NC LITE-UP

Results and Conclusions from a Research Program Designed to Investigate Broadband Adoption and Use in Low-Income Households

NC Broadband

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This is the final and comprehensive report detailing the results from and processes used in designing and implementing the NC LITE-UP program. NC Broadband, a division of the North Carolina Department of Commerce, is North Carolina's State Broadband Initiative (SBI). NC LITE-UP was funded by the NTIA (National Telecommunications and Information Administration), a division of the US Department of Commerce.

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Executive Summary

Ubiquitous access to broadband Internet and the capacity to take advantage of the information and resources it can deliver is a recognized public policy goal that has been the focus of significant federal, state and local interest. It is increasingly important that citizens be digitally literate and digitally active to have access to online learning tools, telework, and telemedicine and to be socially and politically engaged with an Internet-linked world. Broadband adoption is a complex challenge with many factors impacting uptake of broadband, especially "wired" broadband at home. Factors include, but are not limited to, cost and income levels, literacy and digital literacy, access to devices, availability of other public Internet access (such as libraries), use of mobile service instead of wired broadband, and perceived relevance.

As a matter of smart public policy there is a growing need to develop effective programmatic efforts to increase the lower-than-average uptake of broadband that characterizes too many underprivileged households. The NC Broadband Division of the North Carolina Department of Commerce undertook a rigorous experimental study – NC Linking Internet to Economically Underprivileged People (NC LITE-UP) – to examine the interaction of these factors and to test and model programmatic efforts to make more pervasive the use of broadband by lower-income households in North Carolina and elsewhere.

The specific goals of the LITE-UP study were three:

- Conduct primary field-based research into barriers to broadband adoption by lower-income households
- Provide high-speed Internet service to lower-income households
- Provide lessons learned for consideration in development of national, state and local programs to expand broadband adoption

Joining Commerce in this study were Wilkes Telecommunications and Wilkes Department of Social Services in rural Wilkes county and Frontier Telecommunications and Durham Department of Social Services in urban Durham county. Funding for this study was provided by the National Telecommunications and Information Administration of the United States Department of Commerce and the Golden LEAF Foundation. A detailed description of this highly structured study is provided in the report that follows.

Overview of the Study

A total of 179 participating households (including 106 households in an urban county and 73 households in a rural county) were randomly assigned to one of six treatment cells that considered three experimental effects: level of subsidy received for Internet service costs (100%, 50% or 0%), whether or not two three-hour sessions of targeted digital literacy training was offered and county type (rural or urban). All participating households were provided a free desktop computer and printer that were installed with the assistance of LITE-UP partners and all participants were provided free access to technical assistance for nine months through a telephone help desk. Expert researches at East Carolina University assessed the impact of the project on broadband adoption through a series of surveys conducted of participating households at the time of enrollment, at the end of the twelve-month subsidy period and three months post project. Project review surveys were also conducted of the technicians who provided helpdesk services and of the telecommunications and social services partners. Excellent response rates to all surveys lend strong confidence in the reliability of the results. Key findings from these assessments and the implications for programmatic efforts to encourage broadband adoption in the targeted demographic are discussed below.

Impact on Participating Households

The LITE-UP program had a powerful positive impact on participants:

- 83 percent of households still had a functioning computer and 79 percent had maintained broadband service three months after subsidies ended.
- The focus of Internet use shifted dramatically to the home, reducing the need to "borrow" Internet access elsewhere.
- LITE-UP successfully facilitated an increase in participant's perception of their digital literacy skills, with those giving their skills the lowest rating on a seven-point scale declining by more than 20 percentage points (27.6% at the project start declined to 6% post-project).
- Participants became more fully-active digital citizens, using the Internet at home and in other settings at a much higher rate and for many additional purposes by the end of the project. With home access, the weight of their Internet use shifted from the strongly pragmatic (job searches, government services and paying bills) to much greater use to seek health and educational information searches, support social connections and conduct e-commerce.

Assessing barriers to broadband adoption

Three primary factors are accepted as contributing to broadband adoption rates among lower income households that trail the national average by almost 20 percentage points: cost, perceived lack of relevance and lack of computer literacy. The LITE-UP study provided a closer look at the relative importance of the cost and digital literacy factors and how they might be manipulated, individually and in combination, to increase broadband adoption by the targeted population. Results were informative and point to the need for continued study. Highlights include:

- Computers, or some form of access device, may be the first and most important investment in broadband adoption. Providing a home computer and helping establish home Internet access appears to have had more impact than subsidies and/or digital literacy training. Computers were the leading enticement for participation (76%), followed by Internet access (54%) and digital literacy training (39%). The value of the computer is also reflected in the fact that 87 percent of households still had a functioning computer 15 months after the project began.
- Once established, Internet access proves its value: Although computers were cited as the primary attraction and signing up for Internet was not a requirement to obtain the computer, 85 percent of households invited to the project signed up for Internet and 71 percent continued the service post project without subsidy. "Cost" was the primary reason cited for not retaining service.
- Although not dramatic, varying subsidy levels, training and county did have interesting marginal individual and interactive effects. At the project's end, subsidy level and being offered training affected the perceived value of having a computer in the home – the greater the subsidy received and being offered training resulted in increasing levels of importance given to having a home computer. Three months post-project, training was the only variable positively associated with a heightened perceived value of having a computer and the association was stronger for participants from the urban county.
- Although training enhances the perceived value of computers and Internet access, it is not a compelling attraction before the fact as only 38 percent of participants offered training attended at least one class.

- Technical assistance can be an important adjunct to broadband adoption programs. Almost half of participants (47%) utilized the telephone helpdesk services at least once during the first nine months of the LITE-UP study.

Lessons

- Partnerships are critical to increasing broadband adoption in lower-income households. Involvement of the social support network, intentional and flexible commitment from providers and available technical assistance and training all played significant roles in making the majority of participants in the LITE-UP study digitally-active citizens.
- Cost is a critical impediment and even partial subsidies can be an effective tool for increasing broadband adoption by low-income households. That said, subsidies alone are not sufficient.
- Service activation costs were covered for all participants who signed up for Internet, so that even households that were assigned to the zero-percent subsidy cells were, in fact, subsidized for the activation costs. Existing discount programs offered by providers do not waive activation fees, Programs targeting lower-income households need to address barrier costs to enable adoption.
- Equipment must be-user friendly and robust. Maintaining functioning computers is an issue; 17 percent of computers in this project were no longer working after one year. The absence of correlation between subsidy, training and location variables suggest that the problem may be systemic and intrinsic to electronic equipment failure rates. Technical assistance is especially important in rural areas where access to help is often problematic. Programs attempting to increase and sustain broadband adoption by lower-income households need to have solutions in place to deal with equipment failures.
- Participants were willing and able to use the Internet in different ways from more locations, with a preference for “home”, “mobile devices” and “public libraries being the top-ranked options. These preferences need to be incorporated into outreach and engagement efforts around increasing broadband adoption and digital literacy.
- Numerically-scaled rating digital literacy skills may be confusing to respondents and at best only offer crude assessments of skill status. Alternative, functionally-defined scales specifying specific basic computer skills would yield more precise information that could be used to tailor training efforts to better effect.

