Annotated Bibliography - Digital Divide (May 2023)

A. BIG PROBLEM: Digital Inequality (background)

A1. General Information/Background – Historical Basis for inequality.

- Robert W. Deutsch Foundation (August 2017); Digital Access and Equity in Baltimore City; https://www.rwdfoundation.org/news/2017/10/19/the-digital-access-and-equity-report-in-baltimore-city-2017; Accessed 11/18/2021.

  This report provides an excellent overview of the Digital Divide issue – pre covid. The emphasis is on digital equity in Baltimore City; the methodology is in-depth interviews with both national experts and City of Baltimore stakeholders. Thus, it provides names and points of view from different sectors in Baltimore: Mayor's office, public school officials, State senators, City Health department, Workforce Development, Employers, non-profits, and universities. It misses quite a few sectors though – ISP's, Hospital anchor institutions, HBCU's, Libraries (especially since Pratt has been so innovative over the last 2 decades).
  This was one of the first references I read regarding the DD and it clarified – before the ACS 2019 – that the issue was not a technical one but an economic one, "The statistics are far more grim for some 3 communities, as 59% of households with annual income below $20,000, 46% of African American households, 50% of Hispanic [sic] households, and 55% of individuals 65 and older lack internet access."

- Lawrence T. Brown, The Black butterfly: The harmful politics of race and space in America (2021), Johns Hopkins University Press, ISBN: 978-1421439877 and https://www.equitybaltimore.org/about/ accessed 2/26/2023.

  This book is primarily about racial and political inequality and how that came to be from slavery, through the civil war and culmination in Baltimore of a description of the 2015 Freddie Gray riots which the author characterizes as the, "third American white lash" (page 56) that began with President Obama's terms in office. There are a series of chapters about home buying while black – beginning in 1910 and how this was characterized by the white majority as an "invasion" stemming from the Great Migration begun in 1910 (p 86). The Federal Government's Home Owners Loan Corporation (HOLC) began drawing residential security maps (redlined maps) that systematically sidelined majority Black neighborhoods and made them ineligible for HOLC loans. In Baltimore, these were drawn in 1937 with the assistance of locals – real estate brokers, developers, city officials, and university faculty. The Housing Authority of Baltimore City systematically segregated city residents. Dr. Brown goes through the scope of forced displacement of neighborhoods that accompanied these racist policies and large infrastructure projects – "21,255 Black households between 1940-2010" (p 97). This resulted in the Black Butterfly – a geographic description of hypersegregation with the city spine as the majority white and wealthy, and the two wings to the east and west as disenfranchised. Dr. Brown takes exception to the term, "concentrated poverty" often used by academics because it puts the onus on the individual and does not interrogate who did the, "concentrating" (P 110). Further, the flip side of this is "concentrated wealth" and disproportionate structural advantage. This is just one of the arguments for the need for critical historical context that is the methodology for this book.

  Neighborhood economic destruction is explored through sub-prime loans, predatory lending and wealth extraction (p 131). Black homebuyers in Baltimore are still denied fair access to capital for mortgages and business building. The effects of redlining are still seen today. The Mayor Pugh child book scandal is put into context; she was a 17 year board member of the UMD Medical System and the entire system was used, by multiple board members to engage in no-bid contracts to enrich fellow board members - ouch (p135).
  Diversity (racial and gender) on decision making and governance boards is woeful. Baltimore's power dynamics are truly, "eds and meds" (p 141).

  Police brutality issues and homicides are put into context and connected to worse income mobility scores in red-lined neighborhoods in hyper segregated cities (p167).

  The book then transitions to how to make Black neighborhoods matter. Influencing factors are budgets; power (accountable leadership and democratic participation); policies, practices, and systems (p181). These factors

are applied to specific sectors – within the overall lens of racial equity include: education, community economic development, housing (and ending homelessness), public health, transit, and tax policy.
To heal the Black Butterfly, Dr. Brown has specific recommendations including a $3B racial equity social impact bond – as just the start. The chart on pa 254 delineates $42B in financial solutions for Black Butterfly neighborhoods.

For the Digital Divide work, this resource is the historical context for inequality in digital infrastructure in Baltimore. Prince George's County has a different history – but the outcomes are the same and likely stem from the same basic harms. I've made a map that demonstrates this overlap from Dr. Brown's online equity tool that accompanies the book:

The urban digital divide is deeply related to historical, structural harms. The PowerMap, an analytical equity tool created by Morgan State's Lawrence Brown, demonstrates how the effects of redlining - discriminatory mortgage practices dating from the 1930's - can still be seen today as a "Black Butterfly" across Baltimore - in equity indicators like affordable housing, educational readiness, and access to capital. Areas of high inequality are in historically Black neighborhoods to the east, west, and south of the city spine (Figure 1, red areas). Today's digital divide is concentrated in these same neighborhoods. Using the Census Bureau's American Community Survey data, Baltimore Neighborhood Indicators Alliance Digital Equity Map [Baltimore Digital Equity Coalition. (2021). Retrieved from https://digitalequitybaltimore.org/; accessed 2/26/2023] shows that some 40-54% of Baltimore households in Black Butterfly neighborhoods are without residential broadband.

