days flow and was scheduled with all speakers and planning committee members. Everything seemed to be ready, and every detail was considered. Two days prior to the event, one of the featured speakers notified us that she was not be able to present due to an unexpected family emergency. Her presentation was unique because she planned on using storytelling to connect with her patients and to provide holistic and individualized care. Fortunately, the AHEC nursing colleagues can identify a potential nursing faculty member who has presented similar presentations in the past. An AHEC nurse made a phone call to the nursing faculty member and shared the dilemma that we faced. Surprisingly, the nursing professor immediately agreed and felt honored to be asked to present at the conference. On the following day, the nursing professor agreed to travel to the AHEC office in Greensboro, NC to do the Zoom testing with an Informational Technology director at the NC AHEC in Chapel Hill, NC. The speaker also agreed to come to the same office to present virtually on the day of the conference.

All the involved key members and the speakers rehearsed and went over the flow of the day one day prior to the event. They were also instructed to log on to Zoom forty-five minutes early on the day of the conference for one last rehearsal and reviewed of the last-minute checklist. It was extremely important to actively engage with the target audience throughout the entire conference. Two of the AHEC nursing colleagues managed the ice-breaking and stretching activities before and during breaks. At the beginning of the program, all the attendees were admitted to the Zoom meeting room fifteen minutes before the conference begins. The opening slides with program information such as continuing education credits, requirements for successful completion and biographies of each speaker were being played on the screen. Customized music was playing while an image of rural North Carolina was shown on the screen. The activity coordinator asked all the attendees to enter their name and the county that they represent in the Chat Box. This was a great icebreaking activity for attendees to see who the rest of the attendees joined this event. At the beginning of the conference, the NC AHEC Director gave a warm welcome and recognition of the important role rural nurses in NC play for the underserved and remote residents and communities. A disclaimer was made to the participants about the project and the projects purpose by the project leader. It was emphasized to the participants that the project survey was completely voluntarily. When they received an email with a link to the program evaluation, detailed instruction was provided on how to complete the project survey if they chose to participate. A moderator was assigned to monitor and managed the Q & A Zoom feature to ensure participant's questions were being addressed and answered by the speakers. Allocation of frequent

small breaks were important to maximize participant's attention span and to avoid Zoom fatigue. It was a great turnout, about 103 participants in attendance. The event was considered a success, and everything seemed to go seamlessly.

Project Closure

A debrief meeting was held immediately after the conference with the planning committee members to capture any lessons learned. There were many positive and appreciative comments made by the participants in the Chat Box at the end of the conference. The replacement of the speaker on patient's story telling was the best topic and was placed at the conclusion of the conference. The speaker's stories deeply resonated with many of the audience on how we should connect with the patients. The participants also felt that their passion for caring was rejuvenated.

The electronic project surveys and program evaluation were sent to the participants within the next five business days. A preliminary report on program evaluation was shared at the AHEC Nurse Council's meeting in December 2020. The data collected from the survey results were reviewed and analyzed by the project leader.

Data Interpretation

A live webinar was specially planned and targeted to rural nurses in NC. The survey tools chosen for this project are the System Usability Scale (SUS) and the Usability Metric for User Experience short version (UMUX-Lite). The SUS and UMUX-Lite are intended to predict whether participants will use or adopt new technology. The SUS includes ten items, and the UMUX-Lite contains two items that was used to test participant's overall experience of the Zoom virtual platform. Both the SUS and UMUX-

Lite (a total of 12 questions) use a 5-point scale to measure the Zoom platform's perceived usefulness and usability in delivering continuing education to rural nurses in NC. The SUS national standard average score is 68. The UMUX-Lite score is required to use a regression formula to convert its score to an equivalent SUS score. The survey included additional questions specific to the participant's learning experience from this CE event. The survey participants included nurses attending the virtual rural nursing conference who agreed to participate in the project survey.

Descriptive statistics were performed on both score types (SUS and UMUX-Lite); mean, standard deviation, median, and range were reported. Each score type was stratified by Past Participation and Conference Format Preference. Normality was assessed by Shapiro–Wilk W test for each score type, both overall and by stratification type. To assess differences in SUS score by Past Participation, an unequal pairs t-test was performed as the data were determined to be parametric (normally distributed). To assess differences in UMUX-Lite score by Past Participation type, a Wilcoxon rank-sum test was performed as the data were determined to be non-parametric.