Conclusions

The NC LITE-UP program was a challenging, interesting and worthwhile undertaking for NC Broadband and its partners. NC LITE-UP brought 179 low-income households further along the path to becoming active participants in the digital age, with all obtaining a home computer and 79 percent establishing and maintaining Internet service after the project ended. That said, it is important to view this study and its successful outcome in the context of the broader challenges that define the quest to ensure that all Americans have access broadband Internet and the capacity to use it. While LITE-UP participants did not have home Internet access at the outset of the project, only some portion of them could be called non-adopters while others reported Internet use at other locations. Also, LITE-UP participants are by definition not among the non-adopters who cite a lack of relevance as the primary reason for not having Internet service given their interest in participating in the research program. Finally, significant numbers of non-adopters are elderly and disabled individuals for whom the approach taken and positive results obtained through the NC LITE-UP pilot study may not apply. Additional research and programmatic efforts are called for to realize continued progress on the goal of bringing all citizens online.

Summary

North Carolina Linking the Internet to Economically Underprivileged People, NC LITE-UP, was a research experiment conducted by the North Carolina Department of Commerce's NC Broadband Division (Commerce). The purpose of this report is to summarize the process involved in implementing the NC LITE-UP program and the results and lessons.

Background

Cost is an important factor cited by 36 percent of Americans as the reason they do not have broadband access in their homes according to a 2010 Federal Communications Commission (FCC) report.[i] This finding is mirrored in North Carolina, where 50 percent of households with annual incomes less than $15,000 do not have Internet access in their homes and 48 percent do not have a computer in their home.[ii] The negative correlation between poverty and Internet access is well established and should be directly addressed to maximize the social and economic returns possible from the federal broadband expansion programs: Broadband Technology Opportunities Program (BTOP), Broadband Initiatives Program (BIP) and the State Broadband Initiatives (SBI). In addition, rural communities have few, or in too many cases, no options for broadband access. These troubling patterns converge in rural North Carolina, which has more total residents living in rural areas than any state except Texas.[iii] When the NC LITE-UP program was developed in 2010, 17.5 percent of North Carolinians lived below the poverty threshold[iv]. As of September 2014, the percentage has risen to 17.9 percent of North Carolina's total population, the eleventh highest rate in the United States.[v] Thus, many of the individuals and children most in need of the resources the Internet offers, such as online education, job training, and health and government services are unable to access them. The combination of the FCC's findings that cost prohibits 36 percent of broadband non-adopting Americans from subscribing to broadband and 10 percent of broadband non-adopting Americans from owning a computer and the above statistics indicate a concerted effort is needed to lower barriers to broadband adoption for North Carolina's impoverished, rural communities.[vi]

A possible broadband adoption program to model is the FCC-administered Lifeline Linkup program, funded by the Universal Services Fund. The program offers qualifying low income households reduced cost telephone services and equipment, and could provide a model[vii] for delivering Internet resources to disadvantaged homes. Encouraging these individuals to use the Internet in their homes will require more than the subsidies the program offers; two thirds of North Carolinians surveyed[viii] indicated their communities have insufficient resources to assist them in gaining the most benefit from the Internet. In addition, in North Carolina, which augments the FCC credit with a $3.50 state tax credit (per household, per month), only four percent of the 16 percent of qualifying households use the subsidy. This dilemma indicates that while subsidizing service may be a good program and model, offering a subsidy without supplemental efforts to increase subscribership does not guarantee the subsidy will be used. To address all parts of this issue, NC Broadband designed and implemented the NC LITE-UP program to develop, deploy and test a pilot program that adapts the Lifeline Linkup program to a broadband platform and delivers necessary outreach and digital literacy training to qualifying individuals.

Project Overview

The FCC's "National Broadband Plan," (Recommendation 9.1)[ix] calls for the establishment of pilot programs to extend subsidies similar to the USF Lifeline Link-Up subsidies to bring computers and Internet access to qualifying households. The NC LITE-UP program was intended to serve as a pilot for a national Lifeline Online program, in terms of offering lessons learned for consideration in a nationally-structured program. A secondary purpose of the NC LITE-UP program was to provide high-speed Internet service to participants who may otherwise not be able to afford it. NC LITE-UP was also a research study aimed to better understand the barriers to broadband adoption low income families experience. The study assigned participants to six different research cells to determine where the adoption barriers exist (i.e., access to a computer and help-desk support, cost of Internet service, digital literacy competency). The number of research cells made the project more complex in the execution of enrollment than may occur in a national Lifeline Online program, but offered more detailed data to analyze the different adoption barriers.

The following is a list of outcomes and benefits the program was expected to offer:

- NC LITE-UP attempted to distill and extend the best proven practices of an existing technology adoption program, FCC's Lifeline Linkup, into the broadband arena to bring critical services and technology to vulnerable populations.
- North Carolina's citizens and businesses can be more competitive with improved broadband access. The program piloted and demonstrated a potentially powerful and cost effective approach to achieving universal access in our state.
- The public–private partnerships that defined LITE-UP could serve as a model for establishing a platform for continued innovative collaboration in the application of broadband for technology-based economic and community development in disadvantaged communities
- Tracking of implementation/cost issues could inform a scaled Lifeline Online program when the FCC determines the design for low-cost broadband household access.

NC LITE-UP was a cost-efficient pilot that provided a needed small-scale (two county) model for a statewide Lifeline Online program. Funding for NC LITE-UP was provided by the National Telecommunications and Information Administration's (NTIA) State Broadband Initiative (SBI) and by the Golden LEAF Foundation; the NC Department of Commerce provided costs for the NC Broadband's personnel as in-kind match. The actual connectivity subsidies for a scaled statewide or national program would likely be covered by state/federal tax revenue, but the small North Carolina pilot allowed a thorough test of concept using NTIA funds for the subsidies.

The NC LITE-UP pilot program for North Carolina met several of the Broadband Data Improvement Act (BDIA) and SBI program's goals, especially: collaborating with broadband service providers and information technology companies to encourage deployment and use. We also believe that the households that participated in NC LITE-UP were in communities characterized by lower-than-average computer ownership and broadband penetration, so that establishing computer ownership and Internet access was a primary goal of the pilot.

Pilot Research Design

Aforementioned, the project outlines six different research cells in which participants were assigned, in order to help pinpoint exactly where the adoption barriers exist (i.e., access to a computer and help-desk support, cost of Internet service, digital literacy competency).

