Judo In Action Strategy!

Can Disruptive Innovative Engineering Technology Successfully Bridge the Educational and Digital 100-Year Divide?

An Analysis of Remote Learning Technologies

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I. Abstract

Today, developing countries are still struggling to bridge the educational and digital divide with their limited access to educational resources and information. The recent Covid-19 pandemic has unveiled the massive gap of resources that keep disadvantaged civilizations suppressed and propel advanced civilizations into superior conditions. The major force keeping developing countries from advancing is a lack of access to information and educational resources. According to UNESCO 3.7 billion people are still unconnected to any kind of internet, remaining offline and living in austere environments. M*ost of the world's population remains in undeveloped regions worldwide and are unable to receive reliable or critical information to sustain an urban environment. Key areas of focus for urban developments are constructed of EdTech, medical, employment, cultivation, and governmental systems to allow for successful country sustainability.*

With recent decades realizing the severity of the educational divide many companies have begun to create platforms and devices to help connect developing countries to digital tools, promote educational sustainability. According to Pew Research Center, despite decades of technology and educational access, there are countries that remain today almost unchanged since 1990. Some of these countries are among the poorest (Central African Republic, Eritrea, Guinea-Bissau, Madagascar, Niger and Somalia) where less than 5% of the population is online. As technology is ever increasing, this paper will discuss the statistical impacts of education in developing countries that are impacted by internet connectivity and how current disruptive technologies could be the answer to successfully bridge the educational and digital divide. Which has not yet been successfully implemented. To bring the world onto the same playing field, the digital and educational divide must be bridged. Closing the digital divide will not only benefit current developing countries' vulnerable citizens, but also bring about a closer global world with new ideas, innovations, and higher economic productivity.

II. Introduction

Educational Disruption of Covid-19

The Covid-19 pandemic highlighted many inequalities, and disparities on the global scale. These divides have been noticeable in many facets of our society, from the racial inequalities to socioeconomic gaps, as well as the political chasm. The past two years have pulled back the curtain on many important areas that need addressing. One of the most noticeable gaps highlighted has been the disparities in education seen throughout the world. This has been exacerbated by another key gap, the digital divide. According to the Public Policy Institute of California, the emergence of the pandemic accelerated the adoption of technology in education. (Gao and Hayes, 2021)

Approximately 1.6 billion students around the world faced major disruptions in their education due to the Covid-19 pandemic, and while numerous of teachers, professors and students were able to adjust and adapt in the virtual environment, more than half of the world's young students were left behind as they did not have the means to continue their education virtually. To put this in perspective, nearly 80% of the global population are disconnected from the internet. 53% of those offline are located in developing countries (Li, 2021).

The educational gap between developed countries and developing countries continues to be a problem despite increasing enrollment of children in primary school all over the world. It is often quoted that the developing world is about 100 years behind in catching up with the developed world. Most educators are not surprised by the idea that there is a 100-year gap between developing and developed regions in the education systems. It is fully documented that the mass education movement began in Europe and North America in the mid-1800s. By the mid-1900s, mass education enrollment spread significantly across the developing world. However, the mass schooling in developing regions began after the devastation of World War II, sparking a push to rebuild, restore, and educate throughout the world.

Judo in Action

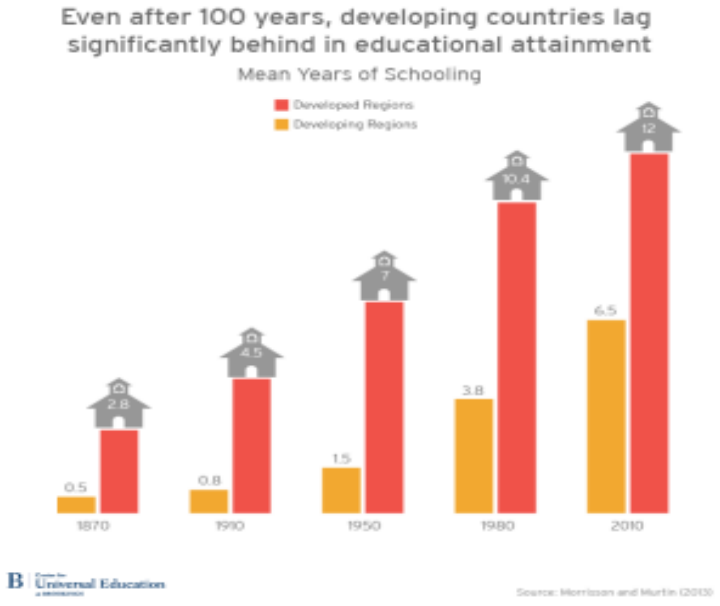
The concept of Judo in Action is derived from the word "Jujitsu" which means unarmed combat when sporting against an opponent. Judo itself means unarmed combat intended to unbalance the sporting opponent. train the body and mind in unbalancing an opponent. While both literally definitions are in response to the sport of Judo and Jujutsu, in recent year the word Judo has been used to explain verbal tactics. According to Brian Watson, a black belt Judo instructor, translator, author and English correspondent, Judo in the verbal sense means "Not to resist, give way or be compliant." Judo combats the condition where someone imposes

