Closing the Gap:
Bringing Women and Technology Together through Education

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Hannah Nemer
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Abstract

With technology's initial expansion came significant disparities in access. Though the digital divide remains on an international scale, the challenge of technology now spans far beyond access. While many call for the more unified global expansion of technological capabilities, without technology and media literacy education, such technology cannot fully serve its purpose. In recent years, the United States and the United Nations have made clear the need for more comprehensive technological expansion, both in terms of how it is employed and understood. Given the expansive nature of the digital divide, to best understand its presence on a more local scale, this paper will focus on its implications and potential solutions to the divide in the United States with emphasis on rural North Carolina, using Girls Inc. as a best-practice model. By first addressing the scope and significance of the global digital divide, and then focusing on its domestic relevance, this paper points to the Girls Inc. model of technology and media literacy programs as an effective means of curbing inequalities in technology use.

Critical Terms

Digital Divide: The Digital Divide refers to the disparity between those who have and those who do not have sufficient access to technology; this is often understood to include disparities in the speed and quality of Internet access.[1]

Participation Gap: The Participation Gap reflects discrepancies that exist after achieving access, referring to gaps in "skills and competencies."[2]

STEM: STEM is an acronym for Science, Technology, Engineering, and Mathematics; the Economics and Statistics Administration defines STEM jobs as those that include, "professional and technical support occupations in the fields of computer science and mathematics, engineering, and life and physical sciences."[3]

[1] Foley, Frances Caprio. "Americans Digitally and Politically Divided: Can Limited Skills and Unequal Access to Information and Communications Technology Impact Citizen Participation in the Democratic Process?" Quinnipiac University. 26 June 2007. PDF, pp 4.

[2] Jenkins, Henry. "The Participation Gap" *NEAtoday*. March 2008. <http://www.nea.org/home/15468.htm>.

[3] Langdon, David et al. "STEM: Good Jobs Now and for the Future." 14 July 2011. U.S. Department of Commerce: Economics and Statistics Administration. PDF, pp2. <http://www.esa.doc.gov/Reports/stem-good-jobs-now-and-future>.

An Issue of National and Global Scale

The United Nations now acknowledges access to Internet as a global right, reminding "all States of their positive obligation to promote or to facilitate the enjoyment of the right to freedom of expression and the means necessary to exercise this right, including the Internet."[4] In this bold statement, the report isolates political engagement as a critical effect of Internet access, which has transformed into "an indispensable tool for realizing a range of human rights, combating inequality, and accelerating development and human progress…"[5] As evidenced by its widespread application to the so-called "Arab Spring," Internet and new media may mobilize communities, uniting populations in the name of social justice.[6] Furthermore, such access to information strengthens the foundations of transparent governments and democratic societies.[7]

However, society may only reap such benefits when technologies are available. In this way, the global digital divide remains problematic – a significant barrier to the freedom of expression and the right to access information as defined by the United Nations. So globally significant is technology's spread as a means of innovation and expression that in 2005 the United Nations created the Digital Solidarity Fund in hopes of combating "the uneven distribution and use of new information and communication technologies."[8]

[4] "U.N. Report: Internet Access is a Human Right." 16 May 2011. PDF, pp 19. <http://documents.latimes.com/un-report-internet-rights/>.
[5] "U.N. Report: Internet Access is a Human Right." 16 May 2011. PDF, pp 22. <http://documents.latimes.com/un-report-internet-rights/>.
[6] Olivarez-Giles, Nathan. "United Nations report: Internet access is a human right." 3 June 2011. <http://latimesblogs.latimes.com/technology/2011/06/united-nations-report-internet-access-is-a-human-right.html>.
[7] "U.N. Report: Internet Access is a Human Right." 16 May 2011. PDF.<http://documents.latimes.com/un-report-internet-rights/>.
[8] Ginsburg, Faybe D. "Rethinking Documentary in the Digital Age." Cinema Journal, 46, Number 1, Fall 2006, pp. 128.