The pilot was implemented in two North Carolina counties, one rural and one urban, selected through a structured process, with input from an advisory committee. Factors considered included the level of interest from the county government, need (percent of families qualifying for Food and Nutrition Services), and availability of broadband and other factors that impact participation. The pilot was implemented in partnership with a local broadband provider and the local Department of Social Services. Qualified individuals residing in these counties, i.e., those who were eligible for Food and Nutrition Services (FNS), and who did not currently have Internet service but could be served from the partner provider, were considered for participation in the LITE-UP program.

In the original optimized research design, ninety qualifying households were projected for recruitment in each of the selected counties, for a total of 180 households. Six cohorts of 15 households in each county were expected to be randomly assigned to receive one of six treatments (see Table 1) that vary the level of subsidy and the provision of training. All participating households would receive a new desktop computer and printer to be installed with assistance provided by the technical staff of NC Broadband or NC LITE-UP partner organizations. Up to two individuals in one-half of the participating households at each level of subsidy were offered two sessions (totaling 6 hours) of digital literacy training with a focus on using examples that demonstrate relevance (e.g., job searches, filling out applications, communicating with schools and doctors, etc.). The remaining participants would not receive digital literacy training through this project, although all participants in the project would be provided with written resource information, including contact information for local assistance and on-line self-directed training programs. Households selected to receive subsidies for Internet service would receive 12 months of subsidy. Participants' awareness, attitude and capacity related to broadband use were to be assessed at the beginning and end of the project and three[x] months post-study.

Table 1
NC LITE-UP Optimized Study Design

Broadband subsidy level	Training	No training
100 percent of cost	30 households	30 households
50 percent of cost	30 households	30 households
No subsidy	30 households	30 households

The SBI funding requested for this project funded the broadband subsidies, help desk support, digital literacy training and external evaluation of the study by East Carolina University. Golden LEAF Foundation funded the portion of the NC Broadband Technical Assistants' time allocated to the LITE-UP pilot.

Process

Pre-enrollment

Since NC Broadband is a division of a state agency, state laws and procedures affected the implementation of NC LITE-UP, particularly as regards the resolution of various legal issues and the execution of contracts. For example, Commerce is a public agency, and must adhere to public records laws which impacted the interactions and contractual agreements between Commerce and DSS; consequently, DSS's client lists are confidential. A number of contracts were drafted and executed to legalize the partnership between Commerce and identified stakeholders and partners, most notably to

govern the exchange any release of identifying information about the study participants. The contracts were signed by the following partners:

- Wilkes Telecommunications, Inc.
- Frontier Communications, Inc.
- Wilkes County Department of Social Services
- Durham County Department of Social Services
- East Carolina University

In addition, Commerce subcontracted with Rutherford County Economic Development Commission (EDC) to house and operate the help desk, after an RFP process did not yield any bids to house the service. Commerce also subcontracted with Frank Odasz of Lone Eagle Consulting to conduct the digital literacy training in both Wilkes and Durham counties.

IRB process through East Carolina University's IRB board

In June of 2012, Commerce determined approval from an Institutional Review Board (IRB) was necessary to proceed with the research study because the study directly observes human behavior. Commerce submitted an IRB application through partner East Carolina University's IRB board on August 7, 2012. Final approval was received on August 22, 2012. In January, 2013, Commerce edited the Entrance survey, added a post-training survey and submitted these modifications to the IRB board for review on January 24, 2013. Commerce received approval for these changes on January 29, 2013. On July 26, 2013, Commerce submitted a continuation request (Continuing Review) to continue the project through August 2014, at which point the study would be complete. An amendment to shorten the study by three months, to better align the end of the program with the end of the grant funding NC Broadband, was submitted at the same time. In July 2014, a second continuation request was submitted and approved on July 30, 2014. Simultaneously, an amendment was submitted to allow for ECU graduate students to call and survey participants via the phone to increase the survey response rates.

Participant Recruitment and Selection

In both counties, DSS randomly selected potential participants and mailed a letter, created by NC Broadband (see Appendix A), informing and inviting DSS's "Food and Nutrition Services" (FNS) clients to participate in the LITE-UP program. Clients interested in participating were instructed to sign and return the attached release form (see Appendix B), along with a copy of the DSS-signed invitation letter. A total of 2600 invitation letters were sent, 1900 in Wilkes County and 700 in Durham County.

The purpose of the release form was to confirm the potential participants' eligibility and to collect their contact information directly from the potential participants. Due to privacy laws intended to protect clients' identities, DSS could not release this information directly to Commerce. The purpose of requesting a copy of the original letter sent by DSS was to confirm that DSS indeed sent this person a letter, thus proving they were a Food and Nutrition Services (FNS) client and randomly selected to participate in the program by DSS. Initially those who sent the release form back to Commerce, but did not include the DSS letter, were considered ineligible; however, due to a low number of eligible potential participants, DSS reprinted the letters for those who did not submit them to Commerce. These potential participants were invited to the original enrollment in Durham and the second enrollment in Wilkes. When they arrived they were instructed to open the letter from DSS and remit it to Commerce to verify the name the letter was addressed to match their identification card (ID).

The original letter instructed the potential participants to return the release form to Commerce by a specific date, September 11, 2012 for Wilkes and February 18, 2013 for Durham. In Wilkes, 383 potential participants returned the forms while 166 potential participants from Durham returned the forms. Information gleaned from the forms were sent to the telecommunications partners in the respective counties to determine if the potential participants' addresses were located within their service territories, and whether they had existing service or an outstanding bill with the provider. From this list, the providers sent Commerce a list of eligible potential participants. In Wilkes, 91 of those who had returned their forms were eligible and invited. In Durham, 133 were eligible and invited.

Eligible potential participants were divided into three categories based on the percentage of subsidy they would receive for their Internet service (i.e., no subsidy, 50% subsidy and 100% subsidy) and sorted alphabetically by last name[xi]. Commerce mailed the identified potential participants an invitation to attend the enrollment session assigned to their subsidy level (see Appendix C). The letter informed the participants of their subsidy level and an approximate monthly cost for Internet service, based on their subsidy. Wilkes potential participants received an additional reminder letter two weeks before enrollment because of an extended time gap between their initial invitation letter and the enrollment dates (See Appendix F). The original enrollment letters were mailed in early December 2012 and reminder letters were mailed in January 2013 so participants would be aware of enrollment dates in case they misplaced the invitation or failed to remember the dates.