their will upon you. In the verbal sense it is meant to respond gently and without force when meeting an opponent or in this case economic and culture problems. The action Judo takes is in response to "what has happened, how it happened and what future implications will be" as Watson elaborates. We can take Judo to focus on the peaceful and sustainable problem-solving solutions to implement education in developing countries without force assertion of the beneficiary party.

The Rise of Distance Learning in the U.S

After the United Nations unveiled the Universal Declaration of Human Rights in 1950, the real traction for mass education enrollment took off in the developing world. Another indicator of gap can be observed by the number of years of education an adult has completed on average, which is known as educational attainment. This measurement is greatly useful in estimating the level of the educational stock in a population. It is a measurement of the skill level of the labor force. Unfortunately, the developing world remains 100 years behind the developed world in education attainment as well (Pritchett, 2013). Children are born with natural ability to learn and on average equally talented regardless of the socio-economic status level they are born. The inequality we discussed above stems from diverse education systems they are exposed to learn from. As we come to accept that education is a universal human right on paper by institutions around the world, millions of people are not able to exercise their promised rights. As we can see from figure 1, the developing countries are significantly lagging behind the developed countries.

Figure 1



Note: This figure was reproduced from Morrisson and Murtin (2013).

Comparing data from UNESCO for minimum proficiency for math and reading of 4th, 5th and 6th grade level students, one can clearly see that there is a wide gap between the developing world and developed world. Almost all students from developed regions successfully achieve basic math and reading levels in middle school. However, only 64 percent of the students in developing regions are meeting the minimum math levels and 84 percent of students meet the same in reading. A comprehensive study by Expertgruppen för biståndsanalys (EBA) identified the following 3 challenges as the primary drivers of the education gap in developing countries: Low household Demand for Education, Inadequate School Inputs, and Ineffective Pedagogy labeled as the Low-Quality School Governance. A summary of each of the challenges are explained briefly below:

- *Low Household Demand for Education.*
  Parents' perception of the value of education for their children compared to the opportunity cost of sending their children to school to get education is the factor in the level of demand that exists in the developing world.

- *Inadequate School Inputs*
  Studies that examine the impact of inputs on educational outcomes indicate that lack of spending on required input is one of the determinants of poor outcome. These costs include the costs of building schools, the operating costs and salaries of teachers. There are a wide variety of school input interventions across the globe. Different input requirements are relevant for different regions and in some cases a unique combination of inputs are required for achieving certain educational goals. The input ratio and the volume of inputs availability could play a factor for effective learning.

- *Ineffective Pedagogy*
  Pedagogical effectiveness is important for achieving learning goals of the educational programs. Organization of school inputs and utilization of these inputs are important determinants of success in many developing countries, pedagogical practices have not changed significantly due to lack of faculty development activities. The teachers often use old and failed methodology and do not have any financial or growth incentives to improve their teaching methods. This problem is highlighted by the diverse pre-existing knowledge and languages of the incoming students.

- *Low Quality School Governance*
  Governments are there to provide oversight for the overall education system. They are reported by education institutions regarding goal setting, personnel policy (hiring, training, retention, and promotions), accountability and monitoring, and performance management. Governments also determine the level of authorities for different institutions. Governments also provide incentives to parents and children to enroll in schools.

Distance Learning in China

It is important to note that policy makers must understand that interventions that increase the number of years spent in school for children must be top priority for improving the situation. Take China for example, it has become the world's largest education system after the number of tertiary students surged sixfold from just 7.4 million in 2000 to nearly 45 million in 2018. The educational reform system is part of China's spectacular economic growth since the adoption of Deng Xiaoping's economic liberalization reforms in 1978. Within decades China went from a massive improvised agricultural country to a massive industrial manufacturing powerhouse. Between the 1980s and today, China's economy expanded at an average rate of approximately 10 percent. Despite this massive growth, China is still classified as a developing country by most measures. For instance, its GDP per capita—USD$9,770 in 2018—is still comparatively low because of prevailing disparities in wealth distribution in the vast and unevenly developed country. (Mini Gu, Advanced Evaluation Specialist, Rachel Michael, Manager of Knowledge Management and Training, Claire Zheng, Team Lead, and Stefan Trines, Research Editor, WENR). Exemplifying first-hand in the present world the extensive and crucial need for education plays in becoming a developed country. The four intervention categories suggested in the current literature are meant to reduce the actual and/or opportunity cost of attending school.