An analysis of variance (ANOVA) test was performed to assess differences between the Format Preference groups. Statistical significance was set at $p \leq .05$ and all analysis was performed using StataCorp v.16 statistical software (2019).

Results

Of the 103 participants who attended the CE conference, 93 completed the program evaluation survey. Of the 93 who completed the program evaluation survey, 87.1% (81/93) also completed the project survey. The project survey included a total of

12 SUS and UMUX-Lite questions and questions related to participant's CE learning experience. All the participants were RN or LPN nurses.

SUS Score

The average overall SUS score was 75.9 out of 100, falling above the average of 68. SUS score was statistically significant in those who reported having participated in virtual CE learning in the past than those who did not (Yes: 77.3, No: 64.1; p=.004).

The average SUS score was higher in participants who reported conference preference as Both formats (Table 3), though the differences in SUS scores between the three preference groups were not statistically significant.

UMUX-Lite Score

The average overall UMUX-Lite score was 82.8 out of 100, falling above the average of 68. The UMUX-Lite score was statistically significant in those who reported having participated in virtual CE learning in the past than those who did not (Yes: 83.7, No: 75; p=.025).

The average UMUX-Lite score was higher in participants who reported conference preference as Both formats. However, the overall differences in UMUX-Lite score between the three groups were not statistically significant.

The SUS and UMUX-Lite score for the participants who reported having participated in virtual CE learning in the past are higher than the average SUS or UMUX-Lite score. It indicated that the perceived usability experience on the Zoom platform was much greater for those who reported having virtual CE learning in the past regardless of the type of virtual learning platform they experienced in the past.

Table 2

Descriptive Statistics for SUS and UMUX-Lite Scores

	Mean (SD)	Median (Range)	p-value
Overall			
SUS Score	75.9 (13.1)	75 (40-100)	
UMUX Score	82.8 (12.6)	80 (40-100)	
Participated in the past, SUS Score			.004*
Yes	77.3 (12.9)	77.5 (40-100)	
No	64.1 (9.1)	65 (52.5-80)	
Participated in the past, UMUX Score			
Yes	83.7 (12.7)	80 (40-100)	.025*
No	75 (7.6)	80 (60-80)	
Format Preference, SUS Score			.073
Both	78.7 (10.6)	77.5 (62.5-100)	
In-person	71 (14.1)	70 (40-97.5)	
Virtual	78.0 (12.8)	77.5 (50-100)	
Format Preference, UMUX Score			.210
Both	86.7 (9.7)	80 (70-100)	
In-person	79.6 (14.6)	80 (40-100)	
Virtual	83.4 (11.9)	80 (50 -100)	

Note: p-value 0.004 SUS score was significantly higher in those who reported having participated in virtual CE learning in the past than those who did not.
p-value 0.025 The UMUX-Lite score was significantly higher in those who reported having participated in virtual CE learning in the past than those who did not.

Desired Outcomes

North Carolina consists of 100 counties and they are categorized by Tier 1, Tier 2, and Tier 3 designation. Each tier designation is based on assessing each county's unemployment rate, median household income, population growth, and assess property value per capita. Tier 1 counties are the most economically distressed and have fewer resources than metropolitan areas, and Tier 3 counties are the least economically distressed. The attendees represented 21 out of 40 counties in Tier 1 designation, 20 out of 40 counties in Tier 2 designation, and 11 out of 20 counties in Tier 2 designation. The goal of 50% of Tier 1 counties having participants was reached (21/40 = 52.5%)

The goal of 200 participants was not met. Registration was 103. The majority (96.3%) of the participants indicated that the CE virtual learning met their educational needs. This met the goal of 90% or more. As for preferred learning settings, 48.1% indicated virtual learning, 30.9% in-person, and 21% stated both. Participants rated that the half-day virtual webinar is the preferable length of the program and learning style. This information provided great insight into rural nurses' acceptance of using the virtual learning platform to fulfill their continuing education needs and competence requirements.

Limitation

The limitation of this project included a small sample size which may not be adequately represent all the rural nurses in NC on their virtual experience of CE learning. Most of the NC AHEC statewide initiative related expenses are funded by the NC AHEC. Sustainability would be a priority focus in the future if there becomes funding issue from the NC AHEC. Search for grant opportunities from other organizations or philanthropies would help continue to meet and support the ongoing educational needs of rural nurses in NC.