Enrollment

Wilkes enrollment was conducted at Wilkes Communications headquarters in Wilkesboro, NC from 8:00 AM-5:00 PM, Tuesday, January 29 through Thursday, January 31, 2013. Durham's enrollment was held at the Holton Career Center, near downtown Durham, from 9:00 AM-6:00 PM[xii], Tuesday, April 9 through -Thursday, April 11, 2013. The initial enrollment period for each county was held over three consecutive days, with different subsidy levels assigned to a specific day so they would not be mixed. Enrollees in the zero-subsidy category were assigned to Tuesdays, 50 percent-subsidy enrollees were assigned to Wednesdays, and 100 percent subsidy enrollees assigned to Thursdays. Initially, one enrollment period was scheduled for each county. However, after the initial three-day enrollment period in each county, all of the slots were not filled. Thus, Commerce conducted a second enrollment for each county, March 7th, 2013 in Wilkes County and April 22nd, 2013 in Durham County. Eligible participants who had not attended the initial enrollment of all subsidy levels were invited to the second enrollment in each county. In Wilkes County, those who did not submit the DSS letter to Commerce but lived in Wilkes Telecommunication's service territory were invited to the second enrollment. During the first and second enrollments, Commerce called participants who did not attend, in each county, to remind them of enrollment and inform them that they could attend a subsequent single enrollment day despite the difference in the subsidy level assignment.

In total, 73 participants enrolled in Wilkes County. At the first enrollment in Wilkes, 22 "no-subsidy" invited participants enrolled, 22 "50 percent subsidy" invited participants enrolled and 21 "100 percent subsidy" invited participants enrolled. Twenty eligible potential participants were invited to the second enrollment on March 7, 2013. Eight participants enrolled at the second enrollment - two from the "no-subsidy category," three from the "50 percent subsidy category" and three from the "100 percent subsidy category." See Table 2 below for a full breakdown of the total number of enrollees.

In total, 106 participants enrolled in Durham County. At the first enrollment, 99 participants enrolled, including 33 in the "no-subsidy category", 31 in the "50 percent subsidy" category, and 35 in the "100 percent subsidy." A total of seven participants enrolled at the second enrollment - two in the "no-

subsidy" category, three in the "50 percent subsidy" category and two in the "100 percent subsidy" category.

At each enrollment, participants moved through a series of six stations to enroll (Appendix D. The six stations were:

- Registration
- Introductory Video and Q&A Session
- Enrollment and Program Information
- Survey Completion
- Internet Service
- Computer Pick-Up

NC Broadband staff was present at each station to converse with and assist the participants as they learned about and enrolled in the program. To officially enroll in the program, all enrollees signed an enrollment agreement form (Appendix E). They also signed a release form indicating NC Broadband could have access to their subscription information, if they chose to subscribe to Internet services through the LITE-UP telecommunications partner (Appendix F).

Table 2
NC LITE-UP Enrollment by Subsidy Category

Enrolled	Wilkes	Durham	Total
0 percent	24	35	59
50 percent	25	34	59
100 percent	24	37	61
TOTAL	**73**	**106**	**179**

One-half of participants in each subsidy category were randomly selected[xiii] for two, three-hour digital literacy training sessions for themselves and one member of their household. For each training session, the selected participants chose one of two session times. The trainings were not mandatory and non-transferable.

Post-enrollment

After enrollment, a single mass mailing to all participants reminded them of the helpdesk that was available to all for their use. Commerce staff communicated with participants individually on an as-needed basis. When Commerce was directly contacted by participants, the staff responded to participants' questions and referred them to the helpdesk, if appropriate. Billing questions were referred to the participants' respective Internet provider.

Depending on their enrollment date, subsidies ended between February and April of 2014. Exit Surveys were mailed to participants once the subsidies ended. Two mailings were sent, with the second offering an online option for completing the survey. Finally, NC Broadband called non-responding enrollees to complete the survey via the phone if possible. In total 129 LITE-UP participants, for a 72 percent response rate, completed the second, "Exit Survey."

For the third and final, "Follow-up" survey, NC Broadband mailed the survey with both a hard copy for return and a link to an online version in the first mailing, and sent a second mailing to non-respondents. ECU Graduate students called non-respondents at least three times to garner a higher response rate. In total, 87 or 47 percent of all NC LITE-UP participants completed the final survey.

Helpdesk

The helpdesk was managed and staffed by Rutherford County's Economic Development Commission and housed at the Isothermal Community College. The helpdesk staff assisted LITE-UP participants with any computer, digital literacy or Internet issues they had. While the original expectation was for an independently functioning helpdesk, it proved necessary for Commerce's Technical Assistance Staff to provide substantial training and direct supervision to the helpdesk staff.

The helpdesk received a total of 269 calls. During and immediately after enrollment in each county, the helpdesk received an initial influx of calls related to password issues[xiv] and printer or computer set-up. Participants' issues varied and ranged from needing assistance in accessing Microsoft Word, to a experiencing a hard drive crash. Helpdesk employees assisted participants in resolving their individual issues or, when necessary, consulted with higher-level technicians and then followed up with the participants. After the initial influx of calls, the helpdesk received an average of three calls a day. The contract for the helpdesk expired on October 31st, 2013, after which the helpdesk was no longer available. Helpdesk technicians were debriefed on helpdesk operations through a combination of surveys and interviews (Appendix G).

Training

Training was a collaborative effort, planned and conducted by nationally-renowned digital literacy trainer, Frank Odasz of Lone Eagle Consulting, and NC Broadband staff. Materials used in the training are included in Appendix H; full training reports and results are included in Appendix I. The training was split into two, three-hour sessions with Part One covering basic computer skills and Part Two moving to more advanced computer and Internet skills. Each part was offered twice on the day of training to accommodate participants' schedules. Training in Wilkes was held at the Wilkes County Public Library. The first session was on Thursday, February 21, 2013 at 9:00 AM-12:00 PM and 5:30 PM-8:30 PM. The second session was Saturday February 23, 2013 at 9:00 AM-12:00 PM and 2:00 PM-5:00 PM. The Durham trainings were held at the Holton Career Center. The first session was offered on Thursday, April 25, 2013 from 9:00 AM-12:00 PM or 5:30 PM-8:30 PM. The second session was offered on Saturday, April 27, 2013 from 9:00 AM-12:00 PM or 2:00 PM-5:00 PM.

Initial Results

Observations include which treatment groups purchased Internet services the most, the treatment groups that attended training most often, the similarities and differences between the rural and urban enrollments, the difficulty of recruiting and enrolling participants. Results reflect information obtained from participants in an entrance survey (Appendix J) that was assessed by LITE-UP evaluation partners at ECU (Appendix K) and from data provided by provider partners.

Strong Performance of "50 percent Subsidy" Category Participants

The initial results show a strong performance from the participants in the "50 percent subsidy" category. In Wilkes County, more participants from this category, 92 percent, subscribed to Internet service than those in the "100 percent subsidy" category, 91.7 percent. In both counties, "50 percent subsidy" participants attended training in higher numbers than the other categories. This group's strong performance could be the result of many causes. However, these preliminary observations suggested that if NC LITE-UP were expanded, a 50 percent Internet subsidy might be the optimal subsidy level to offer to receive the highest return on investment.