Table 1 below shows these drivers of the education gap in developing countries and the strategies that have been promising to work and the plans that have helped bridge the gap are reported.

Table 1

Time in School							
Demand Side Intervention		School Input		Teaching Pedagogy		School Governance	
What Works	What's Promising	What Works	What's Promising	What Works	What's Promising	What Works	What's Promising
Compassion Cultivation Training (CCTs)	Merit Based Scholarship Information on returns to education Labeled Cash Transfer Bicycle Program Matching Remittances funds School Counseling Unconditional Cash Transfer	Building New Schools School Meals	Extra Teachers/ Materials Multi-level Materials Deworming Medicine Support Circles Take Home Rations School Meals	N/A	N/A	Private Schools (Vouchers)	Single Sex Schools

Note: This data taken from EDUCATION IN DEVELOPING COUNTRIES WHAT POLICIES AND PROGRAMMES AFFECT LEARNING AND TIME IN SCHOOL?, Expertgruppen för Biståndsanalys (EBA), 2016.

Table 2 below describes the interventions that have been proven to be promising and the strategies that have proven to be effective in improving the learning outcomes (measured by improved test scores).

Table 2

Test Scores							
Demand Side Intervention		School Input		Teaching Pedagogy		School Governance	
What Works	What's Promising	What Works	What's Promising	What Works	What's Promising	What Works	What's Promising
Merit Based Scholarships Compassion Cultivation Training (CCTs)	Mother on Child Learning Combined Mother Literacy Class and Mother Class on Child Learning	Teacher-Pupil Ratio Building New Schools School Meals	Hours per School Day Multi-level teaching materials and parent-teacher partnerships Take Home Rations Provision of Eyeglasses Unexpected School Block Grant Iron Supplement Attending an Elite Public School Infrastructure /materials /training Multi-Level Learning Materials	Computers /Electronic Games Teaching at the Right Level/ Supplemental Instruction	Tracking/ Streaming	School-Based Management Teacher Performance Pay Private School (Vouchers)	Contract Teachers

Note: this data taken from EDUCATION IN DEVELOPING COUNTRIES WHAT POLICIES AND PROGRAMMES AFFECT LEARNING AND TIME IN SCHOOL?, Expertgruppen för Biståndsanalys, 2016.

Many well intended programs to bridge the education gap that persisted in developing countries had traditionally focused on providing financial support to governments and nonprofit organizations. However, in the past 30 years with the development of online education and improved connectivity of the global world, the focus, and the mode of assistance to the developing world has shifted towards investing in resources that help with the globalization of western education to the developing world using the internet as the mode of delivery. Before we get into the details of success and failure of these efforts, a historical journey of current online education is in order. This paper limits the discussion of the historical development of online education in the US. However, a similar timeline was observed in other developed countries.

III. Historical Context of Online Education in the US

Over the past three decades, online learning in the US evolved from what was previously known as "Distance Learning". Distance learning in the United States has evolved over the last three centuries into what is currently referred to as "online learning." Originally, It first used postal systems. Later we moved to using the radio as a way to connect with the remote students. Later, television became the viable mode of communicating with remote students. Currently, universities and learning institutions now use advanced technologies to connect with their online students virtually. (Anderson & Dron, 2011; Kentnor, 2015).

The US Department of Educational Research and Improvement defines distance learning as ''the application of telecommunications and electronic devices which enable students and learners to receive instruction from some distant location''

(Bruder, 1989). In the early days of distance learning, letter writing was the first known course to be offered remotely. In 1728, Caleb Gazette advertised his class in Boston by placing an advertisement in the newspaper. This was the first well-documented example of a correspondence course (Gensler, 2014). The first school for correspondence learning," The Society to Encourage Studies at Home" was founded in the United States in 1873. In 1892, the University of Chicago followed by offering correspondence courses and it became the first traditional educational institution in the US to offer such courses. By the early 1900s, many primary schools in the US began to offer courses remotely. Not unlike today's educators, these courses promised that the level of learning would be just as good as traditional face-to-face experience.

Ten years later, history records that radio course delivery systems followed parcel post. University of Wisconsin launched a federally recognized radio station delivery system in 1919. Later in 1950, using the same system, University of Wisconsin began offering college level courses for credit via the same radio station delivery system. The University of Phoenix is often given credit for being the first University for making online programs acceptable in the US. It offers many programs fully online. Before the internet was popular, the University of Phoenix used CompuServe in 1989. Many institutions began developing their version of online programs by the 1990s. In 1998, NYU announced their new Online programs. By the year 2000, many Universities differentiated their online offerings by introducing "blended" or "hybrid" programs that use both face-to-face instructions with online instructions. Online and blended programs took advantage of the technologies to use both asynchronous and synchronous delivery methods.

