The Training Difference:
How Formal Training on the Internet Impacts New Users

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This paper addresses the question: Five years after delivery of the National Broadband Plan (NBP), what have we learned about how to increase broadband adoption and use, one of the NBP's key priorities?

The paper will unfold as follows:

1) A review of how perspectives on the digital divide have evolved.
2) A discussion of what has been learned since then.
3) Examination of the role training plays on drawing people to online use
4) Lessons for stakeholders on how to promote broadband adoption and use.

I.   Closing access gaps: Understanding the role of poverty in online access

Research and scholarship in the past dozen years have pushed stakeholders to see online access as about more than just access and fairness, as important as they continue to be. The discourse has expanded to view the digital divide as a difficult – though not intractable – problem that requires sustained interventions and widespread participation from stakeholders in the public and private sectors. It also calls for deep understanding of the circumstances of non-users that drive non-adoption. To see why, some background on the evolution of the digital divide debate will help.

The digital divide debate inherited a universal service policy framework that placed the social dimensions of the issue in terms of access to service. From the early days of the Bell Telephone System, universal service was about ensuring widespread network deployment and, later, making telephone service affordable to Americans. In establishing the Federal Communications Commission in 1934, the Communications Act stated as its goal "to make available, so far as possible, to all the people of the United States, a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges."[2]

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[1] Views in this paper represent those of the author only, not those of the Pew Research Center
[2] 47 US Code, Chapter 5, Section 151, Federal Communications Commission. Available online at: http://www.law.cornell.edu/uscode/text/47/151

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Elaborate regulatory mechanisms developed to make sure the price for telephone would be low enough so that more and more Americans would purchase service.

As discussion of the National Information Infrastructure (NII) unfolded in the 1990s, traditional universal service values shaped how policymakers talked about the need for available and affordable advanced information tools. Discussion of the information "haves" and "have nots" from the Clinton Administration's 1993 Information Infrastructure Task Force (IITF) focused on closing gaps in network access and end-user devices for individuals and, importantly, for public institutions such as schools and libraries. Although initiatives of that era did discuss the need to train teachers on how to use the Internet in the classroom, a good deal of policy discourse involved watching metrics on device adoption (back then desktop computers) and consumer purchases of modems to connect to the Internet.[3]

By the turn of the 21st century, community-based efforts in many parts of the country sought to close the digital divide by reaching into mainly low-income neighborhoods. The Community Technology Center (CTC) movement created places in communities where people could go for services that many could not afford at home. Libraries and schools were also part of the equation in this era as access points. CTCs had the dual advantage of opening access to many people who might otherwise not have ways to get online, but also exposing stakeholders behind these initiatives to the challenges and nuances of introducing new technology to largely low-income populations.

From this work came an appreciation that adoption of ICTs had more dimensions than simply ensuring the availability of networks, inexpensive service offerings, and cheap access devices.

An early call for reformulation of the digital divide debate came in the early 2000s from Lisa Servon, now of the New School for Social Research. She argued that measures to address the digital divide had to include training on how to use the technology, since the problem is "much more complex than a mere lack of computers." Servon noted that access gaps would close, with falling prices for electronic devices and services resulting in more low-income people purchasing these goods. Yet "entrenched gaps" in usage would remain unless training programs and content were developed for specific groups.[4] Qualitative research that the Social Science Research Council (SSRC) conducted for the National Broadband Plan noted that, among poor Americans

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[3] James McConnaughey, "Universal Service and the National Information Infrastructure (NII): Making the Grade on the Information Superhighway," in Making Universal Service Policy, Barbara A. Cherry, Steven S. Wildman, and Allen S. Hammond IV, eds. Lawrence Erlbaum Associates, 1999, pp. 189-212.
[4] Lisa Servon, Bridging the Digital Divide: Technology, Community, and Public Policy. Blackwell Publishers, 2002.

not using broadband, lack of high-speed service adoption at home "tracks closely with socio-economic inequality" and that access barriers tend to be multiple in nature.[5] More recent research from scholars at Temple University centers on the structural barriers poor women in Philadelphia face to Internet access. Gilbert and Masucci find that contextual factors such as sexism, inequality, and challenges in poor women's daily lives are all crucial in devising approach to draw them to sustained technology use.[6]

