

MOVING ACCESS TO EQUITY:

Digital Literacy in Lower-Access Communities

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INTRODUCTION

In an increasingly digital and global economy, access to the internet and digital resources and tools is crucial to ensuring what can be considered a fundamental right to information, essential services, and opportunities for betterment. The digital divide prevents a significant portion of the world from assuming this right because a lack of access to stable, high-speed internet and reliable technological devices also means a lack of access to important information, resources, and services. This divide also entails the gap between those with digital skills and those individuals who lack digital literacy and agency in the digital world and therefore are unable to participate in or benefit from interactions with technology. As more resources and services move online and technology becomes more pervasive and complex, the divide grows.

This paper discusses the digital divide and challenges faced by lower-access communities, especially in low-income and African countries, and the importance of digital literacy to equity. The American Library Association Digital Literacy Taskforce defined digital literacy as “the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.”¹ In order to increase equity, digital literacy must extend beyond access to include education on using computers, assessing information, producing digital content, and navigating websites and digital resources in meaningful interactions that enable opportunities to benefit equally from technology. The paper also recounts the author’s experience teaching a digital literacy curriculum at a secondary school in Machakos, Kenya, and reflects on next steps for implementing the program, now informed by lessons gained from the pilot experience, information gathered from other initiatives to increase digital skills and literacy, and a greater understanding of digital inequity.

BARRIERS TO ACCESS

Infrastructure and Affordability

Perhaps the most obvious obstacles to digital access are a lack of stable broadband internet and a lack of a reliable, enabled device. This lack can be absolute, such as when there is an absence of infrastructure to support high-speed internet or when the internet subscription, data plan, or device to access it is unaffordable. Or this lack can be relative, such as when internet access is unstable or when the only affordable data or internet plans are inadequate for necessary use. While the former is more common in rural areas, the latter can be true regardless of the population density.

In most low-income and less developed areas in Africa, broadband mobile and internet access remains less available than in high-income and urban areas. Even when internet is available, it can be so slow or unreliable that it prevents the user from being able to accomplish what they need to do, such as streaming video for an online course, making little difference over having no internet at

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all. This lower availability and quality of internet affect usage. African regions have the lowest percentage of people using the internet in the world, with just forty percent versus sixty-six percent average for the world and even eighty-nine percent for Europe.² The difference is even more pronounced in rural areas. In 2022, only twenty-three percent of people in rural areas in Africa used the internet compared to sixty-four percent of African urban dwellers.³

The cost of access is not as straightforward as it may seem, especially as most of these costs are recurring. While smart phones often provide a more affordable option for an internet-connected device, the cost of data necessary for daily life may be well beyond what an individual in low-income countries can afford, especially for students or those who use their phone as part of their jobs, such as those who run their own small business or are self-employed. In African countries, data-only mobile broadband prices average five percent and fixed (home) broadband services average almost sixteen percent of gross national income per capita.⁴

Additionally complicating this barrier to access are issues of technology maintenance, reliability, and quality. Many low-income households deal with used, cheap, and outdated devices that are more disruptive to use as they need to be replaced more often and require ongoing maintenance or technical support that is beyond the capabilities of users with fewer digital skills.⁵

Many low-income countries also are plagued with issues of electricity outages and the theft of internet wiring. By making the internet only intermittently available, both outages and crime make the internet unreliable enough that it makes work too precarious for those businesses that rely on the internet. Extended internet shut-downs can even lead to losses of technology- and internet-based jobs, furthering economic hardships both for the individuals affected and their former employers.

Digital Literacy and Technical Skills

Infrastructure and device availability traditionally have been recognized as essential for access, but as technology has become more pervasive, digital literacy has become recognized as equally important for true access. Simply having access to a device connected to a working internet does not mean an individual will be able to navigate the websites, use the applications, or participate in whatever technology interaction is needed to find the resources or carry out the task that is needed in order for that individual to actually benefit from using technology.