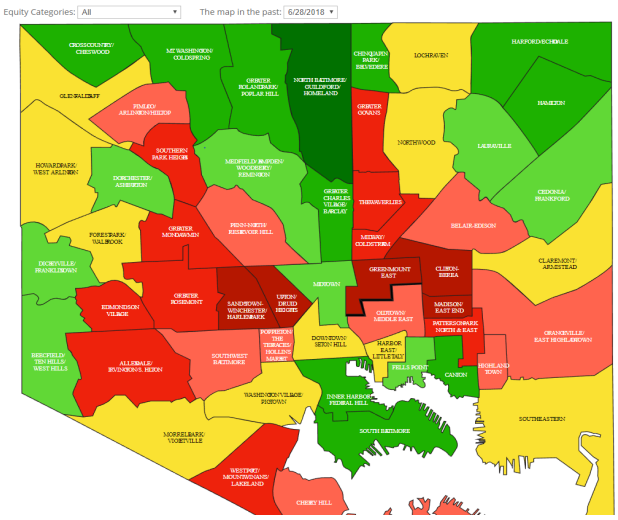

Figure 1, Brown's PowerMap – Baltimore City Equity Tool; Red areas = high inequality including access to affordable housing, education readiness, capital and broadband

- Horrigan, J.B. (2020). Baltimore's Digital Divide: Gaps in Internet Connectivity and the Impact on Low-Income City Residents. Abell Foundation Publication. https://files.eric.ed.gov/fulltext/ED610143.pdf; accessed 12/11/2022

This report provides the Covid-19 lens to Baltimore Broadband data and stipulates that gaps in the adoption of digital tools fall into three (non-exclusive) categories: (a) geography; (b) race; (c) income. It appears to be specifically targeting the differences between the urban broadband deficit and the rural deficit. At the time it was written, the Hogan Administration office was named the Office of Rural Broadband; it has since been renamed the Office of Statewide Broadband.
"A strong majority of disconnected Maryland residents live in the state's metro counties and Baltimore City. Some 342,000 Maryland homes in Maryland's metro counties and Baltimore City do not have broadband internet subscriptions at home and 193,000 do not have a desktop, laptop, or tablet computer. Those figures for rural areas are 178,000 and 95,000, respectively. This means that about two-thirds of all household in Maryland without internet access tools live in metro counties or Baltimore City." (page 2). The report also makes an argument that digital disconnectedness amounts to social exclusion. The report is written for the public but it has all the data (American Community Survey data) by county and metro county. It is also a good overview of how the ACS collects broadband information (page 9) – "The ACS data does not allow a clear way to distinguish between different reasons behind technology adoption choices. In addition to the role of population density noted above, the data strongly suggests a link between income and tech adoption."

This technology adoption question is a big one. The Pew Research Center has consistently found that there are multiple reasons for non-adoption such as affordability, lack of skills and inadequate networks. (https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/)

- Mack, E., Dutton, W., Rikard, R.V., and Yankelevich A. (2018). Mapping and Measuring the Information Society: A Social Science Perspective on the Opportunities, Problems and Prospects of Broadband Internet Data in the United States. The Information Society, 35:2, 57-68, DOI: 10.1080/01972243.2019.1574526; https://ssrn.com/abstract=3103457

  This paper is pre-covid but looks at the issue of faulty maps as contributing to the inadequate data regarding broadband internet connection information. The reason for this inadequacy is placed across numerous stakeholders: government, industry, academics. It's a good paper for background on the globally unequal distribution of internet infrastructure – evident across socio-economic strata. The purpose of the paper is to answer the question: "Moreover, private data sources can be prohibitively expensive for widespread use, even though they are not necessarily better alternatives to public data sources. This apparent choice between flawed alternatives can put information society researchers in a quandary: public data sources are often not optimal for investigating many pertinent questions, but it is unlikely that dramatic changes in the quality or availability of data from public or private sources will be made in the near future."

  There is a great overview of existing databases: FCC and NTIA and the form 477, and how it has evolved over time. The main "loophole" that creates data information deficits is that ISP's can report an entire census tract is covered by broadband if there is one connection within that census tract. This therefore cannot pick up which households are not connected for cost/expense reasons – even assuming that each residence within the tract does have last mile fiber – which has been shown to be untrue in places like Baltimore City.