Empirical research also demonstrates the role of poverty and broader social context in explaining the adoption of broadband, computers, and the Internet. In study of computer adoption using 1997 data, Goolsbee and Klenow found that people were more likely to have a computer at home if they live in areas where others have adopted and if a large share of family and friends had a computer.[7] A Gates Foundation study in 2003 found that, even when controlling for income, people living in low-income areas are less likely to be computer or internet users. That is, a low-income person who happens to live in a middle income area with high uptake is more likely to use the internet than a person at the same low level of income that lives in a poor (low adopting) area.[8] This same neighborhood effect has been found more recently in Chicago and in a survey conducted by the Joint Center for Political and Economic Studies.[9] Finally, research from the mid-2000s found that, in the relatively early stages of broadband's rollout as a consumer service, socio-economic factors (particularly income) explained broadband uptake more than price sensitivity, even when controlling for service

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[5] Dharma Dailey, Amelia Bryne, Alison Powell, Joe Karaganis and Jaewon Chung, "Broadband Adoption in Low-Income Communities." Social Science Research Council, 2010. Available online at: http://www.ssrc.org/publications/view/1EB76F62-C720-DF11-9D32-001CC477EC70/

[6] Melissa R. Gilbert & Michele Masucci., Information and Communication Technology Geographies: Strategies for Bridging the Digital Divide. Praxis (e) Press - University of British Columbia, 2011.

[7] Goolsbee, Austan and Klenow, Peter J, 2002. "Evidence on Learning and Network Externalities in the Diffusion of Home Computers,"Journal of Law and Economics, University of Chicago Press, vol. 45(2), pages 317-43, October.

[8] Margaret T. Gordon, Elizabeth J. Moore, Andrew C. Gordon, "A Report to the Bill & Melinda Gates Foundation U.S. Library Program." Public Access Computing Project, University of Washington, April 2003. Available online at: https://docs.gatesfoundation.org/Documents/NeighborhoodsFinal.pdf.

[9] Gant, J. P., Turner-Lee, N. E., Li, Y., & Miller, J. S. "National minority broadband adoption: comparative trends in adoption, acceptance and use." Washington, DC: Joint Center for Political and Economic Studies. Available online at: http://www.jointcenter.org/research/national-minority-broadband-adoption-comparative-trends-in-adoption-acceptance-and-use.
See also, Mossberger, K. & Tolbert, C. (2009). Digital Excellence in Chicago: A Citywide View of Technology Use. Available at: http://www.cityofchicago.org/dam/city/depts/doit/supp_info/DEI/Digital_Excellence_Study_2009.pdf

availability.[10] This research indicates how problems with broadband adoption in low-income communities are intimately bound up in other problems that are markers of poverty, such as low high school graduation rates and health outcomes. Efforts to increase broadband adoption in these communities must understand the structural problems of poverty.

Research conducted for the National Broadband Plan extended understanding of non-adoption by examining in detail the barriers to non-adoption. That work found adoption barriers to be multiple in nature, while also determining, in the midst of multiple reasons for non-adoption, which factors loomed largest. In "Broadband Adoption and Use in America," the methodological approach to asking non-broadband users why they do not have service essentially let them check more than one box on a menu of possible reasons for not having broadband. That approach found that, among non-broadband users, when asked to choose more than one reason for not having broadband, 51% say the monthly cost is too expensive, 32% say they are not comfortable using a computer, 35% say they worry about bad things that can happen online, 32% say they cannot afford a computer, 25% say there is nothing online they want to see, and 24% say the Internet is a waste of time.[11]

When asked subsequently to identify the *main* reason they do not have broadband, reasons for non-adoption sort into three categories:

- **Cost**: 36% of non-broadband adopters cited a cost-related reason, such as 15% who cited monthly access fee, 10% who cited computer cost, 9% who cited activation fee and 2% who cited a combination of reasons.
- **Digital Literacy**: 22% cited factors pointing to digital literacy including 10% who said they were worried about bad things that could happen online and 12% who said they were not comfortable with computers.
- **Lack of relevance:** 19% of non-adopters said they did not find online content compelling enough to purchase service. This means they thought the Internet was a

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[10] Kenneth Flamm and Anindya Chaudhuri, "An Analysis of the Determinants of Broadband Access." Telecommunications Policy, Volume 31, Issue 6-7, July 2007.