Low Training Attendance

An average of 27.8 percent of the 50 percent of participants offered training attended at least one training session - Wilkes at 25 percent and Durham at 29.6 percent. In both Counties, the participants in the "50 percent subsidy" group attended at least one training session in higher numbers than the participants from other subsidy groups. In both counties, the participants in the "no subsidy" group were the next highest training attendees followed by the participants in the "100 percent subsidy" category.

The participants assigned to the 50 percent subsidy category, in each county, were most likely to attend the trainings. However, the overall training participation was low. The 50 percent group in Wilkes County had the highest attendance, 30.8 percent,[xv] at one of the Thursday trainings. The reasons for low attendance were not obvious. See Table 3 below for a breakdown of the training participation.

Table 3
NC LITE-UP Training Participation

	Wilkes: Percent Attended Thursday Training	Durham: Percent Attended Thursday Training	Wilkes: Percent Attended Saturday Training	Durham: Percent Attended Saturday Training
0 percent	25.0 percent	26.3 percent	8.3 percent	21.1 percent
50 percent	30.8 percent	29.4 percent	15.4 percent	29.4 percent
100 percent	18.2 percent	11.1 percent	9.1 percent	11.1 percent
TOTAL	25.0 percent	22.2 percent	11.1 percent	20.4 percent

Difference between Rural Co-op and National Telecommunications Provider

Prior to the program's launch, Commerce approached several national telecommunications providers with the opportunity to partner with Commerce in the NC LITE-UP program. Initial discussions with these national telecommunications providers indicated their standardized enrollment and billing processes would not accommodate the complexity the LITE-UP program would introduce. However, Frontier Communications, a national company, agreed to participate. The challenges they faced in billing were only overcome because Frontier staff were willing to hand enter the data and billing information for the NC LITE-UP participants. This customized system might not be replicable on a large scale if the program was expanded.

Similarly, Wilkes Communications, the rural telecommunications co-operative also hand-entered information for the participants. However, because they are a smaller local agency, implementing enrollment and billing changes to protocol is a less onerous process that other local coops could mirror if this program were expanded.

Enrollment Challenges

Recruiting participants was a longer and more difficult process than originally anticipated in each county, resulting in slight deviations from the equal enrollment numbers and even distribution of participants across the six treatments that defined the original optimal design, seen in comparison of the realized study design depicted below in Table 4 with the optimal design depicted in Table 1.

Table 4 NC LITE-UP Realized Study Design						
Enrollment Totals	**No Subsidy**	**No Subsidy**	**50 percent Subsidy**	**50 percent Subsidy**	**100 percent Subsidy**	**100 percent Subsidy**
	Intended	*Actual*	*Intended*	*Actual*	*Intended*	*Actual*
Training	30	31	30	30	30	29
No Training	30	28	30	29	30	30

Recruiting and enrolling participants in Durham was more successful than in Wilkes County. In Durham, 77.94 percent of those invited to enroll actually enrolled in the program compared to 65.77 percent in Wilkes County.

Among those who enrolled in the program, 76 percent of all participants signed up for Internet service from the project's telecommunications partners. While Wilkes had fewer participants overall, a higher percentage of those participants, 80.9 percent compared to Durham's 72.6 percent, subscribed to the Internet service offered through the project's partners. In Durham, participants in the 100 percent category were the highest Internet subscribers, whereas in Wilkes, participants in the 50 percent subsidy category were the highest Internet subscribers.

Reasons for the initial low enrollment in Wilkes and the difficulty in garnering mass interest in the program are not obvious, although the issue of perceived relevance for computers and/or broadband Internet could be expected to be a factor. Statistically, a lack of need/relevance has the most impact on the decision to adopt broadband. If this is true in Wilkes County coupled with the larger population of qualified participants recruited to NC LITE-UP it would be expected that a significant number of households would not be attracted to the program. This situation and other circumstantial causes for the limited success of the recruiting effort are found in the explanations offered below by some invited participants who disclosed their reasons for not attending:

- No photo identification card
- Enrollment location too far from home, could not afford cost of gas to attend
- Could not afford electricity cost increase that computer would cause
- No relevance to their lives

Based on reasons given for non-enrollment in the program, it is evident that this group (low-income at-risk households) is subjected to issues and constraints of all types, which impact every part of their lives, including their willingness and ability to adopt Internet in their home. As such, the reason for their non-attendance and lack of interest in the program could be that other issues they face are of higher priority than subscribing to Internet service. Cost is clearly an important consideration – some invitees determined that even 100 percent service cost subsidies would not cover the total costs of adding computers and/or Internet to budgets that could not absorb even marginal additional expenses; the cost of gas to attend the enrollment session and the cost of additional electricity costs were both cited as reasons for not enrolling.

Final Results

Inherent in realization of the goal of ubiquitous access to broadband Internet and the capacity to use it is a need for public investment on some scale to ensure that individuals without personal resources to acquire Internet service or the needed digital skills are not excluded from online education and training, health and government services, telework, e-commerce and social networks. Although relatively modest in scale, NC LITE-UP achieved its objectives and delivered insights that inform public and private sector efforts to increase broadband adoption by lower-income households. It is important to note that in assessing the impact of NC LITE-UP the highest standards of independent expert external evaluation using best practice statistical methods were utilized and established standards for human subject experimentation were followed.

Results from exit and post-project surveys (Appendix L and Appendix M, respectively) provided the information used by LITE-UP evaluation partners at East Carolina University to develop the exit and post-project assessments found in Appendix N and Appendix O, respectively

Computer Ownership Increased

The opportunity to obtain a home computer was of compelling interest to NC LITE-UP participants, with more than 95 percent stating at the outset of the study that they wanted a computer in their home and 70 percent citing the opportunity to get a computer for their home as a reason they were joining the study (multiple response were allowed, with 64% also citing Internet service and 47% citing training). All enrollees were provided a desk top computer and printer and 15 months later 83 percent still had a functioning computer. Participants strongly value having the computers, with 88 percent giving computers the highest rating on a seven-point "importance" scale.

Major finding: these results show that the increase in the percent of participants reporting having a computer compared to when the program began.

Broadband Adoption Increased and Sustained

At the beginning of NC LITE-UP 4 percent of participants acknowledged having access to the Internet in some way, although it is not clear that they were referring to home access. Eighty-five percent of participants signed up for Internet service and fifteen months post-study 79 percent of respondents had retained Internet service. Cost is the reason cited most commonly for dropping the service. This is a marked change in behavior and reflects increased value placed on having Internet service at home – 75 percent of participants cited cost as the primary reason they did not have computers and/or Internet so it is reasonable to infer an almost total shift in the decision to allocate resources to maintaining Internet access at home. None of the experimental factors (e.g., subsidy level, county or training) had any impact on this result.

Major finding: these results show the dramatic increase in the percent of participants reporting retention of Internet service after subsidies ended.