Once communities bridge the digital divide, the participation gap remains problematic, particularly for women and girls. At the fifty-fifth session of the United Nations Commission on the Status of Women in 2011, Barbara Bailey, an expert serving on the Committee on the Elimination of Discrimination against Women (CEDAW), contextualized discussions of gender equity in education through a technological lens, suggesting:

> "Women's rights *within* education are yet to be widely realised. Although globally, women are increasingly seizing opportunities for higher education, they continue to pursue stereotypical, feminised fields of study and are under-represented in the more critical science and technology areas and in the technical crafts which have serious implications for future life chances, career paths and employment and earning capacity."[9]

Thus, access to technology is of global concern, as is the gendered divide in the use and higher-level study of such innovations. Indeed, studies in the United States suggest that although women make up virtually half of the United States' workforce, they represent less than a quarter of jobs in the STEM field.[10] Without models of women in the field, girls may see STEM careers as more of an impossibility than a future. This divide manifests itself as early as eighth grade, when twice as many boys as girls demonstrate an

[9] Bailey, Barbara, "Access and participation of women and girls to education, training, science and technology, including for the promotion of women's equal access to full employment and decent work." 2001. PDF, pp 2.

[10] Beede, David et al. "Women in STEM: A Gender Gap to Innovation." U.S. Department of Commerce: Economics and Statistics Administration. August 2011. PDF, pp 1.

interest in STEM careers.[11] Thus, fostering girls' interests in and affinity for technology at an early age is critical.

Because studies show that women, more so than men, focus on the ways in which technology will be used, they offer a critical perspective to STEM careers. Women are more conscious of the needs of female consumers and the ways in which technology may support others.[12] Dr. Rebecca Blank, the Acting Secretary of Commerce, also points to the gendered gap in technology as an inhibitor to innovation. She noted, "closing the gender gap in STEM degrees will boost the number of Americans in STEM jobs, and that will enhance U.S. innovation and sharpen our global competitiveness"[13] In this way, it is critical that communities may eliminate the gender gap in STEM careers and education.

Thus, the challenge now facing rural girls is twofold – achieving greater technology access and developing strong technology and media literacy.

Access as a Barrier – A Regional Need

While largely mitigated through policy initiatives, rural technology access remains a challenge in regions of the United States. Particularly rural broadband[14] access, often called high-speed Internet, eludes rural communities. A recent Digital Nation report suggests that of the 68-plus% of U.S. households having high-speed broadband access,

[11] Marra Rose M. et al. "Collaboration as a means to building capacity: Results and Future Directions of the National Girls Collaborative Project." April 2009. PDF, pp 3.

[12] Milgram, Donna. "Gender Diversity in STEM. Why Bother?" *Recruiting Women Technoblog*. 15 November 2010. <http://www.iwitts.org/blog/?p=558>.

[13] "New Commerce Department Report Finds Greater Wage Parity, Premium for Women in STEM Jobs." Economics and Statistics Administration. 3 August 2011. <http://www.esa.doc.gov/news/2011/08/03/new-commerce-department-report-finds-greater-wage-parity-premium-women-stem-jobs>.

[14] Broadband (high-speed) Internet: Broadband is distinct from the alternative "dial-up" Internet, as it need not connect to the Internet via a phone line, and is resultantly characterized by faster access and operating speeds.

there remains a 10% discrepancy between rural and urban communities, suggesting that further work remains to eliminate the rural-urban digital divide, though the divide has been largely reduced.[15]

On a domestic level, Internet access serves to integrate individuals into larger social and political processes, connecting users to information, education, and services.[16] Furthermore, Pam Lewis, the senior Vice President of Entrepreneurial Development at a regional economic development partnership serving Western North Carolina, suggests, "Internet connectivity is as basic as water, sewage and infrastructure."[17] Her words echo that of the United Nations – access to Internet has become a right, without which the progress of rural communities becomes stagnant. With other areas of the state moving forward with technological integration into educational systems, rural students struggle to remain competitive. Similarly, large, data-intensive companies, ranging from hospitals to online businesses to libraries with online data systems, cannot achieve efficiency or their optimal effectiveness when there exists no cohesive broadband system.[18]

Literacy as a Critical Next Step

Throughout this paper, the term literacy will be used in two distinct ways – digital/technology literacy, which refers to the concrete skills required to utilize available

[15] U.S. Department of Commerce National Telecommunications and Information Administration, "Digital Nation: Expanding Internet Usage." February 2011. NTIA Research Preview. PDF, pp 2.
[16] Foley, Frances Caprio. "Americans Digitally and Politically Divided: Can Limited Skills and Unequal Access to Information and Communications Technology Impact Citizen Participation in the Democratic Process?" Quinnipiac University. 26 June 2007. PDF, pp 7.
[17] Shrestha, Bibeka. "Internet could be key to economic development in WNC." *Smoky Mountain News.* 15 September 2010. <http://www.smokymountainnews.com/news/item/1445>.
[18] Ibid.

technology, and media literacy, which refers to the analytic tools required to critically evaluate and communicate messages in various mediums.[19]

Technology Literacy

Technology literacy is a prerequisite to bridging the digital participation gap, enabling individuals to:

> (a) accommodate and cope with rapid and continuous technological change,
> (b) generate creative and innovative solutions for technological problems,
> (c) act through technological knowledge both effectively and efficiently, and
> (d) assess technology and its involvement with the human lifeworld judiciously.[20]

For women and girls to consider STEM careers, they must first have a comprehensive understanding of technology usage. In this way, it is no longer sufficient to provide communities with greater technology access, without the corresponding education. Similarly, technology literacy emphasizes critical thinking, encouraging users to use technology not as an end but as a means for greater innovation.