Digital literacy is increasingly recognized as an integral factor in what can move someone from having access to having equity, as it facilitates meaningful connection. “Acquiring a higher level of digital skills develops individuals’ disposition of continued, productive use and increases the diversity of their online activities.”⁶ Whereas the ALA definition of digital literacy given above focuses on the abilities it entails, a definition that perhaps better makes the connection between digital literacy and equity is: “digital literacy...encompasses the digital skills and competences required to participate in an information society and knowledge economy.”⁷

IMPORTANCE OF DIGITAL EQUITY

Digital equity brings together factors of access and digital literacy. Gwen Solomon’s definition of digital equity in education can be applied to a wider context:

Digital equity...means ensuring that every student, regardless of socio-economic status, language, race, geography, physical restrictions, cultural background, gender, or other attribute historically associated with inequities, has equitable access to advanced technologies, communication and information resources, and the learning experiences they provide....Digital equity also means that all learners have opportunities to develop the means and capacity to be full participants in the digital age, including being designers and producers.⁸

Or more simply put, digital equity is “a state in which both the digital divide and the participation gap are bridged.”⁹

Important to digital equity is recognizing that with the advent of a digital economy, digital inclusion alone is not enough and may even contribute to a growth in inequality. Though most of the world’s population is included in digital systems of some kind, this does not mean participation in those systems is equitable or that

those systems are designed for equitable use. For example, those who have reading or writing illiteracies may have access to a system without being able to employ it, especially if the system has not employed inclusive user experience design. Or the individual may be able to use the system but, with a lack of digital, media, and information literacy, they may not be able to benefit from it.

Multiple factors and abilities influence what an individual can gain through their participation in a digital system, leading to digital inequities in use outcomes that can reinforce existing divides and inequities due to race, gender, income or other socio-economic factors.¹⁰

E-Health and E-Government

The rise of health and government information and services accessed through websites or applications continue to increase and create critical need for digital literacy. The advent of telehealth—potentially beneficial to rural populations challenged by distance, transportation, or availability issues—may not be beneficial in practice because less access to reliable high-speed internet in rural areas may prevent patients from being able to conduct a video telehealth consultation. In addition to connection issues, patients with lower digital literacy can have difficulty navigating the telehealth platforms. This can result in patients benefiting less from a telehealth appointment than from seeing a provider in person. In a 2013 study, both providers and patients reported a lack of technological skills as the top barrier to benefiting from telehealth consultations.¹¹

A lack of access or digital literacy also highly affects use of government websites (e-government), which provide important information but also act as portals to enroll in government benefits programs, pay taxes, apply for loans and other services that are vital to being a citizen. A 2013 study showed that households with less access, internet experience, and awareness of e-government services were consistently less likely to visit government websites despite these households also being more likely to qualify and have need for many of the e-government services available.¹²

In many low-income countries, e-government growth outpaces the growth of access or digital literacy, creating a critical gap. “In Kenya the introduction of the e-government platform demands that citizens can mainly access key government services online.”¹³ In other words, to fully access government services, individuals must adapt and be able to interact with the e-government platforms.

Opportunities for Betterment

Digital equity may also be considered a human right because it affects an individual’s opportunities to participate in systems important for their livelihoods and in opportunities to enhance their lives. “Digital skills have been transformed into a precondition for benefiting from any technology across all sectors of the economy, and a digitally literate workforce is needed to build digital economies. Digital literacy has also become a requirement for social inclusion and an indicator of professional competence, digital citizenship, and social skills.”¹⁴

Digital literacy can affect employment in a number of ways. Job seeking is now conducted almost entirely online and an inability to search the internet or fill out online applications will prevent many job seekers from finding employment. Also, many jobs now require digital skills. Not only will a lack of digital literacy make an individual a less desirable candidate for these positions, but it also will make it more difficult for that person to acquire the necessary skills without the aid of affordable training opportunities. A lack of digital skills may also prevent an employed individual from promotions, raises, and other career advances.¹⁵

A lack of access or digital skills can also hinder an individual’s financial opportunities, such as applying for business loans or microloans online. They may not be able to navigate online application sites or even be aware of loan opportunities if they are advertised only online. Banking and conducting financial transactions online continue to grow. The popular M-PESA mobile money transfer system, established in Kenya and available in seven African countries, “provides financial services to millions of people who have mobile phones, but do not have bank accounts, or only have limited access to banking services.” M-PESA users can send and receive money, purchase mobile data, pay bills, apply for loans, and more.¹⁶ A lack of access or digital skills may make it impossible for some to use this increasingly prevalent service.

