BACKGROUND AND SIGNIFICANCE

The initiative to begin this thesis, evolves from the "digital divide," which is, "the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies(ICT), and to their use of the Internet for a wide variety of activities" (OECD, 2001: 5). In simpler terms, there is a gap between those who have material access to the internet and those who don't. Over the past two decades, research has emerged to explore various inequalities in the context of ICT for Development (ICT4D), which utilizes technology to aid less advantaged communities in developing countries. Key research areas include infrastructure, human-computer interaction, and social impacts. The World Librarians directly work with these countries, specifically Africa, to make education accessible by sending openly licensed materials. The focus of ICT4D has shifted from a technical to a more socially-oriented perspective, with ongoing debates about the meaning of "development" (Chipidza and Leidner).

In "A review of the ICT-Enabled Development Literature: Towards a Power Parity Theory of ICT4D," Chipidza and Leidner outline four perspectives on the meaning of development in the context of ICT4D. These perspectives are: increased freedom, expanded inclusion, improved well-being, and increased economic productivity. They argue that these perspectives often overlook power imbalances, leading to their "Power Parity Theory of ICT4D," which acknowledges the negative impacts of colonial relationships on development efforts. ICT4D project recipients, often seen as "subaltern," are perceived as socially inferior compared to Western donors, who are considered more mainstream and resource-rich. This power imbalance leads to the marginalization of the subaltern's voice and their dependency on donors. The Power Parity Theory of ICT4D argues that successful development requires the subaltern to achieve both resource independence and a meaningful voice from the start of the project. This dynamic reflects broader issues of knowledge production, where Northern knowledge is prioritized over Southern perspectives. The Global North also controls media narratives, reinforcing power structures that limit the representation of Southern voices. This creates an exploitative relationship that suppresses the "powerless" and perpetuates colonial discourses.

Through the rise of ICTs, phones especially, have improved global communication access for historically underserved populations. However, surveys show significant access gaps remain, with households in less-developed countries five times more likely to lack Internet access compared to those in developed areas. In Africa, women's Internet access is 25% lower than men's, and most young people aged 15 to 24 lack connectivity (ITU, 2017b). Despite various technical efforts to bridge these divides, such as satellite and balloon technologies from companies like SpaceX and Loon, challenges persist, including high costs and long timelines for implementation.

A potentially simpler solution involves using existing satellite technology to broadcast digital information to remote areas. However, this raises questions about who controls the content being transmitted, echoing the power dynamics discussed in postcolonial ICT4D contexts. As of September 2024, SpaceX has expanded their satellite internet constellation, Starlink, to over 100 countries, including Malawi and Kenya, Africa. "Starlink is the world's first and largest satellite constellation using a low Earth orbit to deliver broadband internet capable of supporting streaming, online gaming,

video calls and more. Leveraging advanced satellites and user hardware coupled with our deep experience with both spacecraft and on-orbit operations, Starlink delivers high-speed, low-latency internet to users all over the world." Starlink is able to provide this internet through, "a constellation of thousands of satellites that orbit the planet much closer to Earth, at about 550 km, and cover the entire globe"(Starlink).

An issue countries face with Starlink, that has led them to reject its presence in their country, is that in many cases, Starlink shuts off coverage to avoid legal or political battles. Even though coverage is global, if Starlink decided they don't want users to have access in a particular area, they can disable connections for dishes inside that area. This is an area I am exploring in my thesis; however, Starlink is not currently available in Bolivia, but once it is, it can only help eliminate costs for courier's to download data.

Access to education is essential for global education development. The World Librarian's project and now club, was directly inspired by the story of William Kamkwamba, a Malawian teenager who was thrown out of his school (because his parents can no longer afford it) and sneaks into a library to learn how to build a windmill to save his village from a famine. This story is a great example of what is possible when information is available and accessible. Co-founder of World Librarians and co-founder of the information technology ShiftIT based in Blantyre, Malawi, Carl Meyer, started this non-profit by asking the question: if he could manage to change his life just by reading a single book, what could other children do if they had access to technology and a lot more information?(Schweik).

Dr. Charles Shweik, professor of environmental conservation and public policy at the University of Massachusetts Amherst, co-founded World Librarians in 2014 along with Carl Meyer. Together they created a socio-technical system and workflow involving three major components: (1) "Requester" nodes – offline schools and libraries in Malawi; (2) The WL App for request node and request management; and (3) a "Searcher" node.