Digital Literacy Improved

Having a computer and Internet access are critical but insufficient requirements to effect broadband adoption – one needs to have the digital literacy skills to use these resources. Prior to LITE-UP only slightly more than six percent of enrollees had any training in computer and/or Internet use and almost 28 percent gave their computer skills the lowest possible rating on a seven-point scale. Post-study, only

6 percent of respondents gave their computer skills the lowest possible rating and 55 percent rated their computer skills above the midpoint (5 or higher on a 7 point scale). Validation of these improvements would require more refined assessment of specific skills and knowledge. An interesting finding points to a possible link between subsidy levels and respondents' computer skills rating; digital literacy skills among respondents in the zero-percent subsidy level were statistically significantly lower (3.8), than for those with 50 percent subsidy (4.4) or 100 percent subsidy (4.8).

Major finding: self-perceptions of digital literacy increase significantly with the ability to use computers and the Internet in the home and that some level of cost subsidy may positively affect skill enhancement.

Broadband-Enriched Lives

At the beginning of NC LITE-UP, participants reported that the most common things they do on the Internet include: search for a job (68.5%), use online government services (37.6%), and pay bills (34.9%). Post-study, participants reported that the most common things they do on the Internet include: keep in touch with family and friends (77%), look for health or medical information (72%), social networking (68%), information about a service or product (68%), online news or information (57%), search for a job (56%), watch television or videos (52%), online banking (50%), and/or buy something online (50%). With home access, the weight of their Internet use shifts from the strongly pragmatic (job searches, government services and paying bills) to much greater use to seek health and educational information searches, support social connections and conduct e-commerce—evidence that participants have integrated having access into a wide range of their life activities.

Major finding: NC LITE-UP participants became more fully-active digital citizens, using the Internet at home and in other settings at a much higher rate and for many additional purposes by the end of the project.

The Impact of Structured Training is Complicated

As cited above, only slightly more than six percent of all LITE-UP participants had any prior computer and/or Internet training, yet less than 38 percent of participants who were offered two three-hour training sessions customized to be especially relevant to the participants (e.g., health information searches, interacting with children's teachers, searching for employment, etc.) took at least one class. Individuals who took the training perceived the computer as (marginally) more valuable than those that did not, but the connection between training and Internet service retention post-study varied with the county. Important differences in training uptake and computer skills self-ratings appeared to vary by county in the final, post-study survey. Participants from rural Wilkes county were less likely to participate in training, and the average computer skills ratings were statistically significantly lower in Wilkes (3.8 on a seven-point scale) compared to the average in urban Durham county (5.3). Possible explanations may include transportation issues that may disproportionately affect rural citizens' ability to attend training.

Major finding: while training can be an important tool for increasing digital literacy skills, identification of best practices in the context of publically-supported broadband adoption efforts, particularly as they concern residents of lower-income rural communities, needs additional research.

Partner Feedback: LITE-UP Provided Valuable Information on Increasing Broadband Adoption by Low-Income Households

In December, 2014, NC Broadband sent all partners a short survey to gather feedback on their respective experiences of partnering with NC Broadband on the LITE-UP program (Appendix P). Overall, the partners rated their experience with the program highly, responding that in their view Internet is very important for low-income households to have in their homes, and stating that the research from this study provided valuable information on issues that impact low-income household's adoption of broadband.

The partners reported a range of problems they encountered: providers noted the challenges of providing service to enrollees who had unpaid accounts and the administrative challenge of manually entering the monthly credits for broadband service; the digital literacy trainer noted the disparity between skill-levels for the participants contributed to challenges in adequately training the participants

Suggestions for improvement ranged from involving DSS more throughout the project (although no specific suggestions were offered for the form that additional involvement might take), setting fewer geographic restrictions when determining eligibility, training the users on the actual computers they receive rather than those at a library or training center, and shortening the trainings. A full list of the responses and recommendations is found in Appendix Q.

Lessons Learned and Suggestions for Their Use in Optimizing Adoption Programs

Although not exhaustive, the following factors, positive and negative, gleaned from the launch, operation, project termination and final assessment of NC LITE-UP, could inform the design and implementation of broadband adoption efforts on various scales, from grassroots community assistance programs to much larger provider-led programs to state and national-scale Lifeline Online programs. The lessons learned for each stage of the program are listed beneath their respective stage.

Pre-enrollment:

The following lessons learned reflect observations taken from Commerce staff most directly involved with NC LITE-UP, from suggestions and comments offered by partners post-project and from comments and suggestions offered by individuals who participated in the study.

- ***Partnerships with telecommunications providers***- The willing and proactive participation of the partnering telecommunications companies was critical to the launch of LITE-UP. Both Wilkes Telecommunications and Frontier Telecommunications went outside their normal operating procedures and duties to accommodate Commerce and NC LITE-UP participants: but for their willingness to customize their subscription and billing processes, NC LITE-UP could not have launched. That said, if the goal is ubiquitous home Internet access as the best mechanism to empower full participation in the digital economy, then some accommodations need to be made between providers' reasonable need for responsible customers and past and current financial problems that are not uncommon among the lower income, disabled and elderly communities that have the lowest broadband adoption rates.

- ***Partnerships with local government and community agencies***-Without the partnerships with the local DSS offices and libraries, the program could not have launched. DSS' assistance in

identifying and qualifying potential participants was invaluable. In addition the librarians who attended and assisted at the trainings assisted the trainer greatly in providing information about the local resources. Although the design of this study did not include deliberate opportunities for significant on-going involvement with participants, all NC LITE-UP participants were given information regarding contacts and programmatic offerings by these and other organizations in their communities that were relevant to digital literacy. DSS in particular expressed interest after-the-fact in having stronger engagement with the effort while it was in process, indicating that they could be more substantively involved in future broadband adoption efforts.

- ***Staff members dedicated to the pre-launch, launch and oversight of program***-The design of the program, pre-enrollment and enrollment were labor-intensive processes that required the attention and time of many of Commerce's staff. If a similar program is to be implemented at any level, evidence suggests a minimum of one staff person be dedicated to the project's development and implementation. Additional staff will also be needed to assist in distributing the computers to the participants; more on an interesting alternative model is offered below.

- ***Time lapse between computer purchasing and distribution is not ideal***-Computers for NC LITE-UP were purchased over a year prior to when they were distributed to participants. As such the computers' warranty expired and each computer had to be updated prior to distribution. Ensuring the warranty is valid for participants would prevent additional and/or replacement costs and disappointments once the program is in place. Some computers had manufactured defective parts that required replacing. In addition, the hours Commerce staff spent updating computers could be avoided if computers are purchased close to the distribution.