Conclusion

The rural nursing conference connected rural nurses from all three Tier-counties by reaching the initial goal of at least 20 out of 40 Tier-1 counties. The rural nurses indicated high perceived usability of the Zoom virtual platform. Although close to half of the rural nurses preferred obtaining CE through virtual learning, about 31% of rural nurses from this conference would instead attend in person. Some of the rural nurses

value a face-to-face networking opportunity with other rural nurses because they share similar challenges and barriers in their practice setting. Rural nurses may feel geographically isolated and have limited access to evidence-based resources. Connecting and supporting other rural nurses may reduce their feeling of geographic isolation and validate the significant role they play in providing safe care for the community. It is an essential mission for the NC Area Health Education Center (AHEC) to continue providing CE specific to meet the educational needs of rural nurses by supporting their professional development and competency requirements.

Many clinical and academic settings were negatively interrupted during COVID resulting in new innovative practices and education changes. For example, using different virtual learning platforms to conduct business meetings and deliver education have become the new normal, and they are here to stay. COVID has changed traditional face-to-face communication to online communication in business and education using advanced technology. It shifted what used to seem impossible to a golden opportunity.

The following year rural nursing conference is in the planning stage, and the same virtual platform will be used at the next conference instead of face-to-face due to the uncertainty of COVID. The benefit of offering CE through different learning platforms simultaneously (both in-person and virtual learning) can reach more rural nurses to a greater extent for future CE programming. The impact is more significant in meeting the educational needs of their professional development and competency requirements. In 2022, the NC AHEC commits to host in person at various rural locations and virtually to

celebrate an outstanding contribution of rural nurses make to the community's overall health.

Further study is recommended to learn more about the attitude and values of face-to-face CE learning than virtual learning related to knowledge retention and other benefits associated with different types of learning modalities.

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Appendix A

Budget Comparison between a Live Webinar and Face-to-Face Conferences

NC AHEC Rural Nursing Conference - Live Webinar

November 6, 2020

Budget Justification

Item Description	**Amount**
NC Board of Nursing Data List	$1,260.00
NC Board of Nursing Bulletin Advertisement	$1,800.00
Speaker Honorarium, mileage/travel	$1,000.00
Charlotte AHEC & Greensboro AHEC AV Support	$500.00
AHEC Management Fee @$1,000.00 per AHEC	$9,000.00
Marketing/Flyer/Site visits per AHEC $200 for 9 AHECs)	$1,800.00
Survey Design and analysis of the results (Charlotte AHEC)	$100.00
Projected Expenses	**$15,460.00**
Projected Revenue from Registration $25.00 x 200 participation	**$5,000.00**
Expected surplus/shortfall (fund supported by NC AHEC)	**$-10,460.00**

NC AHEC Rural Nursing Conference

Face-to-Face (7 hosting sites)