- Pirolli, P., and Card, S. (1999). Information foraging. Psychological Review, 106(4), 643–675. https://doi.org/10.1037/0033-295X.106.4.643

  Pirelli and Card's, information foraging theory describes the "evolutionary-ecological explanation of food-foraging strategies" that come from Stephens & Krebs, 1986. This is a mathematical formal model. The theory is developed by (a) adaptation (rational) analysis of information foraging problems and (b) a detailed process model. Here, the theory assumes that people, when possible, will modify their strategies or the structure of the environment to maximize their rate of gaining valuable information. The analysis is developed along three tracks: information patch models, information scent models, and information diet models. Multiple examples are used: business intelligence newsletter (p 647) and a strategic management analysis of MBA students (p 649). These knowledge workers did things in their process or environment that enriched rates of returns including: filtering, skimming or restructuring the environment. The paper's conclusion is that: "The two examples illustrate that (a) there is an interleaved set of activities devoted to foraging, sense making, and knowledge product construction; (b) process and structure traces can be used to identify recurring activity loops; (c) schematic representations are used to judge the utility or relevance of information sources; and (d) information structures and flows in the environment can be analyzed to identify the costs and benefits that determine the rate of return on foraging activities." (p 650)

  I have relayed this to the digital divide by connecting it to the historical characterization and rationalization (by the govt and ISP's) that internet adoption is a reasoned and logical, active choice that people make; either people have an "interest" in getting online (when access is present), or they do not. This increasingly challenged binary assertion derives from a decade of survey responses about non-adoption, collected by multiple sources (NTIA, Pew Research Center), that have allowed for the description of only one primary reason for non-adoption, with the most popular answer as, "do not want/not interested; (no) relevance to my life" [15].

  If the information foraging theory held, in the case in the digital divide, individuals would modify the structure of their environment (get the internet) to gain access to valuable information online; if they do not, then they must not value the information. Covid-19 has really blown this argument out of the water – especially in terms of education and people's active desire to get access for themselves, their children, and their communities.

A2. Infrastructure Studies

- Sandvig, C. (2013). The Internet as Infrastructure, in The Oxford Handbook of Internet Studies. Dutton, W., (ed). Oxford University Press, 10.1093/oxfordhb/9780199589074.013.0005

This is a book chapter from the Oxford Handbook of Internet Studies. The position taken is that it can be very helpful to view the Internet as infrastructure to delve into how technical changes to this infrastructure can have social, societal, political, economic (financial) consequences. It goes through some history and introduces the case study of how, in 2010 how sites were taken down by the Libyan Telecom & Technology (LTT), for violating Sharia Law. There is some complicated history of how this came to be. This history is a lead into the discipline of infrastructure studies – the study of the co-evolution of the internet and society and in so doing, designates the internet as infrastructure. There are two complementary approaches:

- relationists (Bowker et al) – closely aligned with the science and technology studies movement.
- New materialists" (Sterne and Parks) = media studies, cultural history

Sandvig's review of the theory's history, details that the approach originated from the hybrid socio-technical areas of research that became *computer supported cooperative work* and was developed to help diagnose why large-scale computing projects often ran into unexpected problems and failures. It provides a foundational understanding of "…the *infrastructure* for the computing infrastructure" that is often invisible until something breaks. The theory allows for multiple perspectives to be held simultaneously as perspective flips, as in when the background of an image is one thing and the foreground another and one can flip back and forth, visually between them.

The most important part for my work is the concept of viewing infrastructure as relational as it encourage users to see technological infrastructure as contextual and not a set of things. It informs the digital divide phenomenon by contrasting the objectivist, physical infrastructure paradigm, with a relational definition for infrastructure. It also provides some background for describing how the digital divide has been so easy for govt and business to hide/deny/shrug off until covid-19 and the educational need brought to the forefront what enormous gaps in infrastructure there were – especially in ubiquitous, residential access.

- Bowker, G. C., Baker, K., Millerand, F., and Ribes, D. (2010). "Towards Information Infrastructure Studies: Ways of Knowing in a Networked Environment", in J. Hunsinger , I. Klastrup , and M. Allen (eds) International Handbook of Internet Research , New York: Springer, pp. 97–118

This paper goes beyond Infrastructure studies of Bowker et al's1990's era work to "information" infrastructure studies and the development of the internet's relationship with the nature and production of knowledge. He continues with describing the, "organizational, political, and finally ontological dimensions of its development_ (p97). He again starts with history, and reorients the reader to the "relationist view" of taking into account, "the social and organizational dimensions of infrastructure" (p99). The definition of information infrastructure begins in the cyberspace – and takes social scientists to help describe.