[11] The data underlying these figures are from the 2010 FCC survey conducted in connection with the NBP. The author has combined findings from the three categories of non-adopters identified in the 2010 report: non-Internet users (22%), dial-up users (6%), and people who do not have home Internet service but go online from other places such as libraries (6%). The combined figures were not reported in the 2010 FCC report, but were in John B. Horrigan, "Adoption of Information and Communication Service in the United States: Narrowing Gaps, New Challenges." Knight Foundation, August 2013. Available online at: http://knightfoundation.org/media/uploads/media_pdfs/DigitalAccessUpdateFeb2014.pdf, page 23.

"waste of time," that there was nothing worth seeing online, or that offline alternatives for getting information sufficed for them.[12]

Since the NBP, research on non-broadband adoption has continued to find these same patterns for non-adoption. Research conducted for the Partnership for Connected Illinois in 2012 found that, for Illinois residents, non-broadband users cited multiple reasons for not having service and, when asked about the main reason, 29% of non-broadband adopters cited a cost related reason (16% cited the monthly access fee and 9% cited the cost of the computer), 17% cited the lack of relevance and 13% cited digital literacy.[13] NTIA's large-scale surveys on non-Internet use find that, when asked only to cite the main reason they do not have the Internet at home, 48% of respondents cite broadband's lack of relevance to them, 28% say it is too expensive, and 13% say they do not have a computer (or an adequate one).[14] The Pew Research Center, in asking the question in a way similar to NTIA, finds that 34% of non-internet users cite lack of relevance, 32% cite usability issues, and 19% cite cost which was made up of 13% saying they do not have a computer and 6% saying it is too expensive.[15]

Most recently, research from the FCC, using Connected Nation data, shows how price is not always the main issue for non-broadband adopters. That research found that found that two-thirds of non-adopters said they would <u>not</u> subscribe to broadband even if the price were zero.[16]

Beyond shaping discourse about drivers to non-broadband adoption, recent research has shown the complex nature behind the decision not to have service. The plural nature of reasons for non-adoption was most striking. Respondents could, and did, identify a main reason for not having service, but that was in the context of multiple reasons (most designated three) they

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[12] John B. Horrigan, "Broadband Adoption and Use in America." OBI Working Paper No. 1, Federal Communications Commission, February 2010, pp. 24-30. Available online at: http://online.wsj.com/public/resources/documents/FCCSurvey.pdf.

[14] "Exploring the Digital Nation: America's Emerging Online Experience." National Telecommunications and Information Administration and Economic and Statistics Administration, p. 36. Available online at: http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf. Please note that the "too expensive" question as determined by the NTIA is the sum of: (a) cost of the computer and/or hardware; (b) cost of installing Internet service; (c) cost of monthly Internet service; and (d) some other cost. The NTIA does not provide separate metrics on these factors and therefore, the "too expensive" question is the sum of the impact of all four factors.

[15] Kathryn Zickhur, "Who's Not Online and Why." Pew Research Center, September 2013. Available online: http://www.pewinternet.org/2013/09/25/whos-not-online-and-why/.

[16] Carare, Octavian and McGovern, Chris and Noriega, Raquel and Schwarz, Jay A., The Willingness to Pay for Broadband of Non-Adopters in the U.S.: Estimates from a Multi-State Survey (November 18, 2014). Information Economics and Policy, Forthcoming. Available at SSRN: http://ssrn.com/abstract=2375867

cited. Expected reasons for not having service, such as the cost (which included different cost elements), relevance and digital literacy clearly came into play.

Non-broadband users, it turned out, occupied a range of different terrains when pressed for reasons underneath their choice not to have service. The research showed that, particularly to those hoping that pulling a single lever (such as lowering prices or offering free computers) would accelerate broadband adoption, the problem was indeed multi-dimensional.

II.   What we've learned & models for the future

The key lesson from looking at recent research is that solving the broadband adoption problem is not about devising the right price-based mechanism to change people's behavior. Rather, it is about building capacity at the local level – at institutions non-adopters trust. The problem calls for drawing people into broadband use by showing them what the Internet can do for them and giving them the skills to <u>trust it</u> and <u>use it</u>.