- ***Delays occurred in recruitment and address verification process***-The recruitment process in each county was more lengthy than anticipated, and as a result enrollment was delayed in each county. Identifying which customers are in their service territory and do not have outstanding bills was time consuming for both telecommunications partners. In Wilkes County, the first recruitment did not return enough eligible participants, so a second mailing to randomly selected participants was required to find enough participants for the program. Planning for potential delays from the beginning can relieve any inconveniences caused by postponing enrollment.

Enrollment:

- ***Personal correspondence and communication with potential participants and participants***-Commerce communicated by phone and mail regularly and often with the potential participants and those who enrolled. This communication ensured the potential participants understood the program, the dates they should come to enroll, and what to expect at enrollment and post-enrollment.

- ***Computer distribution presents an important opportunity to create a local community of interest around broadband adoption-*** Evidence from this and a related grassroots adoption effort in rural Martin County (Appendix R) suggests a promising alternative model that utilized a combination of staff from the provider of record and local volunteers engaged to help people in their community make the transition to being computer owners and digitally active.

- ***Enrollment is the best opportunity to secure critical contact information-*** The need to transmit information (such as training opportunities, equipment upgrades or swaps, mentoring programs, etc.) and the interest in tracking the impact programs such as NC LITE-UP are having in the lives of new adopters places a high premium on maintaining accurate and functional contact information. A variety of issues, including residential transience and frequent changes in mobile telephone numbers made it difficult to maintain contact with some participants. Particular attention should be paid at the onset of adoption programs to obtain alternative contact information for participants.

Helpdesk:

- ***A computer and Internet assistance resources are valuable for participants*** - NC LITE-UP had a specific helpdesk dedicated to assisting participants when issues arose. At the beginning of the program, 76.7 percent of the participants reported that they expected to use the helpdesk at some point. At the end of the program, 47 percent of respondents indicated they had in fact used the helpdesk. No difference in use between rural and urban participants was reported. Forty-five percent of the respondents who reported using the helpdesk rated its service as being very useful. Indeed, when surveyed, the helpdesk technicians cited the helpdesk services they offered as critical to the achievement of digital literacy for the participants.

- ***The assistance services do not have to take the form of a helpdesk-*** On average, the call volume was minimal with an average of three calls a day. In addition, a small percentage of people (6%) accounted for a large part of the calls (30%). The disproportionate use by a small number of users indicates a dedicated helpdesk might not be optimal; a more cost-effective method to provide assistance would be to partner with an already established resources. For example, a future program could partner with local libraries and train librarians how to answer questions from participants. Regardless of the method by which the assistance is delivered, the function is invaluable for the digitally illiterate.

- ***Additional support required for participants with physical and mental disabilities***- LITE-UP demonstrated that intensive, one-on-one support was often necessary to assist participants with physical and mental disabilities. Given the disproportionate representation of the disabled among non-adopters nationally, it will be important to develop practical strategies for providing the additional support that will be needed to adequately help this population become Internet active.

- ***On-site technical support*** **is often requested and needed**- Identifying and addressing the legal and safety risks of providing on-site technical support (in participants' homes) prior to the program launch would benefit the program and prevent problematic issues that might arise from offering on-site support.

- ***Ensure helpdesk is staffed with highly technical staff that is well-trained***- Identifying a partner agency able to house the helpdesk was a lengthy process that was complicated by the apparent lack of interest among the private and non-profit sector in performing this service at an affordable price. NC Broadband had no serious expressions of interest to a request for proposal issued through state contracting and other established portals. Direct solicitation of services from an organization that had provided similar services for a different NC Broadband study provided the needed helpdesk function rather late in the startup process. Thus, the helpdesk

was not functional until enrollment began in Wilkes County, preventing helpdesk technicians from being adequately trained prior to assuming their duties. Initially, the helpdesk staff was highly dependent upon Commerce staff for advice and training. This oversight was time consuming for Commerce staff and inefficient. Provision of technical assistance for adoption programs needs to be given appropriate attention early in the planning process.

- ***Ensure second level support is present for helpdesk management***-Initially, all helpdesk technicians reported to one manager and often called upon Commerce's Technical Assistants for assistance. The technical assistants worked with the technicians to assist in any way possible. However, the technical assistants in partnership with the helpdesk managers created a second level of support so the technical assistance director would not be the first point-of-contact for assistance, but rather the third point-of-contact.

Increasing Adoption

- ***Provision of access devices is important to increasing adoption-***Computers were an important draw to the NC LITE-UP study, were maintained in working order 15 months post study by the vast majority of recipients, were given the highest value ratings by participants post-study and effected significant improvement in participants assessment of their digital literacy skills. The impact of having a computer superseded training and subsidy on broadband adoption. Computers given to recipients were unused but had sat in storage for over a year due to start-up delays. As a result there were some replacement issues but presumably fewer than would have been the case with older and refurbished units. Desktop units were used in place of tablets, laptops or more mobile devices because they were expected to be more robust and be less prone to misappropriation. That said, the high adoption of smart phones and other mobile access devices by all segments and progress made in the range and utility of mobile applications the extension of 4G networks and Wi-Fi suggests that serious consideration be given in future adoption programs to the possible use of mobile access devices to get non-adopters digitally active.

- ***Cost is a critical impediment but subsidies alone are not the answer-*** Participants cited costs most frequently as an impediment to computer ownership and establishing broadband service. Some small proportion of those offered 100 percent installation and service cost subsidies still cited additional electricity and in-direct costs as causing them to decline service and among the 17 percent of participants that did not continue service post-project almost half cited costs as the reason for ending their service. The level of subsidy affected the perceived value of participation in the LITE-UP study in ways that were anticipated, with higher-value ratings correlated with increases in subsidy. That said, results indicate that considerable positive effects can be achieved with less than total subsidies – participants receiving 50 percent subsidies did not differ from those receiving total subsidies in retention of Internet services post-project and they also took advantage of training offered at higher rates, although the limited numbers make this finding less robust.

- ***Literacy, not just in a digital context, is a major impediment to adoption***-Internet adoption is closely correlated with education – the higher the level of educational attainment the higher the level of Internet adoption and the broader the range of online services and activities utilized. From the outset problems with general literacy negatively affected the value of the project to some participants who needed significant assistance completing the forms required for

participants, establishing service and completing the surveys that were there the crux of the project evaluation. Questions posed to helpdesk technicians and NC Broadband staff substantiated the finding that general literacy will be a significant impediment to broadband adoption by lower income households that on average have lower educational attainment. Buried in this problem may be a seed for a creative solution that deliberately uses Internet-assisted tools to simultaneously increase general and digital literacy. This warrants further study.

- ***Underlying transportation issues-*** Lower-income households, the disabled and senior citizens have in common transportation impediments that affect adoption programs on multiple levels. Timing, location and whether the enrollment location was accessible by public transportation systems all determine not just whether participation is convenient but whether it is even feasible. While online training is technically possible, distribution of access devices is not. Failure to explicitly address transportation challenges will inevitably limit the success of adoption programs similar to NC LITE-UP. The related adoption program in Martin County circumvented some transportation issues by conducting the distribution and training concurrently and at three different locations around the county on three different Saturdays, thereby marrying convenience with efficiency for the participants. This design also facilitated the involvement of local volunteers at distribution assistants and mentors.