- *Using the US as an example, Dziuban, Picciano, Graham, and Moskal (2016) claimed that online education has evolved in four phases. These phases are:*

  1. *1990s (Internet propelled distance education)*
  2. *2000–2007 (increasing use of Learning Management Systems – LMS)*
  3. *2008–2012 (growth of Massive Open Online Courses – MOOCs)*
  4. *2013 – Present (growth of online higher education enrollments outpacing traditional higher education enrollments)*

Major challenges in globalization of online education stem from the well documented idea that there is a digital divide which exists between developed and developing world. The digital divide also known as a social gap is created when the presence of unequal access to technology causes social and economic division. The Internet is a relatively cheap utility to come by in the western world. All countries in North America pay more than $5 per 1GB, with the United States paying $12.37, Canada paying $12.02 and Mexico paying $7.38 (Raul, 2019). Compared to the average income of the three countries, the United States pays 0.02% of annual income, Canada pays 0.01% of annual income, Mexico pays 0.04% of annual income for only 1GB. According to a report by CNN, the most expensive internet usage is in the African continent. (Monks, 2019).

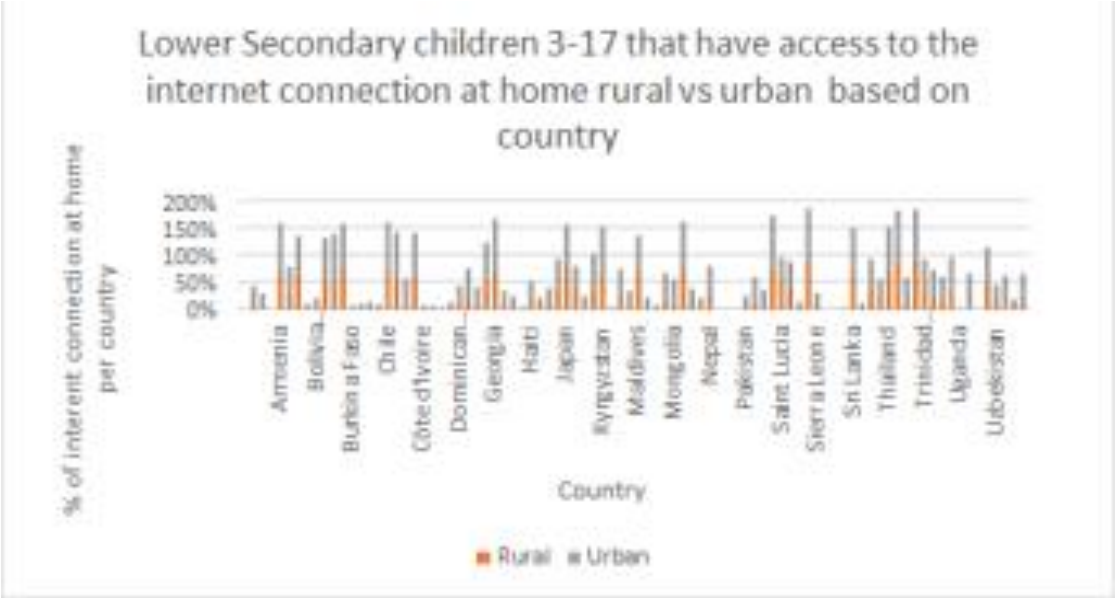
IV. Affordability of the Internet and Education Divide

Affordability according to a report by The Alliance for Affordable Internet is defined as 1GB of mobile broadband data costing no more than 2% of average monthly income. However, the African continent fails to meet these criteria for affordable internet access in the region. In fact, the cost is nearly 4 times higher than the affordability. Only the wealthy can afford to have access to the internet. Assessment by The Alliance for Affordable Internet (A4AI) of 136 low and middle-income countries in their annual Affordability Report, it used Malaysia, Colombia, India, Jamaica, South Africa, and Ghana for its Middle-income examples and while low-income examples were Nepal, Mali, Haiti, Liberia, Yemen, and Mozambique. For example, 1 GB of internet connectivity costs $10.40, $8.64 and $8.47 in the Central African Republic (24.4% of monthly income), Chad (15% of monthly income) and Congo (20.6%) respectively. (Benhaddou, 2021).