If encouraging trust and cultivating skills can draw people online, what is the right program design to do those things? Models that have arisen over the past several years offer guidance. Some are from the programs BTOP has funded. The private sector has played a key role too, most prominently Comcast's Internet Essentials, but also Google's "digital inclusion" efforts in Google Fiber cities. These different models add up to a general model for broadband adoption and use, summed up in three words:

- Partnerships
- Engagement
- Training.

Partnerships: Several years ago, NTIA sought to understand "best practice" in its BTOP-funded projects that focused on sustainable broadband adoption and public computing centers. The resulting "Broadband Adoption Toolkit" shows the importance of developing partnerships with established and trusted neighborhood institutions to promote adoption. Communities should develop a broadband adoption plans to meet citizens' needs. Private sector partners are crucial to boosting public awareness of programs, offering training, and supply discount

computer and home Internet subscriptions. Partnerships, in other words, were indispensable to illuminating for people the value of having broadband access.[17]

Engagement: Programs have to "meet people where they are." That is, they have to appeal to people to change established routines that do not rely on the Internet to do things. This is a place-based strategy that calls for taking advantage of existing community institutions to promote digital engagement. Pew Research Center research demonstrates how libraries often fill this role. Over half of all library users say that the availability of computers and Internet access at libraries is important to them and half say libraries' resources for finding jobs or applying for them is important.[18]

Comcast's Internet Essentials (IE) program is very relevant to the digital engagement equation. IE aims at low-income families with children and offers training, a $150 computer, and a $10 per month home Internet subscription plan. By aiming at something likely to be relevant to the target population – their kids' education – IE clearly is addressing a need for its target population.

Research surveying IE customers shows that the service helps IE households meet expectations of connectivity. "The Essentials of Connectivity" found that IE households overwhelmingly say that their kids' schools expect that they have broadband at home. Notably, strong majorities also say that other institutions – such as banks, health care providers, and government – also expect that people have access at home. These institutions basically assume the Internet's relevance to users and that delivery of services digitally will unfold seamlessly. But that's a risky assumption. The "Essentials of Connectivity" research has a different lesson: It shows that programmatic intervention can help overcome the relevance barrier for certain non-adopting groups and promote digital engagement.[19]

Training: This is final part of the model and, on its face, a bit of a no-brainer. If a key barrier to broadband adoption is dearth of skills with computers and the Internet, then investing in training is a common-sense strategy. But it's no sure bet that such investments will pay off. Yet

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[17] National Telecommunications and Information Admniistration, Broadband Adoption Toolkit. May 2013. Available online at: http://www2.ntia.doc.gov/files/toolkit_042913.pdf

[18] Kathryn Zickuhr, Lee Rainie, Kristen Purcell and Maeve Duggan, How Americans Value Public Libraries in Their Communities, December 2011. Available online at: http://libraries.pewinternet.org/2013/12/11/libraries-in-communities/

[19] John B. Horrigan, The Essentials of Connectivity: Comcast's Internet Essentials Program and a Playbook for Expanding Broadband Adoption and Use in America, March 2014. Available online at: http://corporate.comcast.com/images/Final_IE_Research_Full_Paper.pdf

there is a growing body of evidence that such training has payoffs. The remainder of the paper discusses the role of training based on data from Comcast's Internet Essentials program.

III. The Role of Training

In this research, two surveys were conducted that queried Internet Essentials customers in January 2014 and September 2014. The first survey had 1,969 respondents and the second re-interviewed 722 who had participated in the initial survey, making the research design longitudinal.[20] The callback survey took a different approach to asking about whether respondents had received any training on the Internet or computers. The January survey asked people whether they had received in-person training provided through IE (13% had) or had used the Internet Essentials Online Learning Center (23% had). This means that 29% of IE customers, in January, had some sort of training on the Internet and computers either through in-person training or the Online Learning Center.