The WL process began with the ShiftIT team identifying potential offline schools or libraries in Malawi. This team, composed of ICT professionals familiar with the local culture and economy, acted as the intermediary organization. Their role included assessing community information needs, evaluating the potential use of the WL system, and supporting stakeholders to develop ICT capabilities, often receiving requests for services from rural and off-grid schools or libraries. After determining financing, ShiftIT set up solar-powered computer labs using recycled laptops and provided Keepod USB devices to ensure each user had a private computing environment without leaving a data footprint. At each requester location, ShiftIT installed an offline wifi server called a "Remote Area Community Hotspot for Education and Learning" (RACHEL). This system came operational with various Open Educational Resource content channels, including Khan Academy and Wikipedia, which World Possible converted to function offline. As a result, users in requester schools and libraries gained immediate access to a vast library of digital resources through wifi using Keepod-enabled laptop labs. Additionally, RACHEL hosted Kolibri, a learning management system that allowed teachers to set up courses accessible to students via these labs. ShiftIT also created a Kolibri channel for sharing new digital information, while providing a model of librarian services where users could request information not available in the OER2Go database. Essential to this

operation was the training of local teachers or technicians to provide technology support, with ShiftIT serving as the intermediary organization that offered backup assistance for any technical issues.

The World Librarians App (WL App) was a cloud-based management system developed in partnership with Salesforce. It served two main purposes: ShiftIT used it to manage Requester node deployments, while the WL Searcher Node team utilized it as a Request Case Management System. The WL App became essential for effective searcher management, allowing for the expansion of additional Searcher nodes as WL increased its reach to new Requester schools and libraries.

As of 2020, WL searcher node was located at the University of Massachusetts Amherst and was composed of students, overseen by two UMass employees (co-authors Schweik and Smith). This team operated within the UMass Amherst Libraries under the Scholarly Communication office, which provided guidance on matters related to Open Educational Resources (OER) and open access copyright licensing (such as Creative Commons). This expertise was crucial for World Librarians, as the licenses had to allow for redistribution in order to share digital resources with requesters. During this time the process went as follows: The WL Search Manager at UMass regularly checked the WL App for new requests from supported requester nodes. When a request was verified as legitimate, the WL Case Manager assigned it to a WL Searcher team member, who conducted an online search for the requested digital content. The team focused on various open access formats, particularly video, to accommodate requesters in Malawi who might struggle with English reading. Once relevant material was found, the WL Searcher uploaded it to a Google Drive folder and notified the WL Case Manager and an Open Access Librarian for quality assessment and copyright approval. Upon approval, the WL Case Manager transferred the content to the designated Kolibri channel for the requester node and arranged for payment to the Courier (typically a teacher or librarian) for their data usage through the World Remit system at UMass Amherst. This "digital postage" system was crucial for facilitating the downloading of data via the Couriers' personal cellular plans, enabling effective content sharing.

During 2020, the World Librarians project took a decline. As the world was being turned upside down from COVID, connecting to the schools and keeping the project alive became difficult. The World Librarians team went from supporting over 20 schools to now only 6. As the club tried to survive with the help of three amazing UMass seniors, they turned back to the office at UMass that they once used to partner with, the Scholarly Communications office in the W.E.B. Du Bois Library.

Charlie Schweik, still running the club, reached out to Theresa Dooley, the Open Education Librarian in the Scholarly Communications office and asked if she, along with any of her student workers, were interested in joining the World Librarians team. Due to the fact that part of their process is sending openly licensed materials and resources to the schools, the prospect of creating a partnership between the office and the club just made sense. Charlie also requested a place in the office to meet every Friday for club meetings. In 2022, when Charlie introduced this to Theresa, I was a sophomore working in the Scholarly Communications office. I was asked if I would like to join the club and immediately said yes after hearing that it was a socio-technical system that strives to solve the information access problem many remote offline schools and libraries have in lesser developed contexts. I didn't know exactly what this meant at the time, but it was the first time since I had been in college where I saw an opportunity to make real change.

Over the next year, I worked with and learned from the seniors and Charlie about the technical side of World Librarians as well as the ethical side. A major point that Charlie wanted us to think about everytime we got a search request was: this is a mechanism for the people in the global south to request information that they want, not what we, the global north, think they want. For example, we received a request on Bible content in that first year and we all paused when we saw the request wondering if we were allowed to provide religious content to a school. However, we had to step back, take our perspectives and knowledge out of the mix, and just be librarians. Our opinions on whether church and state mix or any hesistance that came from that request was not for us to figure out.

As the year went on and the seniors got closer to graduation, I was given the opportunity to become Search Manager and consequently, president of the club. With this great responsibility I was able to see more clearly and in depth the communication we had with our partner schools. I was now in charge of communicating with the couriers through WhatsApp, so I had the privilege of seeing the impact we were making.