- ***Trade-offs and efficiencies at all levels-*** While much research is being conducted to assess the cost-benefit equation for publically-supported broadband access and adoption there is evidence from the NC LITE-UP study that points to outcomes that may make the balance between local costs and benefits more immediately relevant. Prior to the study participants largely limited their Internet activity to pragmatic purposes that included job searches, homework, and transactions with government – all relatively time intensive activities conducted most often at public libraries. Post-study, libraries dropped to a relatively distant second place after "home" as the access location of choice. Broader programs to expand home access can be expected to reduce the demand for public access and possibly free librarians and other community partners, such as Goodwill Industries, to provide the more hands-on assistance that the most digitally-illiterate require and to function as the community-based technical helpdesk.

- ***LITE-UP as a pilot for community-based adoption programs-*** An opportunity arose mid-project to extend the model being developed through LITE-UP to a community-based effort in rural Martin County. Commerce and its evaluation partner, East Carolina University, joined the Martin County School System, CenturyLink Telecommunication and Kramden Institute, a Durham County-based non-profit organization that refurbishes computers for distribution to K-12 students. The Martin County project design improved on lessons learned in the NC LITE-UP enrollment in terms of timing, convenience involvement of local volunteers as onsite mentors. Use of similar participant survey designs will facilitate evaluation of cross-cutting factors by a single evaluation team for both NC LITE-UP and the Martin County project Appendix R). This county-wide project is the largest scale effort undertaken by Kramden Institute. Both Kramden Institute and CenturyLink have expressed interest in replicating this program in other rural counties in the state with significant numbers of lower-income students whose homes lack computers and Internet access.

Conclusion

The NC LITE-UP program was a challenging, interesting and worthwhile undertaking for NC Broadband and its partners. NC LITE-UP brought 179 low-income households further along the path to becoming active participants in the digital age, with all obtaining a home computer and 79 percent establishing and maintaining Internet service after the project ended. That said, it is important to view this study and its successful outcome in the context of the broader challenges that define the quest to ensure that all Americans have access broadband Internet and the capacity to use it. While LITE-UP participants did not have home Internet access at the outset of the project, only some portion of them could be called non-adopters; most reported Internet use at other locations. Also, LITE-UP participants are by definition not among the non-adopters who cite a lack of relevance as the primary reason for not having Internet service –their participation in this project being testimony to their recognition that Internet is relevant to their lives and economic futures. How to engage the interest of individuals who still do to see the relevance of the Internet to their lives remains an open question that points to the need for additional research and targeted programs to spur broadband adoption by this population.

Integrated adoption efforts such as NC LITE-UP can effect higher levels of digital literacy but results will remain sub-optimized until more enticing and effective approaches to training are available for broad and convenient delivery. This may be particularly true for households in rural regions.

Cost is clearly an impediment, even among motivated adopters such as many of the households that participated in the NC LITE-UP. Positive outcomes were limited for some participants at either extreme of the subsidy scale: zero –percent subsidies were associated with lover broadband retention and digital literacy improvements (self-assessed) at the end of the study and even the offer of 100 percent subsidies were not sufficient to entice some participants to subscribe to broadband at any point during the study. And, interestingly, there were no significant differences in positive outcomes between the 50 percent and 100 percent subsidy groups.

As a starting point for similar efforts this study suggests that successful broadband adoption efforts will include the following elements: a combination of a strong doses of encouragement from partnering organizations that have regular contact with the targeted population; partial (50%) subsidy for broadband service costs, with additional assistance with installation costs; paired with local technical assistance, such as might be provided through the library; and availability of convenient and user-friendly digital literacy training.

Appendices (in chronological order)

A. DSS Letter
B. Release 1
C. Invitation to Attend/Eligible letter
D. Station List
E. Enrollment Agreement Form
F. Release 2
G. Help-Desk Technician Survey/Interviews
H. Training materials
I. Training reports
J. Participant Entrance Survey
K. Enrollment Survey Assessment
L. Participant Exit Survey
M. Post-Project Participant Survey
N. Exit Survey Assessment
O. Post-Project Participant Assessment
P. Post-Project Partner Survey
Q. Post-Project Partner Survey Responses
R. Martin County Survey

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[i] Horrigan, J. B. (2010). *Broadband Adoption and Use in America.* Federal Communications Commission (FCC). Page 5.

[ii] Wilson, K. and Powers, R. "Digital Technology and Internet Access Trends in North Carolina: 1999 to 2011." 2011.

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[vi] Horrigan, J. B. (2010). *Broadband Adoption and Use in America.* Federal Communications Commission (FCC). Page 5.

[vii] Through the Universal Service Fund (USF), mandated contributions collected from telecommunications companies (including wireless and VoIP providers) are redistributed to qualifying low-income households to subsidize basic telephone equipment and services. In North Carolina, the primary means of determining eligibility for this subsidy is the receipt of Food and Nutrition Services (formerly Food Stamps). In March 2009, only 125,000 of the 544,000 eligible households (including 1,360,652 individuals) in the state were served by the Lifeline program. This program provides up to $10 per month for telephone service in the primary residence of a qualified subscriber. The Link-Up program gives one-half (up to $30) of the initial installation fee for a traditional wireline telephone or the activation fee for a wireless telephone. The State of North Carolina contributes an additional $3.50 per beneficiary family, bringing total monthly savings for beneficiaries to as much as $13.50. No subsidies currently exist to establish and maintain Internet service to these homes.

[viii] Strategic Networks Group (SNG). (2010). *E-Strategy Report for North Carolina*. Ottawa, Ontario.

[ix] Federal Communications Commission. (2010). *Connecting America: The National Broadband Plan.* Washington, D.C.: U.S. Government Printing Office.

[x] Originally, the final survey was scheduled to be sent six months post-study. Due to delays, the final survey will be sent out three months post-study to finalize the project before the grant ends.

[xi] Potential participants were each assigned a number corresponding with the subsidy level. Numbers were assigned numerically in order of last name (i.e. 1,2,3,1,2,3…). 1=no subsidy, 2=50% subsidy, 3=100% subsidy.

[xii] Durham's enrollment extended after 5:00 PM because after the Wilkes enrollment, Commerce determined that offering enrollment hours after 5:00 PM might enable more participants to attend enrollment.

[xiii] Every other participant was selected.

[xiv] A password was set-up by Commerce staff. After the Wilkes enrollment, the password was simplified for the Durham computers due to a high volume of calls to the helpdesk by frustrated participants.

[xv] This was the 50% group from Wilkes attending one of the Thursday trainings.