The callback survey, rather than replicate the January survey, instead asked a longer list of possible ways IE customers might have gotten training on how to use a computer or the Internet. The results were:

- 47% had received training through their children
- 18% received it through the library
- 15% from a friend in their neighborhood
- 11% from a community center
- 10% from a program *other* than Internet Essentials
- 9% through the Internet Essentials program itself

When focusing on formal training – that is, whether the respondent had training at a library, community center, Internet Essentials, or some other program – some 31% of respondents took advantage of these programs (as distinct from learning through children or friends). Moreover, those who took advantage of formal training were significantly more likely to use the Internet to look for a job and report high levels of comfort with computers (while controlling for other

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[20] More detail is at John B. Horrigan, "Deepening Ties Comcast Internet Essentials Customers Show Broader and Deeper Ties to the Internet Over Time — Especially Among Those Who Had Digital Literacy Skills Training." January 2015. Available online at: http://techfund.comcast.com/images/comcast-ie-report-2-horrigan.pdf

things, such as the respondents' baseline level of comfort with computers in January, age, income, and education; see methodological appendix for further discussion).

This is a significant finding for two reasons. First, though it seems natural to assume that training will make a difference for people, empirical support for it is hard to come by – yet is clear here.[21] Any effects from training may also be spurious; a significant training effect may actually reflect the passage of time and accumulation of experience with computers and the Internet, not the training itself. Such effects may also be an artifact of the people who seek out training; perhaps those people are more motivated to learn or already skilled with computers, meaning the training itself does not mean much. Yet the longitudinal research design, for reasons elaborated upon in the methodological appendix, increases the strength of drawing inferences about the significance of the training effect, even if it does not draw a cause-and-effect linkage between training and online engagement.

Second, it is of note that having had training from a friend or child has no impact on people's behavioral patterns. Often it is thought that the existence of "digital natives" in the household will lift the levels of digital skills for everyone. The findings here do not show that.

Comparing frequency of activities for those with formal training to those without puts the impact of formal training on full display. As the following table shows, two-thirds of IE customers who have had training have looked for a job online compared with half (52%) for those who did not take advantage of any training. Similar differences are evident when it comes to applying for work and working at home on occasion. The differences are smaller with respect to communicating with employers and online banking, but they are of note nonetheless.

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[21] In Chicago, analysis suggests that, over a five year time interval, neighborhoods subject to the Smart Communities intervention have home broadband adoption rates that are 9 percentage points higher than other neighborhoods. Smart Communities also show higher rates of use of the Internet for searchers for jobs, health information, and transportation matters that are 10-11% higher than that in other neighborhoods. See Karen Mossberger, Caroline Tolbert, Christopher Anderson, "Measuring Change in Internet Use and Broadband Adoption," April 2014. Available online at:
https://cpi.asu.edu/sites/default/files/smartcommunities_measuringinternetchangeinchicago_0.pdf

Table 1: Comparing impacts for those with training and those without

	Got training (IE, library, community center, other)	No training
Help manage work schedule	71%	59%
Look for a job	67	52
Apply for a job	63	51
Communicate better with employer	53	46
Help work at home on occasion	50	36
Do online banking	50	44

Respondents who have had computer or Internet training are also much more likely to say that their IE service helps them manage their work schedule than those who have not had training. This kind of benefit from home access – having more certainty about work hours so that child care and other issues can be better managed – can really open users up to the possibilities of home access in other parts of their lives.

The impact of training is also evident when IE customers think about how having home Internet service has affected their lives or their children's. Those who have received training are much more likely, compared to those who received no training, to say home access has helped "a lot" in looking for a job, accessing government services, and staying in touch with family or friends. The differences in favor of those with training are consistent, if smaller, in other areas with the exception of getting access to banking or financial services.

Table 2: Comparing activities for those with training and those without

	Got training (IE, library, community center, other)	No training
Do school work	86%	81%
Stay in touch with family, friends, and neighbors	65	53
Access entertainment like videos, movies and online games	56	52
Look for or apply for a job	55	38
Get access to government services	44	30
Get access to banking and financial services	44	44
Look for or start a business	18	14

Regarding their children, having had training with the Internet or computers adds a 6 to 9 percentage point difference in terms of whether parents think the Internet has helped their children "a lot."

Table 3: Comparing impacts for children, those with training and those without

FOR CHILDREN (A lot)	Got training (IE, library, community center, other)	No training
Find out more about a topic that interests them, such as math, science, or history	85%	79%
Do their assignments for school	84	79
Improve their reading ability	71	62
Pursue creative activities, such as music, writing, or art	67	61

People who have had training are, perhaps not surprisingly, more likely to be interested in having training in specific areas. When asked whether they would be interested in a training program that focused on specific topic areas, the following table shows what they said.