The classic definition is nicely summarized for Star & Ruhleders work:
"For this we return to Star & Ruhleder's now classic definition of infrastructure (Star & Ruhleder, 1996) originally composed for a paper on one of the early scientific collaboratories, the Worm Community System. We show in Fig. 1 how their definitions can be ordered along two axes, one explicitly non-spatial and the other spatial: the social/technical and the individual/group or local/global. As Star and Ruhleder put it, the "configuration of these dimensions forms "an infrastructure", which is without absolute boundary or a priori definition" (p. 113). We think of infrastructures and their construction as distributions along these axes rather than as tensions between polar opposites. Our argument is an ecological one; it calls for investigating infrastructure building a set of distributed activities – technical, social and institutional".(p101)

He re-states the primary question as not whether there is a "social" or "technical" problem but for any given problem, what solution is needed (this is often a combination of socio-technical). The example that accompanies this is email.

He then delves into the, "long now" of information infrastructure by detailing examples leading to the conclusion that the lesson is that organizations are also, "information processors (Stinchcombe, 1990). People, routines, forms, and classification systems are as integral to information handling as computers, ethernet cables, and web protocols." (p 103).

This early part of the paper is of the most interest. It provides history and context for qualitative and quantitative methodology/work of the digital divide problem.

A3. Feminism and Critical Cartography

- D'Ignazio, C., & Klein, L.F. (2016). Feminist Data Visualization. Workshop on Visualization for the Digital Humanities (VIS4DH), Baltimore. IEEE

  Intersectional feminism is an extremely useful theory to contextualize digital divide barriers because, as outlined by D'Ignazio and Klein's paper it prescribes the interrogation of power systems and opportunities to, "…help overturn systems of oppression that cannot be reduced to a single structure or source".

  The theory is tied to Science and Technology Studies (STS) – an interdisciplinary field that emerged in the 1960s and examines the social, cultural, and historical aspects and challenges the idea that science/tech is objective and neutral. Feminist STS looks to the perspectives of those who have been marginalized. But this does not mean that the world should not be known quantitatively – but more how certain perspectives are excluded from the knowledge regime.

  There are six principles – here related to the digital divide.

  1. Rethink Binaries – relates per infrastructure – either there or not there – no! It's relational.
  2. Embrace Pluralism – I know this about getting to multiple truths but I don't really understand this one – I'm going to have to come back to it and hopefully read the source material they quote: Bardzell and Dork.
  3. Examine Power and Aspire to Empowerment - $ is power and is getting more so by the deployment of internet infrastructure more so in places with concentrated power.
  4. Consider Context – situated knowledge = social, cultural, material (and more).
  5. Legitimize Embodiment and Affect – there is emotion in this issue; deep emotion. How will we be sensitive to capturing this emotion but not unfairly using it to elevate the research effort?
  6. Make Labor Visible – very true in terms of the digital divide mapping. The survey instrument (and the community co-development of the survey) will be part of making this labor visible. It is not only the research that is the visible labor, but all the organizations (libraries, non-profits, governments, education system, govt officials, etc.) who have worked to make the problem visible.

  Data feminism goes further by explicitly detailing the need to examine and challenge power, rethink binaries and hierarchies, and consider context. Stemming from the critical *structuralist* theories of Michel Foucault (per the D'Ignazio and Klein 2021 paper) – that detail how power distorts epistemology and how social hierarchy influences accepted knowledge – these feminist principles have been integrally applied to the research of geographic knowledge and cartography.

- Kurgan, L. (2013) and Close Up at a Distance: Mapping, Technology and Politics. Zone Books. ISBN 9781935408284
  Kurgan's work allows for the binary scale underpinning power systems to be visualized by introducing social and political questions onto map visualizations. This additional knowledge not only provides context and complexity but allows the *realness and reality,* with which we inherently imbue maps and geographic images, to be questioned. For example, Kurgan's work exposes that the implied objectivity of Google Earth images are, "a patchwork of archived aerial and satellite images of varying origins, sources, motivations, and resolutions", compiled from different private and government sources. They are not reliable transcriptions of our landscapes (even when useful). This understanding is what Kurgan calls *para-empiricism*, a recognition that data "…means nothing more or less than representations, delegates or emissaries of reality."

  This book is a series of pictures and punctuated stories. The chapter that most align with the Digital Divide work is: Mapping Considered as a Problem of Theory and Practice. This chapter contrasts two famous photographs: the Apollo 8 mission historical Earthrise image (AS8-14-2383,) taken in 1968 that shows the earth

in shadow against the lunar landscape and the 1972 image taken by Apollo 17 astronauts – a circular image of a shadowless globe that is known as The Blue Marble. The Blue Marble is updated by NASA every few years. Each new update between the photo generations is put together not from one photographs but months worth of satellite images that NASA calls, "seamless, photo-like mosaic of every square kilometer of our planet.". These, then are not photos taken by one person traveling in space with a camera. They are composites of massive quantities of remotely sensed data collected by satellite-borne sensors (p 11). This book is what Kurgan calls, "the intersection between the true and the virtual". She conducts this research through practice – by generating maps, images, installations and art projects.