Looking at the global population, given such high prices of connectivity, it is not surprising that only 51% of the global population uses the internet. The main reason for these costs are attributed to sluggish markets and monopolies. By contrast, the most affordable rates in the continent are in Egypt at 0.5% of monthly income and people in Mauritius spend 0.59% of their monthly income on internet connectivity (Benhaddou, 2021). While in many areas of the world the price to connect is high, the majority of the population around the world cannot afford the costly access to internet connectivity. For example, look at figure two. You will see the impact of how the lack of access to education affects the undeveloped world.

Figure 2 below describes children in lower secondary school education illustrating the internet connectivity gap by a percentage between those who live in rural and those who live in urban environments by country.

Figure 2

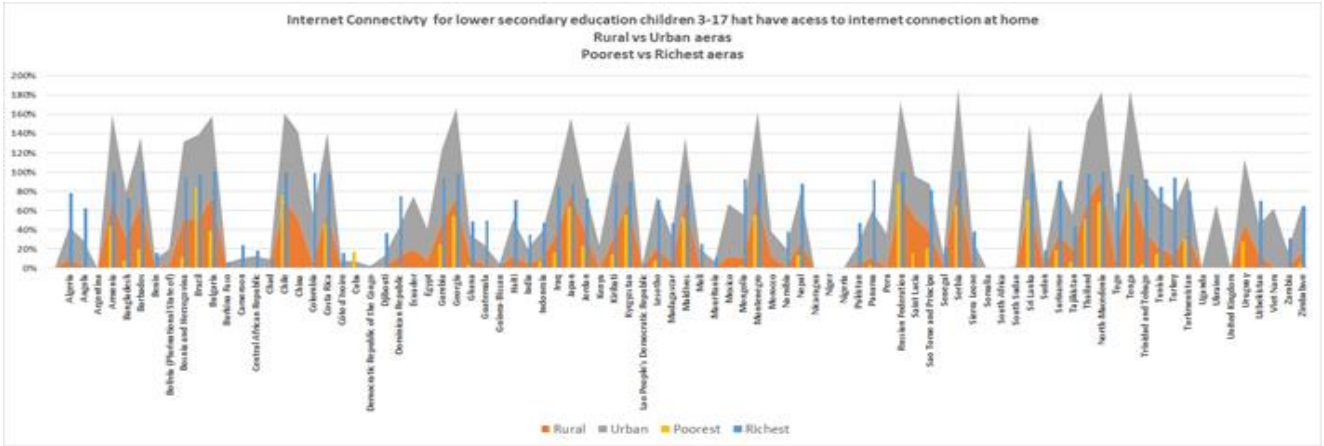


Note: Figure 2 data is taken from UNICEF Global database on school-age digital connectivity, 2010.

Many children who live in urban environments have a much better chance at having connectivity at home and thus a much better chance at improving their livelihood compared to those who lack connectivity in rural areas. Let's also examine Figure 3 for more information on the connectivity gap for lower, secondary education:

Figure 3 below explains that children in lower secondary education illustrate the internet connectivity gap by a percentage between those who live in rural and those who live in urban environments by country compared to those living in the poorest and richest percentiles of their countries.