And perhaps most apparent, digital literacy is crucial to education, not only because of the use of computers in the traditional classroom, but also because of the necessity of technology and digital skills to participate in online education, which is heightened especially after the onset of the COVID-19 pandemic. Schools who do not have full access to technology face barriers in preparing students adequately for higher education and evolving employment needs. A lack of access, devices, or digital skills can also present barriers to benefiting from valuable open access publications, open educational resources, and from MOOCs and other open online courses. These open and no-cost resources could be particularly useful for educators in low-income areas.

Security, Exploitation, and Misinformation

A lack of digital literacy can also mean that, though an individual has rudimentary skills to operate a computer or access the internet, they do not have the capacity to be safe online because they don't know enough about how computers, the internet, or applications work to be able to identify suspicious websites, malware, privacy breaches, or phishing and other scams.

Misinformation is a pervasive issue with the growth of online information sources, such as social media and alternative news websites. Individuals who possess basic computer skills but lack information literacy may not be capable of carrying out the evaluations necessary to ensure they are gathering information from a credible source. The ability to evaluate information and resources is increasingly crucial simply because of the sheer amount of misinformation and because of artificial intelligence advances that enable sophisticated “deep fake” videos and internet bots that produce believable social media posts. The COVID-19 pandemic also increased the issue of misinformation with a rise of questionable medical information online, which, without digital or information literacy, could have a directly negative influence on individuals' health.

Individuals who lack digital literacy may not be able to recognize when they are participating in an exploitive online interaction or digital system. Sexual traffickers often abuse through online avenues, taking advantage of vulnerable individuals who lack the ability to identify when they are being targeted by traffickers through social media or other online communication channels. Or the exploitation may be financial, such as with phishing scams or pyramid schemes. Even the “gig economy” can be exploitative when those who are carrying out the actual labor benefit less than those who have ownership over the digital system organizing the work. This has been termed “adverse digital incorporation, meaning inclusion in a digital system that enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group.”¹⁷

Effects of COVID-19 Pandemic

At the onset of the COVID-19 pandemic, the sudden shift to digital brought on by limiting in-person contact exposed to a greater degree than ever before these issues of the digital divide and digital inequity. Lower-income communities were particularly affected as many of their members relied on public internet providers, such as libraries, for access and so were completely cut off when these spaces had to close for public safety. Without the internet access, enabled devices, and help from staff to use the computers that was provided by these public spaces, many services and resources essential for everyday life and critical for health were completely unavailable, making the digital divide “no more a resource or skills issue but a human right.”¹⁸ Such lacks also led to job and educational losses for these individuals, furthering the divide.

DIGITAL LITERACY INITIATIVES

In the last decade of growth in broadband and mobile access, more attention has shifted to the need for digital equity. “As the access gap has been narrowing, recent studies have shifted attention to digital inequalities beyond access such as gaps in skills, usage, and outcomes.”¹⁹ While there are many initiatives to improve access and digital literacy, the lack of digital equity is a complex issue to solve because it often requires on-going, time- and resource-intensive initiatives that must take into account both the benefits and burdens that technology brings in order to be impactful and sustainable. UNESCO addressed this consideration in *Education for Sustainable De-*

velopment: A Roadmap: “ESD has to respond to the opportunities and challenges brought about by technological advances. Some ‘old’ problems will be resolved through technology, but new challenges and risks will arise. Critical thinking and sustainability values become ever more relevant, as the task of teaching ESD may become more challenging with the illusion that technologies can resolve the majority of sustainability problems.”²⁰