Budget Justification

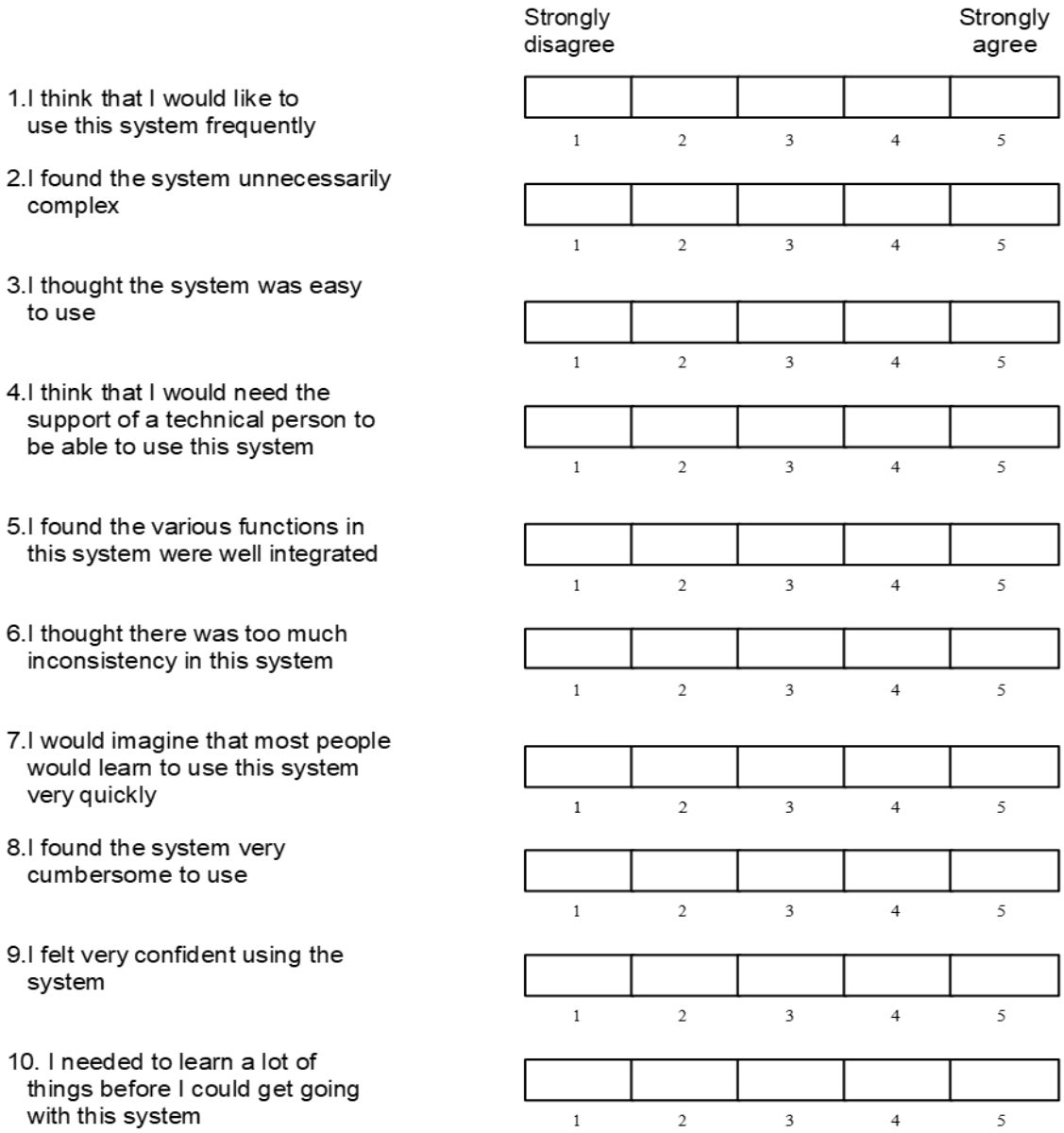
Item Description	**Amount**
NC Board of Nursing Data List	$1,260.00
NC Board of Nursing Bulletin Advertisement	$3,500.00
Keynote Speaker Honorarium, mileage/travel, and hotel	$2,000.00
Speaker(s) honorarium and mileage/travel per site (7 sites) @ $800.00	$5,600.00
AHEC staff hotel including mileage /travel @$300 per AHEC x 9 AHECs	$2,700.00
Facility Rental Fee Per Site (7 sites) @$1,200.00	$8,400.00
AV/IT (NC Program Office AV person and IT support at 7 hosting sites) @$500.00	$3,500.00
AHEC Management Fee Per Site (7 sites) @$1,000.00	$7,000.00
Management fee for converting the pre-recorded presentations into enduring materials	$1,500.00
Speaker honorarium for pre-recorded presentations (2 speakers @ $300.00)	$600.00
Marketing/Flyer/Site visits per AHEC $200 for 9 AHECs)	$1,800.00
Printing for Handouts $200.00 per site (7 sites)	$1,400.00
Survey Design and analysis of the results (Charlotte AHEC & MAHEC)	$500.00
Estimate Program Expenses	**$38,760.00**

Budget adjustment will be made base on final number of hosting sites

Appendix B

System Usability Scale (SUS) Template

System Usability Scale



Appendix C

UMUX-Lite Template

1. **This website/product/tool/software/prototype capabilities meet my requirements.**

   ___Strongly Agree ___Agree ___Neutral ___Disagree ___Strongly Disagree

2. **This website/product/tool/software/prototype is easy to use.**

   ___Strongly Agree ___Agree ___Neutral ___Disagree ___Strongly Disagree