Figure 3

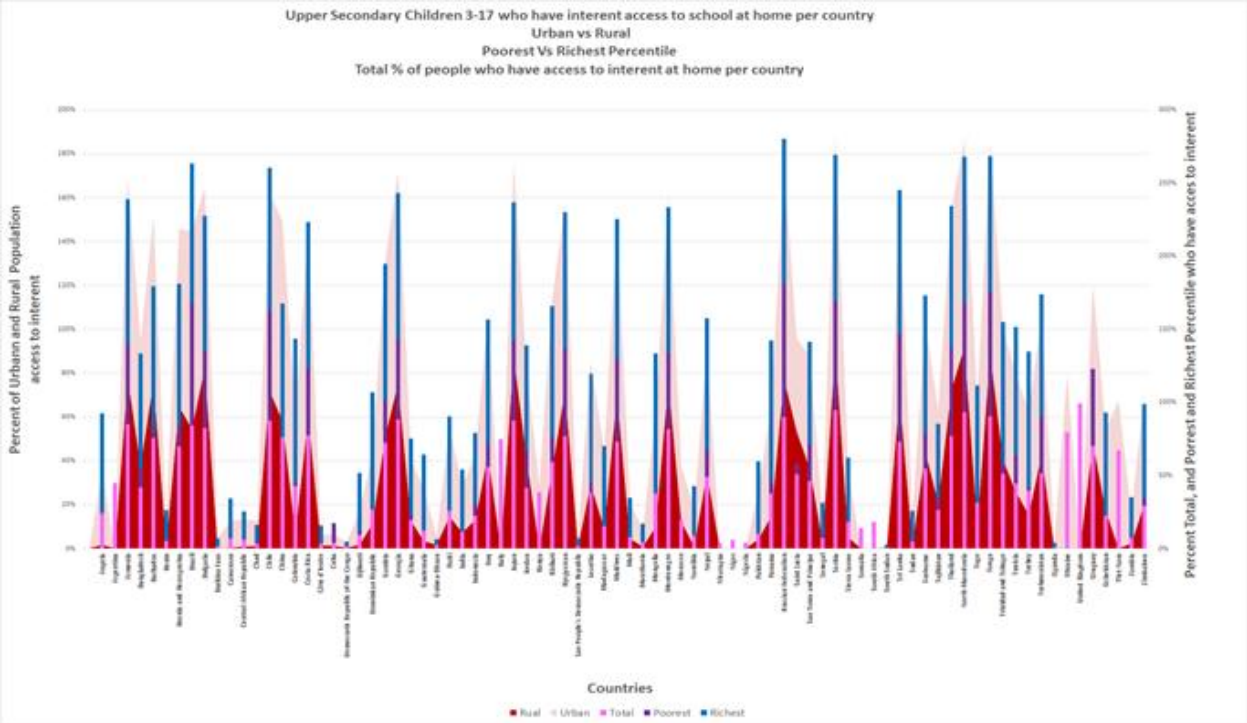


Note: Figure 3 data taken from UNICEF Global database on school-age digital connectivity 2010.

For example, note: Russian Federation urban population has one of the richest and poorest populations that both have almost equal access to internet connectivity at home because the majority of the population is living in urban environments. Thus, the data outcome is expected. Yet, look at the Democratic Republic of Congo (DRC) or Guinea Bissau, both rich and urban populations are expected to be relatively high; however, both are some of the lowest on the chart. This is going back to the data from (Monks, 2019) and the internet affordability report by the Alliance for Affordable Internet where it is explained that internet connectivity is so expensive in the African Continent that only the very wealthy have access to connection. Therefore, in unison with Figure 3 as it clearly illustrates the lack of internet the overall population is able to afford weather be it in rural or urban environment or in the poorest and richest percentile. This in turn creates a huge division of education behind developed countries as currently seen in the present world. Let's take another look at figure 3 with Turkey or Pakistan. When comparing Turkey or Pakistan to the Russian Federation's (RU) poorest percentile population, RU looks relatively great. This is because only the wealthiest have access to internet connectivity. Few individuals of the poorest percentile have access to the internet, and they are of the lucky few.

To see the evidence that the distinctive gap education has played between the developed and underdeveloped countries in the world, see figure 4. Figure 4 below illustrates the percentage of upper primary children who have access to education at home in both rural and urban areas and further split apart by the richest and poorest wealth percentile and the total who [children] have access to education

Figure 4



Note: Figure 4 Taken from UNICEF Global database on school-age digital connectivity, 2010.

As we can see from the figure 4, children in urban areas have more access to education overall than those in rural environments. As well as those in the richest percentile far exceed any relative capable means for connectivity compared to those in the poorest percentile. This is important to illustrate as it shows of the 82 countries with data taken, the overall total of children reaching the adult stage in life who have access to connectivity at their house are still in the urban areas and of the weather percentile in each country.

Figures 5 and 6 below, in relative order, further explain the gap that internet connectivity has played into the economic growth and sustainability of the underdeveloped countries and developed countries during the last century.

Figure 5

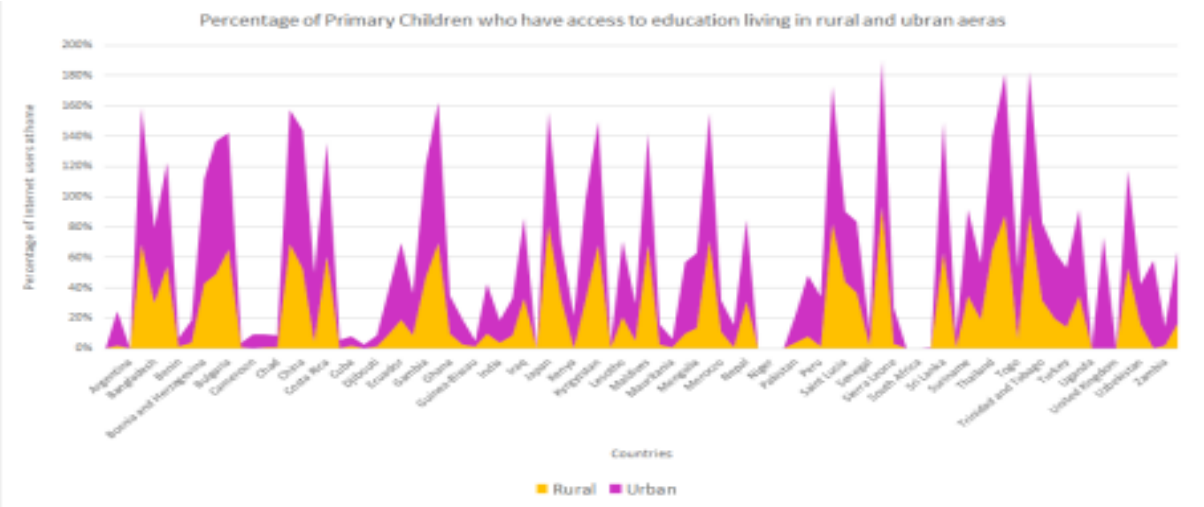


Figure 5 data is taken from UNICEF Global database on school-age digital connectivity, 2010.