Table 4: Comparing interest in training on specific topics, those with training and those without

FOR RESPONDENT (A lot or some)	Formal training (IE, library, community center, other)	No training
Acquiring new workforce skills so you can increase your income	60%	52%
Starting your own business	38	29
Pursuing creative activities, such as music, writing, or art	58	48
Taking classes online for credit toward a degree or certification	55	42

IE users are clearly interested in the Internet for economic advancement and those who have training more so. Some 60% of those who have had training would be interested "a lot" or "somewhat" in guidance on acquiring new workforce skills, 55% say this about online classes, and more than one-third (38%) would welcome training on how to start their own business. Also of note are creative activities. Nearly three in five (58%) would be interested in learning how to pursue creative activities online, a 10 percentage point difference compared with those who have not received training.

Finally, it is worth noting that those who had formal training on the computers or the Internet were more likely to report *increases* in levels of comfort with computers from January to September. Recall that the share of respondents saying they were very comfortable with computers rose from 47% in January to 59% in September. Of this increase, 60% comes from those who had formal training, a disproportionately large share given that just 31% of all respondents had any training.

What was the source of the training people had? <u>Trusted community institutions</u> – libraries, community centers, and IE training programs that were often run through community institutions. The "Deepening Ties" research also found that there is more to be done when it comes to training. Only one-third (31%) of IE households had some sort of computer or Internet training – suggesting that encouraging more people to take advantage of training would have payoff.

It is worth noting that these findings hold for formal training, but the survey also asked about informal types of training, such as whether someone had received training from a friend or child. Nearly half (47%) said they had received training from their children and 15% from a friend in their neighborhood. These kinds of informal training had *no statistical impact* on respondents' behaviors. Given discourse that suggests online use will unfold seamlessly for new adopters as they get help from those around them, these findings are striking and important.

IV.   The Future

What lessons does this offer as stakeholders look to the future?

- Training makes a difference, that is, those who have had little exposure to the Internet in the past are more likely to engage in online activities if they have had formal training on the Internet – compared to those who have not received training.
- Training resources typically unfold in trusted community institutions such as libraries or non-profits that serve low-income areas. This taps into the social dimension of technology adoption for tech novices.

Five years ago, the goal was to close the digital divide and get broadband adoption numbers up. Since then, we have learned that the challenge is more difficult than originally thought, but research and practice have shown that it is solvable. With the emergence of the Internet of things – along with people's abiding concerns about trust and privacy online – there will remain a need for tools to help people acclimate to the digital world. The current state of knowledge in the field shows that there are viable models for continuing to develop these tools. As stakeholders and policymakers continue to look for ways to promote broadband adoption – whether at the community level or reform of the Lifeline program, they should look to lessons learned over the past several years.

Methodological Appendix: Isolating the impact of training

The consistent finding that those who have had training are more active Internet users than those without seems to point unavoidably to the proposition that training is the driving force behind the differences. It is possible, though, that the differences are not due to the training, but rather the kinds of people who decide to seek out training on how to use the Internet or computers. This potential selection bias – whereby people who have some aptitude with computers or interest in job search seek out training – means that the training itself may make little difference. These motivated or competent people would have applied for jobs or reported high interest in pursuing creative activities online anyway. It is because of attributes they already possess, not due to training.

Put differently, even if those who have had training on computers are more likely to use the Internet for certain applications, *it is possible* that the training has nothing to do with the difference. Other factors – the fact that those who seek training are highly motivated or the mere passage of time – may make the difference, not training.

Multivariate statistical techniques can help untangle the training effect. These techniques allow us to hold a range of other factors constant and then focus *only* on a variable in question to see what difference that variable makes. For instance, those who have had training are much more likely to have used the Internet to look for a job – by a 55% to 38% margin. Some, or even most, of that 17 point difference may be due to online job seekers having, to begin with, higher levels of comfort with computers and the Internet, higher levels of education, age, income, and other factors.