In January of 2023, I went to Bolivia for two weeks with my mother and grandmother to visit our family, whom I had only met through phone calls and posts on Facebook. For the first couple of days, we stayed in the town where my grandmother grew up, Sucre, Bolivia. After spending a few days here, we went to Nucchu where my family had a house that had been passed down through generations. It was when I was in Nucchu that an idea sparked for my honors thesis. The town of Nucchu is very rural and when I arrived, I immediately lost cell reception. One day as my mom and I walked through the village, I saw the town's school. The only time I had seen the students was when my mom traveled to Bolivia the year before and she and my uncle taught one of their classes English. My uncle had joked about my mother teaching their class and the next day all of the students were at our family home, waiting for my mom's lesson. As I thought back to this I remembered their excitement to learn. I saw their desire for education and the desire to have access to these things. It was then that I decided I was going to implement the first school in South America into the World Librarians program. This honors thesis became more than just a project for me. It became an opportunity to connect with my community and also to provide them with the resources that are withheld from them due to a lack of funds, resources, and access.

OBJECTIVE

The proposed project aims to bridge the educational gap in Nucchu, Bolivia, by providing openly licensed educational resources, 15 chromebooks, and a "Remote Area Community Hotspot for Education and Learning" (RACHEL) to the U.E. German Busch School through the partnership of World Librarians. In January, I will bring the RACHEL and the chromebooks to the U.E. German Busch School and set them up as a new school partnership with the World Librarians team at the University of Massachusetts Amherst and train teachers on how to communicate and request information.

METHODOLOGY

Since joining the World Librarians team I have felt like I have truly been able to impact the lives of others while at UMass Amherst. Last year after being part of this club and seeing the impact we were making, my trip to Bolivia, where my family is from, became something else. After visiting the small, rural town of Nucchu where my grandfather is from, I saw a school that needed the resources that our other schools we were helping also lacked. Not only did I want to help them with their primary education, but if any of these students wanted to attend high school they would have to walk an hour to the closest school. So, another aspect of this partnership will allow for secondary education to be taught within their school. The proposed project aims to bridge the educational gap in Nucchu, Bolivia, by providing educational resources to the U.E. German Busch School through the partnership of World Librarians.

To begin my honor's thesis I gathered as much information as I could about the process of World Librarians(down to the technical level), the RACHEL, the educational curriculum in Bolivia, and the ethical ways in which to provide educational resources to the global South without presuming their needs from a global North perspective. As I learned about how to implement resources into their curriculum, I realized that communication with the school was necessary first. I, again, didn't want to impose my global north perspective. So, I have been in communication with one of the main teachers at the U.E. German Busch school, Profe(professor) Leyda Chirinos. I have learned that they have just under 50 students, the school teaches primary education, and that they severely lack educational resources and funds to access these resources. Profe Leyda Chirinos is still somewhat understanding the program, but her and her students are excited about the prospect of having not only technology but a librarian search team to find resources to implement into their school.

Through the RACHEL we have already created a library/database that is accessible to any user of the device. It includes all previous searches we have done organized in subjects such as science, math, english literature, and world history. Over the 2024-2025 winter, I will travel to Nucchu, Bolivia to deliver and help set up this equipment, as well as train the school's teachers on utilizing the RACHEL device and integrating it into their curriculum. The RACHEL contains materials equivalent to an entire library, focused specifically on educational resources relevant to primary and secondary schooling. By connecting this device to the laptops/tablets, all students at the U.E. German Busch School will have access to a wealth of information and tools to enable quality learning.

Although we have all of this pre-downloaded content to provide them, we lack education resources applicable to their history and their culture. That is why some of the key readings I have chosen to read relate to Bolivian curriculum and ways to not colonize Bolivian education through our wants and needs, but theirs. In my research I have also come across Starlink and its potential benefits for Bolivia. Although it will not be available in Bolivia until 2025, it was really interesting to read about the different countries that are finding ways to use Starlink in their rural areas, where it is not yet available. As of right now I will not be using Starlink for this thesis, but in the future when Bolivia has Starlink available, there is potential to eliminate World Remit costs made by UMass Amherst and use Starlink to download the information. Starlink also has the potential to help us create searcher teams on ground, who know the area, culture, and people. Teaching the searcher teams how to search for

openly licensed materials would help provide schools with information most relevant to their learning and give them the most time efficient responses. Throughout this semester I will also demonstrate and become skilled in how to set up the RACHEL to stimulate the experience I will have when I am there. Furthermore, hands-on training sessions will be conducted for teachers, empowering them to utilize the resources effectively within their teaching methodologies so that they can communicate with the World Librarians team on their own. Once the school is set up they will continue to work with the World Librarians club at the University of Massachusetts Amherst well after I have graduated. My team and I's hope is that by expanding our work with schools in different countries we can continue to grow the World Librarians program and potentially implement this organization into other universities across the country.