Figure 6

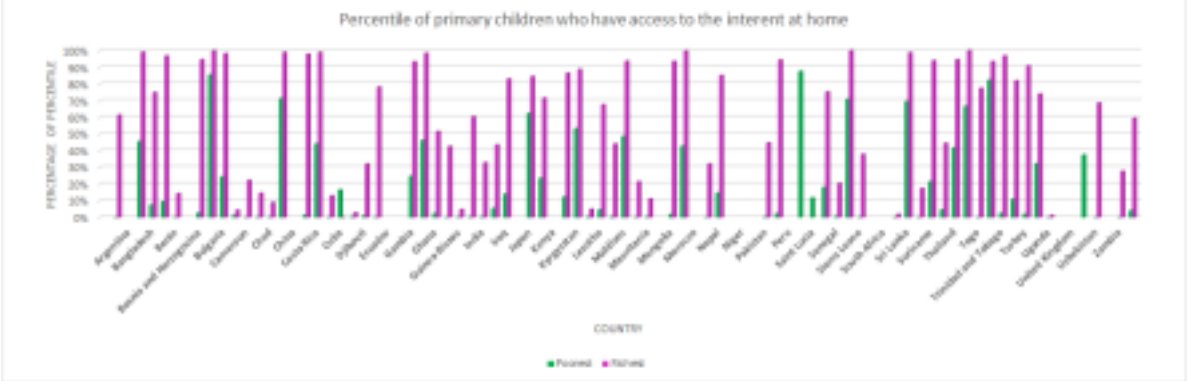


Figure 6 data is taken from UNICEF Global database on school-age digital connectivity, 2010.

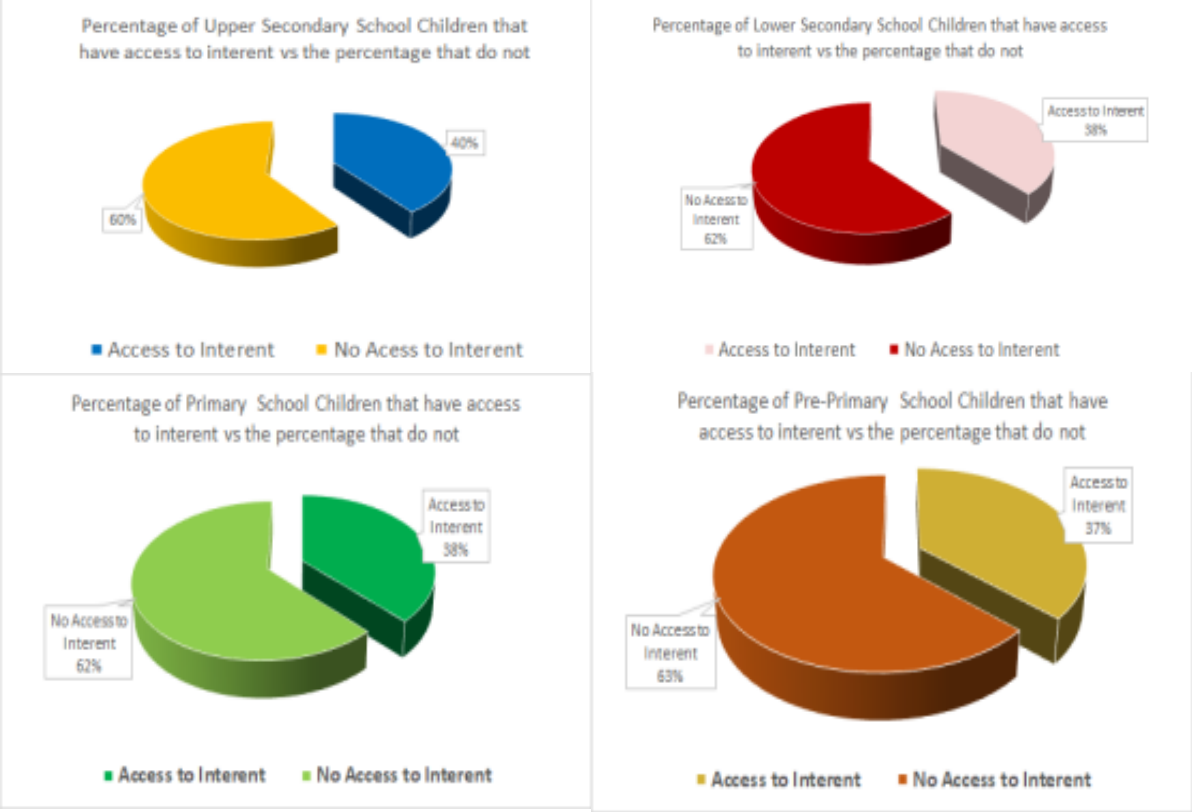
Figure 6 illustrates the percentile gap between the richest and the poorest kids in primary education who have access to the internet at home. Figure 5 illustrates the environmental gap between primary education kids in urban and rural areas.