Some of the other factors are worthy of discussion. They include whether the respondent has a smartphone. That is likely to significantly increase the incidence of people using the Internet for specific purposes and indeed it does. Past Internet experience may also influence levels of online activity. The January survey asked whether IE users had, in the past, home broadband service and half had. Past home broadband does contribute to higher levels of Internet use in this survey, but only modestly. But neither having a smartphone or past home broadband service does away with the significance that online training has on behavior. The impact of training on Internet behavior is larger for those who have *not* had broadband at home in the past – but it is also significant for those who have had service.

To assess the impacts of formal training on computers or the Internet on online behavioral and attitudinal patterns, a logistical regression model was specified that explores which factors

influence the probability of a respondent doing specific online activity. The discussion to follow uses the results of the logistical regression analysis and examines the likelihood that a respondent searched for a job online and applied for a job online. The analysis also examined whether training had any impact on respondents' levels of comfort with computers. Recall that, from January to September, the share of IE respondents who said they were *very comfortable* with computers rose from 47% to 59%.

<u>Looking for a job</u>: Having formal training on computers or the Internet is a significant contributor to the likelihood of using the Internet for job search. This holds true even controlling for respondents' baseline level of computer skills in January (that is, people's levels of comfort with computers in the early days of having IE service), changes in levels of Internet use from January to September, age, income, and education. It is true that those with high levels of comfort with computers in January are more likely to use the Internet for job search – but having had training is an equally (and independent) factor that contribute to the incidence of job search. Older and Hispanics respondents are significantly less likely to use the Internet for job search, as are the least educated respondents (those with a high school education or less). Those who attend college or graduated from it were significantly more likely to use the Internet for job search.

<u>Applying for a job</u>: The results for applying for a job are much the same as with job search. Those who have had training on the Internet or computers are significantly more likely to use the Internet to apply for a job than those who had no training. The effect is significant when controlling for a number of other variables, such as age, education, income, and race. In this specification, *change* in levels of computer comfort from January to September turned out to be a significant predictor of applying for a job online. That is, respondents whose reported levels of comfort with computers *increased* in the eight month timeframe were also were more likely to use the Internet to apply for a job. Having had training was a significant and independent contributor to higher levels of using the Internet to apply for a job.

The finding that *both* variables are significant is important because it shows the power of formal training on people's behavior. One could discount the contribution of training on the rationale that people become more comfortable with computers over time, which in turn draws them more deeply to online use; training might be nice, but it doesn't matter. Yet these findings do not support this. While the findings show that people's comfort with computers may be a function of time, they also show that training reinforces that significantly and with an effect that is independent from whatever changes may come about due to the passage of time.

Comfort with computers: The preceding discussion raises the question of whether having formal training on the Internet or computers contributes to changing people's perception of their comfort with computers. Here the longitudinal data is particularly useful, in that it one can develop a model that looks at change in reported comfort with computers from January to September and see if training had anything to do with the change over time. Simply comparing levels of comfort with computers at a specific time to reported incidence of training has limits; other factors (some knowable from the data and some omitted) may explain any relationships between the two. However, linking change over time to training strengthens inferences about statistical relationships, especially since the survey includes data on whether, in January, respondents had received any computer or Internet training in the past.

The results point to the importance of training with computers and the Internet as a contributor to increases in respondents' reported comfort with computers. IE customers were *significantly* more likely to report an *increase* in levels of comfort with computers from January to September if they had formal training (as reported in the September survey). This holds true controlling for age, income, race, and education – as well as whether they had ever had training on the computer or Internet before having IE service (as reported in the January survey).

The finding shows that respondents' growth in comfort with computer is not just a matter of experience accumulated through time. Having received formal training at a library, community center, the Internet Essentials, or another program *since* starting IE service explains a significant portion of respondents' increase in comfort with computers. The effect is independent of training they might have had before IE and other demographic factors such as income or education.

Although the link between training and the changes in phenomena is clear, it is hard to make an airtight claim that training is the causal factor behind the differences. The design does not include a control group of a similar set of low-income Americans with school age children for comparison. It is also impossible to include all possible variables that might influence change in behavior over time. All this said, the statistically significant findings that relate change in behavior to training – while controlling for other relevant factors and tracking individuals over time – strongly indicates that the connection between the two is far from a coincidence or statistical fluke.