Government Initiatives

Many African governments recognize that access and digital literacy affect national productivity. Kenya Vision 2030, the country’s development plan, includes initiatives to improve telecommunications infrastructure and intensify use of science, technology, and innovation to improve productivity. Technology training also is emphasized in its education and training initiatives, including a flagship project to “establish a computer supply programme that will equip students with modern IT skills.”²¹ However, implementing these initiatives in all areas in Africa is difficult because of the lack of adequate “infrastructural capability” and commitment of resources to “create the innovative technology...that has become a necessary precursor and driver for high productivity and socio-economic growth.” The high initial investment “is seen as a big burden to the already poor continent, making the adoption rate of technology drastically low in comparison to the developed world.”²²

Despite these challenges, the backing of a government entity often is vital to the success of initiatives both because of financial and resource support and to aid in coordination between and buy-in from the regional organizations and individuals who will carry out the initiative.

Government entities’ involvement also can aid in preventing initiatives from becoming solely for commercial gain and even contributing to greater inequity. “For instance, when internet service providers (ISP) make possible wider access to the internet by many people, but without an oversight role for relevant government agencies of the activities of these service providers, the result can be greater control by the ISPs, rather than digital empowerment and inclusion.”²³ While partnering with commercial businesses may be beneficial to some initiatives, it does require some oversight.

Telecenters

Largely supported by government-owned or supported non-governmental organizations, community “telecenters” are a significant initiative to combat the digital divide in Africa. The goal of these local centers is to empower people living in disadvantaged communities and reduce poverty provide their surrounding communities. The centers provid internet, technology devices, digital skills training, and resources like business registration, lists of government grants, and job.²⁴

These centers provide important resources, but they have not benefited all members of the community equally. Rural women in Africa, in particular, are the most excluded from access and digital skills training, yet their needs are not taken into account when the centers are designed or implemented, upholding existing barriers and gender inequality is increased. Many women are less able to use the telecenters because of socio-economic backgrounds and other factors like education, environment, language, and social behavior. Other barriers to rural women benefiting from telecenters include culturally based negative perceptions of women using technology, fear of humiliation from a lack of digital skills, unawareness of the center’s services, and a lack of time or access to a device to practice skills. “ICTs [information and communication technologies] alone cannot empower women; it is crucial to address other issues, such as establishing public access ICTs, regulations, and incentives to facilitate the actual use of ICTs.”²⁵

Professional Development and Other Training

Some of the most important initiatives to increasing digital equity target educational institutions. These include initiatives in coordination with libraries and schools, such as the collaboration between Kenya National Library Service Thika (KNLS) and the Department of Adult and Continuing Education Kenya to provide computer skills training to Kenyan youth. These programs varied from instruction in basic computer skills to data analysis to on-

line book clubs. Results from the first cohorts to complete program sessions include an eighty-five percent graduation rate and reports of benefits such as employment, promotions, credit transfers, and more.²⁶ The National Library of Nigeria offered similar training programs, including coding, financial literacy, and website creation.²⁷

Education-based digital literacy initiatives also target higher education and professional development. This includes reviewing ICT curriculum at technical schools and universities to ensure that it is updated to meet the evolving needs of industry and economy and adequately prepares students for employment, especially for technology-related jobs. Other initiatives provide educators with professional development opportunities to gain digital skills. One such program offered in rural Kenya aimed to increase teachers' digital literacy and digital pedagogy skills to better integrate technology into teaching to have more impact on students. Teachers were challenged to move away from traditional teacher-centered teaching to learner-centered teaching, which was shown to be more effective in providing students with meaningful interactions with technology while also enhancing opportunities for creativity and collaboration. The program also centered on culturally relevant teaching, choosing activities such as digital storytelling that empower students to engage with technology while using their own language, creating content about their own communities, and sharing their own stories. Their projects were also carried out in groups, aligning with the Kenyan cultural value of collectivism over individualism.²⁸

DIGITAL LITERACY PROGRAM IN KENYA 2022

In June 13-17, 2022, the author carried out digital literacy training at Kitie Secondary School near Kathiani, in Machakos County, Kenya, in a rural region about forty miles southeast of Nairobi. The school was selected as the author had an existing connection to the principal of the school, Charles Kinyanjui, who was an enthusiastic advocate for conducting the digital literacy program at his school and remained a supporter throughout the training, along with several of the school's teachers.