> *That research has not simply been aimed at developing a theoretical framework for better understanding these new sorts of spatial representations but has taken the form of a series of projects utilizing the technologies that have produced these images in order to investigate them.*

I am interested in doing something similar with the digital divide data – I just have not figured out what that will be yet – but it is a guiding principle for when I think about the data and the mapping tools I use – these technologies also need to be investigated – how do they shape the conclusions? How do they limit the inclusion of information (typically unstructured)? How do we convey the emotion that the community will entrust us with (if they provide us with survey data that is imbued with their lived experience? I am also embedded in this technology as the researcher; how do I check my perspective – because I know I cannot eliminate it.

B. SMALLER PROBLEMS

This section is designated into 3 sections that outline the major research frameworks that tie back to the bigger question of the digital divide. Different research areas are looking at this in different ways – from the health and epidemiological lens, to access to opportunity lenses (both educationally framed and library-focused) and finally equitable participatory design. This is both a lens and a methodology.

B1. Social Determinants of Health

- Fridsma, D., American Medical Informatics Association (AMIA), "AMIA Responds to FCC Notice on Broadband-Enabled Health Technology" May 24, 2017 https://brand.amia.org/m/3a04808bf2cf6591/original/AMIA-Responds-to-FCC-Notice-on-Broadband-Enabled-Health-Technology.pdf; accessed 2/26/2023

  This letter was written to Trump Administration FCC Commissioner, Ajit Pai, JD as public input to FCC current approach to accelerating adoption and accessibility of broadband-enabled health care solutions and advanced technologies per Connect2Health track. AMIA strongly agrees with the FCC's assertion that "health care is being transformed by the availability and accessibility of broadband-enabled services and technologies and the development of life-saving wireless medical devices". While they recognize that FCC has a, "Digital Empowerment Agenda" they, note however that per past historical practice (not spelled out that way in the letter – but it could be reasonably inferred that that is their starting premise), "that should private-sector actors fail to sufficiently address broadband access and digital opportunity for disadvantaged populations, FCC and other federal, state, and local partners must be willing to take a leadership role. This role may include direct funding or subsidies for access, and preemption of state and local laws pursuant to section 253 of the Communications Act".

  A specific point of policy is that for M-Health apps, messaging features should be without data charges. They state multiple times that there is, "evidence suggesting that broadband access is a social determinant of health, government must be willing to provide protections for the public good". There is a specific push for the inclusion of chronic care diseases and conditions: heart disease, stroke, cancer, type 2 diabetes, obesity, and arthritis—as the leading cause of death and disability in the United States. They suggest that the FCC should align programs that can bolster efforts to better garget those with chronic conditions and ensure these populations have access to affordable broadband and M-Health technologies. This is a non-direct manner of requesting additional assistance for marginalized communities as their rates of chronic illnesses exceeds that of the general population.

The letter further goes over the need for enhancements to mapping broadband availability in the US. They recommend overlapping broadband availability data with epidemiological data. "This (mapping) tool could be developed further to use data collected by the Centers for Medicare & Medicaid Services (CMS), the Office of the National Coordinator for Health IT (ONC), and other agencies. For example, by combining CMS data with broadband availability data, officials could identify overlaps of referral patterns – based on CMS claims data – to identify obvious gaps among health information exchange partners and their patients. Additionally, CMS data on accountable care organizations, and other pilots conducted by the CMS Innovation Center, might elucidate informative trends and information."

Digital technology access has been characterized by the American Medical Informatics Association (AMIA) as a *social determinant of health* —the conditions in which people are born, grow, live, work and age - since 2017. Targeted investments in digital access, equity, and literacy that connect vulnerable populations to 21st century mHealth and Telehealth broadband-enabled solutions are likely to have significant, positive, long-term, individual wellbeing and public health impacts. This letter is a really powerful example of the potential stakeholders who can influence the availability of broadband and the underpinning of maps as a basis for providing needed assistance and specifically health care to marginalized communities.

This argument can also be used to bolster access to public housing – especially for elderly and disabled residents – where the use of 911 and ambulance services can be extremely high (need to get an academic reference for this) – my information on this came from a confidential Johns Hopkins Report in 2018 on a potential clinic they were going to put into a HUD-RAD Conversion property. This was being used as part of the economic argument for the clinic – but it is also an economic argument for Broadband. The city pays for both – and broadband would be much cheaper than daily ambulance calls to the housing complex).