Media Literacy

To understand the significance of media literacy education from a gendered perspective, it is first critical to consider the inauthentic representations present in common media. Media has the enormous potential to shape a community's understanding of gender roles and social norms, oftentimes reinforcing stereotypes as women working

[19] Hobbs, Renee. :The seven great debates in the media literacy movement." Journal of Communication; Winter 1998; 48, PDF, pp 16.

[20] Gagel, Charles W. et al. "Literacy and Technology: Reflections and Insights for Technological Literacy." *Journal of Industrial Teacher Education.* Volume 34, Number 3. <http://scholar.lib.vt.edu/ejournals/JITE/v34n3/Gagel.html>.

outside of STEM or professional careers. In G-rated films from 2006-2009, not a single woman had a career in the medical sciences, a career as a business leader, or in law or politics. Similarly, 80.5% of all working characters were presented as male.[21] Such representations shape the possibilities that societies and young girls see for women and themselves.

Despite girls' potential for media creation, there are few models of women in the field of content creation. Only 7% of directors, 13% of writers, and 20% of producers are female, meaning, that males working behind the camera outnumber women nearly five-to-one.[22] Without a larger female role in media's creation, media continues to inauthentically represent women and girls.

Thus, the United Nations Alliance of Civilizations (UNAOC) suggests that education strategies require a pedagogical reform that recognizes the influence of media on youth culture, but also the potential for youth to shape the digital world.[23] To become not only users, but producers of media, youth must learn to understand themselves as content creators. Media literacy encourages such creative processes.

The Girls Incorporated Model

Girls Incorporated, a nonprofit seeking to empower young girls ages 5-18, has impacted girls on a national scale, with over 1,400 sites and reaching 150,000 girls annually.[24] While the program's origins may be traced to the 1860s, when the group

[21] "Research Informs and Empowers." *Geena Davis Institute on Gender in Media.* <http://www.seejane.org/research/>.
[22] Ibid.
[23] "Media & Information Literacy." United Nations Alliance of Civilizations. <http://www.unaoc.org/actions/online-platforms/mle/>.
[24] "Girls Inc.: USA and Candada." <http://www.girlsinc.org/find/find-a-girls-inc.html>.

existed to produce "homemakers of the future," the Girls Inc. model underwent several reconstructions, resulting in the 1998 adoption of what is now reflective of its current mission statement of "inspiring all girls to be strong, smart, and bold."[25]

Operation SMART

Operation SMART (Science, Math, and Relevant Technology) serves to combat the stereotypes that filter women and girls away from STEM careers. By creating an all-girl space for technology exploration, Girls Inc. encourages girls who might otherwise shy away from "non-traditional" careers to excel in STEM programs.[26]

To engage girls in STEM education, Operation SMART has several initiatives, each emphasizing the natural affinity girls have for technological innovation – setting traditional notions of femininity aside.[27] Targeting youth at a critical age, Operation SMART reframes the ways in which girls view science, math, and technology.

Operation SMART may manifest itself in a variety of forms. Girls Inc. provides affiliates with a series of questions to help determine whether or not an activity is "SMART." These questions remind program facilitators to break away from stereotypically "feminine" activities, and to instead encourage girls to discover the application of math and science in unexpected and exciting activities. Once programs meet the requirements of a SMART program, it embodies what Girls Inc. refers to as "3 E's and an F" – equity, exploration, equality and fun.

[25] Kropf, Marcia Brumit. "Inspiring Girls to be Strong" *Regional Review: Reaching the Top: Challenges and Opportunities for Women Leaders.* Volume 14, Number 3. 2005. PDF, pp. 12
[26] "Girls Inc. Operation SMART." <http://www.girlsinc.org/about/programs/operation-smart.html>.
[27] Ibid.