At the time of the training, the mixed boarding school had around 200 students, all of which participated in at least one session of the digital literacy training. The sessions took place in the existing computer room, which housed eight working desktop computers, and the author supplied an additional six laptops. The number of students in each session ranged from 18-39, depending on the number of students in each grade level. Students ranged in age from eight years to twenty years old, and had varying degrees of computer or internet experience, from no experience at all to very proficient in at least some areas of computer use.

The planned curriculum included lessons on information literacy, such as evaluating websites, assessing credible sources, and effective keyword searching. It also included lessons on basic computer and application use, focusing on open-source applications and software, like LibreOffice, GIMP 2.0, and WordPress, as the author did not want to teach using software that would incur ongoing licensing costs for the school or its students. These lessons included basic tasks in LibreOffice Writer (word processing) and Calc (spreadsheet) applications and an introduction to image editing in GIMP 2.0.

Challenges

The two greatest challenges the author faced in carrying out the pilot program was the lack of internet access for the majority of the week and the wide range of digital skills of the students.

As aligned with the research above, the internet was not reliable during the program and was unavailable for four out of the five days of teaching. Because most of the curriculum had been designed with the assumption that internet would be available, this meant extending, on the spot, lessons using non-internet hosted applications, like Microsoft Word (added to the curriculum because the school's existing computers already had the Office suite loaded on them), LibreOffice, and GIMP. At the same time, it meant that the author was unable to conduct important pieces of the curriculum that focused on information literacy, such as website navigation and evaluation and searching for credible information online. Not only are these lessons critical to battling the problem of misinformation but also, they may be the most universally relevant to students as they enter adulthood, regardless of employment or interest in technology.

The vast range of digital skills also made it difficult for the author to adequately prepare lessons that would benefit all students in the classroom as some pieces would be beyond the understanding of part of the class while already well understood by another part of the class. In general, students required individual support. Often class time was dominated with the author almost constantly circulating the room answering questions and performing light technical support. This made classroom management more difficult and left less time for teaching or meaningful group work, possibly leaving low-digitally-literate students with even less confidence in using computers in the future.

Other challenges to the success of the program related to the differences in expectations from the Kenyan students and the author. While the author normally teaches university students who generally are independent learners, most of Kitié's students did not seem to thrive with individual learning and were reluctant to explore open-endedly tools and applications, rather seeming to prefer structured lessons with detailed step-by-step instructions.

The students, teachers, and administrators at the school also seemed to have differing expectations of what a digital literacy program would offer. Whereas the author prepared lessons that focused on learning skills most relevant to essential tasks, job readiness, and daily life, many students and teachers at the school expected more advanced digital skills training, such as learning how to code, despite a general lack of basic computer skills that would make coding difficult for these students to learn before completing the basics of digital skills training.

Successes

Despite the challenges listed above, the digital literacy program did enjoy some success, particularly with a shift to more group work. Because of the ratio of computers to students, each class had to place several students to each computer. This necessity turned into a positive as the students seemed to flourish working in groups, with the members who had more computer experience helping those with less. Often groups who completed a lesson's task would even help neighboring groups who had not yet accomplished it. Students in every class seemed to enjoy and benefit from peer-focused teaching.

The students who did have existing computer skills appeared comfortable with the lessons as they were presented, and they also expressed interest in learning more. The group of older students who had been taking an elective computer class offered at the school requested a lesson on creating a website. On the final day of the program, and the only day with working internet access, the author taught the computer class how to create a website using WordPress. This allowed the students to build sites without coding and quickly enough that each group was able to create a multi-page site by the end of the lesson. At the start of the lesson the students appeared unsure about what pages to build and what content to include, but as the lesson went on, the students became more confident in their choices. The school district's computer teacher also was able to join that day and provide concrete suggestions to the students of what to include. The students were so interested in building their sites that the lesson extended to over three hours and ended in multiple completed sites and students who seemed proud with what they had accomplished that day.