- Marmot, M., Friel, S., Bell, R., Houweling, T., Taylor, S.,; Commission on Social Determinants of Health, "Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health," The Lancet 372, no. 9650 (Nov. 8, 2008):1661–1669.

This publication provides a global review (at the time – 2008) on the theory of the Social Determinants of Health. The premise is based on health inequality: "The poorest people have high levels of illness and premature mortality—but poor health is not confined to those who are worst off. At all levels of income, health and illness follow a social gradient: the lower the socioeconomic position, the worse the health. If systematic differences in health for different groups of people are avoidable by reasonable action, their existence is, quite simply, unfair." They state that health and health equity are a fundamental result of social and economic policies. The overarching recommendations are:

  - Improve daily living conditions (especially of girls and women); especially early childhood nutrition.
  - Tackle the inequitable distribution of power, money, and resources (fair employment and decent work)
  - Measure and understand the problem and assess the results of action

I like this paper as a foundation for the social determinants of health. While much more work has been done in this area, I felt the need to better understand that this had first come out of the "global" health community – the UN and then is being applied in the US to longstanding inequalities.

- Office of Disease Prevention and Health Promotion, Department of Health & Human Services, "Social Determinants of Health"; Healthy People 2030; https://health.gov/healthypeople/priority-areas/social-determinants-health; accessed 2/26/2023

This is the DHHS and OASH webpage on the social determinants of health. Additions from the 2008 UN report include language and literacy skills and talks about the "upstream" factors – usually unrelated to health care delivery that can improve health and reduce health disparities. Broadband is interesting because it is both an upstream and a downstream factor. Much of this downstream effect is very new! Tele-medicine has been around for decades but only widely deployed since covid. The site has nice resource pages on: Economic Stability; Education Access and Quality; Health Care Access and Quality; Neighborhood and Built Environment;

Social and Community Context. These headings are followed by literature summaries on specific topics like workforce development.

B2. Access to Opportunity: Educational and Library System information

- Stelitano, L., Doan, S., Woo, A., Diliberti, M.K., Kaufman, J., and Henry, D. (2020). The Digital Divide and COVID-19: Teachers' Perceptions of Inequities in Students' Internet Access and Participation in Remote Learning. Santa Monica, CA: RAND Corporation publication. https://www.rand.org/pubs/research_reports/RRA134-3.html. Accessed 11/18/2021

  This report came out in 2020 and looks at how what teachers learned about home internet access per remote learning that accompanied Covid-19. Data are drawn from the American Instructional Resources Survey (conducted in May and June 2020) where 6000 teachers participated. The Data report investigates the relationship between teachers' reports of their students' internet access and teachers' interaction with students and families during pandemic-related school closures. The survey asks both closed and open-ended questions.
  - One question was: "In your opinion, what is the biggest challenge for teaching and learning related to COVID-19?" Many answers were given – deeply intertwined:
    - 43% of teachers reported concerns with communication with students and student participation
    - 31% reported concerns with providing instruction within the context of remote learning, including concerns about how to teach new content, and engaging in asynchronous instruction
    - 27% reported challenges relating to students' families, such as teachers' ability to reach and support families,
    - 20% of teachers reported challenges related to technology, including students' lack of access to the internet, lack of access to devices, and students' or families' challenges with using technology.
  - Teachers working in high poverty school were significantly more likely to report that their students lacked access to the internet and devices at home.
  - Gaps in Internet Access Among Students in Higher Poverty Versus Lower-Poverty Schools—as Reported by Their Teachers—Varied Greatly by State. This survey has representation across 12 states (Maryland is not one of them); there is a rural element to these results. For example in Tennessee, high-income schools had only 50% of teachers reporting that their students had ubiquitous internet and device access. The high-poverty schools were at zero % and the state average was at 33%. But even in NY the range was between 85-50% - still a large portion of students.

  The conclusion of the report is that remote instruction delivery is mediated by home internet access and device access. The policy recommendation was: Policymakers should aim to bring internet access and devices to every household for the coming school year.

  The results of this report are not stunning to us now, but in 2020, they provided hard numbers to digital access when the FCC data maps were still horribly inaccurate – for both rural and urban communities. And it put the economic strain of not having home internet access as a burden on children and students and not on the choice or non-adoption-choice of adults. It was one of the first reports I saw that provided the educational-context rationale for internet access as a utility. I would love to see this kind of data for Maryland! I would love to see how many school districts gifted the "loaned" hardware equipment to students/families. I would love to see how many families signed up for the Affordable Connectivity Program.