REFERENCES

Baber, Colby. "Using Starlink in Unsupported Countries." *Starlink Hardware*, 3 Oct. 2024, www.starlinkhardware.com/using-starlink-in-unsupported-countries/. Accessed 04 Nov. 2024.

Charles M. Schweik, Carl Meyer, Pempho Chinkondenji, Jeremy Smith, Promise Mchenga, World librarians: A socio-technical system providing library search services to offline schools and libraries in Malawi, World Development Perspectives, Volume 20, 2020,100234, ISSN 2452-2929, https://doi.org/10.1016/j.wdp.2020.100234. (https://www.sciencedirect.com/science/article/pii/S2452292920300540)

Decolonizing Bolivian Education – Ideology versus Reality, educationanddevelopment.wordpress.com/wp-content/uploads/2008/04/wp12.pdf. Accessed 04 Nov. 2024.

"Facts and Figures - ITU." *ICT Facts and Figures*, www.itu.int/en/ITU-D/Statistics/Documents/facts/ictfactsfigures2017.pdf. Accessed 04 Nov. 2024.

Li, Catharine. "UMass World Librarians Discuss Impact of Connecting Underserved Communities to Educational Resources." *Massachusetts Daily Collegian*, 26 Oct. 2023, dailycollegian.com/2023/10/umass-world-librarians-discuss-impact-of-connecting-underserved-communities-to-educational-resources/. Accessed 04 Nov. 2024.

Mendoza, Maxima, et al. "Education's Power to Change Lives in Bolivia." *Stories & News*, 24 Jan. 2023, blog.choicehumanitarian.org/educations-power-to-change-lives-in-bolivia. Accessed 04 Nov. 2024.

"OECD Annual Report 2001." *OECD iLibrary*, www.oecd-ilibrary.org/economics/oecd-annual-report-2001_annrep-2001-en. Accessed 04 Nov. 2024.

"Satellite Technology." *Starlink*, www.starlink.com/technology. Accessed 04 Nov. 2024.

Wallace Chipidza, Dorothy Leidner, A review of the ICT-enabled development literature: Towards a power parity theory of ICT4D, The Journal of Strategic Information Systems, Volume 28, Issue 2, 2019, Pages 145-174, ISSN 0963-8687, https://doi.org/10.1016/j.jsis.2019.01.002. (https://www.sciencedirect.com/science/article/pii/S0963868717302391)

"WORLD LIBRARIANS." *World Librarians*, 2015, https://worldlibrarians.org/ Accessed 04 Nov. 2024.

"World Possible's Rachel Server - the Best of the Web Offline." *World Possible*, https://worldpossible.org/ Accessed 04 Nov. 2024.

BUDGET

This budget proposal requests $900 for the purchase of 15 Chromebooks for U.E. German Busch School in Nucchu, Bolivia, a school that is currently facing significant barriers to accessing modern educational resources. The requested Chromebooks will provide the school with the technological resources needed to bridge the digital divide, support interactive learning, and improve educational outcomes for students who are otherwise left behind due to financial and infrastructural constraints. This investment will not only enhance classroom learning but also empower students with the tools to develop crucial digital literacy skills for their future success. This investment will not only enhance classroom learning but also empower students with the tools to develop crucial digital literacy skills for their future success. The RACHEL is already in possession since Charlie Shweik graciously offered to give it to me to bring on my trip to Bolivia. So, there is no cost for this. But providing the U.E. German Busch school with chromebooks will totally transform their education experience and hopefully be an example to expand this program to other schools.

**Shipping the chromebooks was a possible way to transport the laptops since last year we had an issue flying with the laptops. Costs to ship are very high, so I plan to transport the chromebooks with me and with other family members who will be traveling to Bolivia since there is a limit of 2 laptops per carry-on for American Airlines. The main purpose of my thesis is to bring and set up the RACHEL, so not all chromebooks need to arrive at the same time.

Item(s)	Quantity	Price per item	Cost
HP Chromebook 11 G8 EE	15	$59.99	$900
RACHEL device	1		$0(already owned)
Flight to and from Bolivia			Personal expense
		TOTAL	**$900**

Chromebooks to be purchased.
HP Chromebook 11 G8 EE Specifications
American Airline Battery Regulations