The combination of the 3 E's and an F appears to be a winning one. The significant impact of Operation SMART on girls' perceptions of STEM careers is measurable. Operation SMART participants in Greater Harrisburg, Pennsylvania were asked particular questions about their attitudes towards math, science, and learning prior to and after the completion of the Girls Inc. program. Here are the results of the before and after responses:[28]

Question	Percent who answered "Yes"	
I know what a scientist does	February: 45%	May: 99%
I am good in math	February: 90%	May: 100%
I am smart (intelligent)	February: 91%	May: 100%
I like to discover things (or invent things)	February: 54%	May: 97%
Not having science would be okay with me	February: 40%	May: 3%

Media Literacy

Just as Operation SMART encourages girls to better understand and innovate using technology, the Girls Inc. Media Literacy program empowers girls to analyze and create new media to help combat representations that seek to reinforce gendered stereotypes. Through a series of programs, Girls Inc. addresses three main ideas. First, Girls Inc. works with its youngest girls to encourage greater critical analysis of media and its influences, helping participants to gauge and to personally overcome media-based biases. Next, participants develop media-production skills, seeking inspiration from media made by women. The application of these new skill sets comes in the final training stages, when girls produce public service announcements and facilitate community

[28] "Operation SMART." Girls Incorporated. May 2001. PDF.

discussion surrounding the subject of their piece. In this stage girls also explore the business elements of media production and investigate media career options.

Girls Inc. on a Rural Scale

While the organization has a national reach, the impact of local affiliates is pronounced. Girls Inc. prides itself on a model that may be applied to both urban and rural communities. One of two North Carolina locations, Girls Incorporated of the Albemarle has been in operation the past 61 years, and will be the focus of the following section as it has responded to a relevant rural need, serving 100 girls in 2010.

Girls Incorporated of the Albemarle is located in rural Elizabeth City, with a 2010 population of 18,683.[29] With 22% of the Elizabeth City population below 18, Girls Incorporated of the Albemarle works primarily with girls, ages 5-15. 30% of the girls live in families earning $30,000 or less, with almost half from single-parent households, in most of which women run the household.[30]

The girls who do participate in Girls Inc. programs become exposed to opportunities available to rural women in their own community. The Girls Incorporated of the Albemarle achieves this through critical local connections. A coastal community, Elizabeth City has access to a Coast Guard Base, with whom Girls Inc. has partnered. This partnership, facilitated through Operation SMART, has given girls the opportunity to tour the education center to see how rescue swimmers are trained and to witness the application of math and science skills to an unexpected field, while delving into the

[29] "Municipality Profiles for Elizabeth City and Elizabeth City." Rural Data Bank. 20 October 2011. <http://www.ncruralcenter.org/databank/st_FieldList.php?Town=Elizabeth%20City&Town2=Elizabeth%20City>.

[30] "Girls Incorporated of the Albemarle." <http://www.girlsincofthealbemarle.com/index.html>.

scientific properties of water. Seeing both men and women working in a traditionally male dominated field has helped girls to explore nontraditional work opportunities relevant to their local community.

Beyond introducing girls to relevant and exciting careers, Operation SMART teaches girls science in a way that seems more accessible and applicable than the other science forums to which they are exposed. Cathy Terranova, the Girls Incorporated of the Albemarle Program Director, notes, "They have science in school, but this program allowed them to discover, in a small group setting, a real appreciation for the many different facets of science and possible careers in the many fields available."[31] Girls Inc. reinvents traditional educational programs, serving as a critical supplement to school-based programming.

The media literacy program also serves an important role in Elizabeth City. Living in a rural community, many girls primarily develop ideas through the images and stories presented in the media. Thus, empowering girls to critically evaluate the messages to which they are exposed helps combat negative media-reinforced stereotypes. Similarly, girls have the opportunity to appreciate their own persona through more reflective aspects of the program, again reinforcing the applicability of the Girls Inc. approach.

Conclusion

Increasing access to technology and media literacy education in rural communities is critical to encourage girls to continue promoting innovation. While a significant portion of Girls Inc.'s work takes place in urban communities, its model can and should continue to be applied to rural areas as well. By addressing specific

[31] Terranova, Cathy. E-mail interview. 27 Jan. 2012.

community needs and utilizing local resources, rural programs, such as the Girls Incorporated of the Albemarle, become highly effective tools for empowering girls. Critical to empowering girls is closing the participation gap through technology and media literacy programs – a task Girls Inc. has proven capable of handling.

This approach cannot only continue to expand throughout the United States, but would be successful in international application. By considering tools of innovation often not connected to women, global communities may further integrate women into previously nontraditional careers – a transition from which all will benefit.