- Daniel Greene:, 2021, The Promise of Access: Technology, Inequality, and the Political Economy of Hope, MIT Press; LCCN 2020025454
  This book interrogates a set of assumptions regarding how to fix the digital divide by digging into the theory of the access doctrine and how this was used by technologists, governments, and the business community to state that the answer to poverty, disenfranchisement, and inequality was in teaching people how to code. This digital access and skill building would bootstrap people out of poverty and digital access (the internet) is a mediator to that shift. Daniel Greene disagrees with this premise. The issue of the digital divide is mediated by poverty – not by a lack of technical skills.

  Chapter one is a great review of the history of the divide – and goes through topics including technology policy as poverty policy; DD as a national economic crisis'; a measurement program – per human capital theory; DD

as market solutions. The historical debate frames economic mobility as a product of individual skills (p10). Thus
"Learn to Code" and STEM are solutions that the individual can use. They do not, however, address structural poverty issues. Instead they turn the problem of poverty into one of technology. Greenes premis is that the digital divide is working exactly as designed – as a mechanism of structural disenfranchisement. Inequality is a feature of a capitalist economy (p 14). It is the culturual glue holding a deeploy unequal information economy together.

The author reviews three case studies of organizations that implemented this theory and looked at the effect on individuals. Methodology is ethnographic.

- MLK Library – central branch of the DCPL and the renovation underway to make it more about digital technology, startup & professionalizing culture, - the Dream lab.
  - The book goes through who the library serves, how they use the current resources, what happened to them during the renovation, and how many people who relied on the library were displaced during the renovation process and then how the professionalism worked against these community members who were using the space more as a community space including child care, food, bureaucratic assistance, adult education and free wi-fi (sometimes for things that are fun! Music, movies, social media etc.) – P186
- WEB Du Boise Public Charter High School Classroom
  - their ethos was to, "boost the human capital of urban, working class Black and Latinx youth through an entrepreneurial approach to education that linked classroom experimentation, digital literacy, STEM knowledge, and data-driven accountability" p117 The intent was to seek solutions to structural poverty and the achievement gap. The school wanted this mission to bleed into all areas of the students' community and social lives. Unaccounted for issues included net-infrastructure issues; conflict over smart phones; pornography use in the library, and teacher exhaustion from, "after-hours texts, emails, planning an extra-curricular work". P132.
- Startup culture in DC. The startup culture in DC is small but monied.

From this book I want to look up the reference that is cited for the topic of state legislators repeatedly passing laws forbidding localities from building low-cost municipal broadband operated as a utility. Koebler, 2015, the 21 laws states use to crush broadband competition, Motherboard, Jan 11, 2015.

I have multiple media pieces on what happened in Chattanooga Tenn. that did a city wide broadband deployment when the big ISP's refused and how after it was so successful, the ISP's sued them so they could not expand their catchment area.

I agree with much of what this book discusses – in terms of structural mechanisms, but I also don't quite know how to include individual accounts of, "if we can see it, we can be it". I still also have to wrestle with the geography of access. There is much evidence in the transportation equity research regarding neighborhood access – often transit access providing other economic and educational access. Many references to find here. Access to the internet, however, introduces an entire new challenge in the analysis of opportunity or neighborhood effects. Neighborhood effects, by definition, are effects that manifest within the spatial confines of a neighborhood. Access to opportunity is typically defined by access through travel. Can we discover the extent to which digital access to opportunity offers the potential to provide access without the physical relocation of families? Can ubiquitous, residential broadband access support residents' access to educational and employment related opportunities?

B3. Equitable and Inclusive participatory research

- Lung-Amam, W., Bierbaum, A., Parks, S., Knaap, G., Sunderman, G., & Stamm, L. (2021). Toward Engaged, Equitable, and Smart Communities: Lessons From West Baltimore, Housing Policy Debate. 31:1, 93-111, DOI: 10.1080/10511482.2019.1672082

The contours of the digital divide became clear to me while I supporting a 2017 project, entitled *How Can Investments in Smart Cities Technologies Improve the Lives of Low-Income, Inner-City Residents, NSF Award-1737495*. The team of technical and social scientists sought to understand how investments in 5G and smart cities technology

could improve the lives of West Baltimore residents. They created an asset-and-community-based approach that surfaced needs including: (1) stable, good-paying jobs; (2) safety without surveillance; and (3) ubiquitous residential broadband access. The framework for the paper is the extent to which (smart cities) technologies can increase access to opportunity, enhance social mobility, and mitigate the digital divide – with an increasingly – greater focus on social equity and justice. The case study utilized community engagement to surface needs – but the intent was driven by municipal desire to engage companies in Smart Cities contracts. This paper also gives a history of discrimination in Baltimore – with the nation's first residential segregation ordinance (p97). The methodology was both focus groups and paper surveys. Three main takeaways: (1) neighborhood current problems and priorities are based in uneven regional geographies of opportunity. (2) the digital divide is large and access to reliable, affordable technologies/hardware are needed; (3) future smart city solutions will only be effective if officials work more closely with communities, focus on critical community needs and priorities, and leverage residents' creative capacity and existing neighborhood assets (p.100). Participants noted that they wanted to be, "*…producers and facilitators of smart interventions as well as their users. They argued that new technology should provide residents with jobs and technology-related training".*