The author also recognizes that any successes of the program would not have been possible without the supportive school administration and teachers. Not only did they allow disruptions to the students' normal schedules, they also supported the program through their interest in and encouragement of their students' digital learning and projects.

Future Plans

The author recognizes the need for significant adaptations to the pilot program for more meaningful impact and to increase its sustainability. This will include incorporating best practices learned from extensive research on digital literacy initiatives and the problem of digital inequity. Understanding what has led to and increased digital inequity is vital background to designing and implementing a program to decrease it, as is taking into account where other initiatives have succeeded or faced challenges.

One best practice learned from research is the importance of involving in the program's development the community who will be hosting the digital literacy initiative. Before conducting another in-person digital literacy program in

Kenya, the author plans to meet with multiple school administrators and teachers, interviewing them to gather more information about what is needed for their particular communities and students and what initiatives they may already have carried out. This will be followed by designing digital literacy curriculum in collaboration, which will aid in making the curriculum with greater cultural relevance, incorporating more local and relevant content into the lessons to increase their effectiveness and perceived value to the students. This will include a more intentional focus on student-centered and peer-centered learning, such as the digital storytelling lesson outlined by Kerkhoff and Makubuya.

The author also will work with school administrators to ensure an adequate number of computers and internet access will be available during the program. Because of issues with access in rural areas and the burden of recurrent costs associated with internet access, this may need to be accomplished through alternative means, such as mobile hot spots. The author will seek partnerships to secure the purchase (or donation) of computers as well as to fund hot spots so as to not unduly burden the schools in low-income communities.

Another important future plan is to shift the focus of the program to training the teachers first and then the students. This will facilitate success in a number of ways. First, it enables the teachers to be supporters of the program by instilling in them the necessary digital skills to carry out the lessons' tasks themselves so that they may assist in answering students' questions during lessons. This will improve classroom management and decrease time taken away from teaching as multiple students can be assisted at the same time.

Having a larger number of trained teachers will also allow for multiple lessons to be taught at the same time and for the program's schedule to be adjusted for longer class times. Having multiple class sessions also makes possible smaller classes and dividing classes based on previous computer experience. Students may also participate in more lessons, which would facilitate a scaffolded teaching that might benefit students who have little prior computer knowledge. These students could build upon their skills daily, rather than all in one session. Additional teachers will also facilitate opportunities for individual or small group tutoring sessions, such as what was offered in the KNLS program, for those who need extra help.²⁹ The skills reinforcement and slower pace will help less-experienced students build their confidence.

In response to learning about the additional barriers to digital literacy faced by women, the author hopes to develop the program to include sessions that particularly target girls and women. Although all students, including all girls, at Kitie Secondary School were encouraged to participate in the pilot program, the author noted that there were far fewer females in the elective computer class than there were males. It is worth exploring whether holding some female-only classes will help these women and girls feel more comfortable participating in digital skills training. If possible, these class sessions could extend to include women from the community, which may facilitate empowerment opportunities, such as mentorships between local women leaders and entrepreneurs and the female students.

CONCLUSION

As the world moves deeper into a digital economy and more essential services and opportunities for betterment require online interaction, the digital divide grows, moving from an issue of access to an issue of critical inequity. In order for any initiative to have an impact on addressing access and digital literacy issues, it must consider the factors, such as socio-economic, that contribute to digital inequity as well as build and adapt from the lessons learned from earlier initiatives. This is apparent in the challenges that arose in the author's digital literacy pilot program. But above all, increasing digital equity requires collaboration, from program development to implementation to adaptation. Without collaboration between all stakeholders, digital literacy programs may not make any sustainable impact and may even further contribute to the digital divide. For this reason, the author's next steps will focus on meeting with school administrators and teachers to plan changes to the program to better the students' and communities' needs.

NOTES

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