- Wong-Villacres, M., Gautam, A., Roldan, W., Pei, L., Dickinson, J., Ismail, A., DiSalvo, B., Kumar, N., Clegg, T., Erete, S. et al. (2020). From Needs to Strengths: Operationalizing an Assets-Based Design of Technology. In Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing. 527–535

This paper ties back to CSCW, Information Infrastructure, and Feminism theories to ask how to address the multiple inequities affecting historically marginalized groups. It asks the questions: What are assets? Whose assets are privileged? What ethical considerations surface when facilitating assets-based reflections? How can an assets-based design tackle systems-level problems? The researchers ground this work in the flip from need/lack to assets that users already have (e.g., existing knowledge, strengths, and capacities). This is deep, relational work in this workshop styled exploration the team brought together researchers from a number of different areas: education, health, community as well as international development to collectively reflect on how to tackle such issues. There were three themes: (1) unpacking the process of identifying assets; (2) understanding assets and issues of power; and (3) translating assets to design. The tie-in of this work back to the theory is the link back from the "small" problem to the big problem.

C. METHODOLOGIES

C1. Mapping Issues and Advocacy issues are tied. The survey and mapping work cannot go forward without the advocacy work and the participatory design theory and methods noted in section B.

- Shara Tibken (Feb 19, 2021); Millions of Americans can't get broadband because of a faulty FCC map. There's a fix. C-NET; https://www.cnet.com/features/millions-of-americans-cant-get-broadband-because-of-a-faulty-fcc-map-theres-a-fix/; Accessed 11/18/2021.

This media piece details issues with the FCC map and details the FCC's plan (under the Biden Administration) to fix the faulty data issues. It gives a good historical overview of the broadband mapping problem. However, experts say that even the new mapping parameters are still not granular enough. This really is the crux of my proposed research – which the pre-Biden era map was terribly wrong; the Biden era map is going to be better, but it will still miss many households and this is a problem, as the federal dollar distribution to fix the divide will rely on these maps. We may over-infrastructure some areas (again) and under-infrastructure others. However, I will be using this new FCC methodology to structure my map: "What the FCC now will do is require more precise data from broadband service providers in the form of "shapefiles." Instead of giving information at the census block level, the ISPs will give more detailed measurements through "polygons" that are overlaid on census blocks to depict the areas where broadband capable networks exist." However, they still do not go down to the address level. ISP's continually fight against this saying that it would create "large and unjustified burdens" on ISP's.

- Carl Vinson Institute of Government, University of Georgia, State of Georgia Broadband Map and Report (2020) https://cviog.uga.edu/information-technology/broadband/ index.html; accessed December 12, 2021

This report provides the basic framework for the Georgia State Broadband Plan - identify, evaluate and recommend options that can be implemented by governments and providers. It details their stakeholder framework, their mapping strategy and the creation of a Master Address File – that collates data from address data from local governments, property appraisers, e911 coordinators, and power companies. This is going to take time! The Master Address File will ultimately be integrated with broadband availability data from broadband service providers. Georgia passed into law a stipulation that allows the ISP information to be anonymized. What this report really tells us is one thing – the ISP's have all the data that would be needed to detail, at the address level, what residences are not served by broadband. However, they will not provide the information to policy makers – even the FCC.

- Robert W. Deutsche Foundation; Digital Equity Leadership Lab (DELL program) (2021) information and website; https://www.rwdfoundation.org/our-work; and https://www.rwdfoundation.org/dell#:~:text=The%20Digital%20Equity%20Leadership%20Lab%20(DELL)%20is%20a%20program%20for,for%20all%20of%20Baltimore's%20neighborhoods.&text=The%20Digital%20Equity%20Leadership%20Lab%20was%20established%20in%202021; Accessed on 1/8/2023.

  This reference is to an advocacy program developed by the Baltimore based Robert W. Deutsch Foundation — Digital Equity Leadership Lab (DELL program). The seven-week program is designed for city residents who want to increase their understanding of the internet and strengthen their ability to advocate for fast, affordable, and reliable broadband for all. This program is based on the historical global modeled called Promotores de Salud/Community Health Workers programs and their success in reaching vulnerable, low-income, and underserved community members. Here, community members are trained to deliver basic health care information and some services to other community members in need. They are the community trusted resource. Ideally, the digital equity project will inspire some local organizations who are already doing work in the community, to include digital equity advocacy as part of their framework.