Figures 5 and 6 illustrate children in primary education (unlike figures 2-4 who represented children in lower and upper secondary education) who live in more

urban environments (figure 5) and those in the wealthiest percentiles (figure 6) have more access to the internet at home. Figure 5 and 6 allows you to see the divide of countries where again almost everyone in Russian (even the poorest percentile) have access to internet connectivity at home. Whereas, Georgia, Banleseg, Maldives and Montenegro, Nepal and Jordan less than half of the poorest percentile has access to internet connectivity and almost all of the richest percentile has access to internet connectivity at home. It comes as no surprise [as seen throughout Figures 2- 6] that the majority of children who have access to the internet no matter their wealth percentile live in urban cities. Further exemplifying the data that only 51% of the world uses the internet because only 51% have access to the means of internet connection (Benhaddou, 2021). When breaking down the data in figures 2-6 it is hard to miss why individuals are flocking to urban environments. Urban environments [even in developing countries] are the most modern and developed areas within the countries. Thus, while many countries remain very underdeveloped, areas that will have access to reliable internet would be those that are most developed: urban environments. For centuries, the focal cities of human civilization have been urban environments when creating and sustaining a country. Urban areas employ people, provide housing, and have modern infrastructure which includes modern transportation. Put simply, creating a sustainable country starts in the urban environment and thus they are the first to receive the most developed technology, such as the internet and education. are located within the urban pockets.

Figure 7 below will now compare the above education with pre-primary education illustrating the overall impact the digital divide has on developing countries.

Figure 7



Note: this data is taken from UNICEF Global database on school-age digital connectivity,2010.

Figure 7 exemplifies the increasing impact of the digital divide in making an already hard life harder to change as children become adults. This chart is astounding when considering the overall education children of ages 3-17 receive in the US compared to children in the developing world. Thus, exemplifying just how much of a gap in education and knowledge internet and digital connectivity has on the role of a successful and sustainable life for an individual's and their economy. Data figures 1-7 have furthered the point of global activity and its high connectivity rate.

Countries in the Middle East and East Asia have the highest cost per 1GB of internet connectivity. For example, in Yemen, Oman, China and South Korea, 1 GB of internet connection cost $15.73, $11.28,$9.89 and $15.12 respectively. The outlier would be one country in Central Asia, Turkmenistan, with a rate of $19.81 per GB. (Raul, 2019) In South America, Central America, and the Caribbean 1GB worth of internet in Trinidad and Tobago, Virgin Islands (U.K.), Ecuador, and Falkland Islands cost $17.71, $18.55, $5.28, and $47.39 respectively. (Raul, 2019)

Furthermore, figures 1-7 indicate the crucial impact urban environments play in developing countries. As urban areas focus on building the key components such as education, medical, business, agriculture and governmental technology communities and countries alike can create sustainable avenues for switching from an undeveloped to a developed country. Thus, in the long-term providing communities with advanced EdTech and medical solutions leading to longer longevity and creating vast economic sustainability with high employment and cultivation. With massive urban growth and proper informational representation available to individuals within the country citizens can create positive and massive governmental impact.

V. Technology Solutions Around the World

Throughout the developing and under-developed world, various strategies of addressing the issues surrounding this unequal level of access to technology are deployed. However, policies to reduce the digital divide must consider the local conditions and existing knowledge of the disadvantaged population within the country to design programs that target the needs of the communities. Many well-intentioned institutions from developed countries have initiated projects in attempts to help communities in developing and underdeveloped countries to help close the digital divide amongst EdTech verticals which are essential in order to attain an urban environment.

Figure 8 below suggests that of the total number of people surveyed in 87 countries, male and female, a majority understood basic computer skills. And of the majority that understood basic computer skills 53%, more than half, were women.

Figure 8

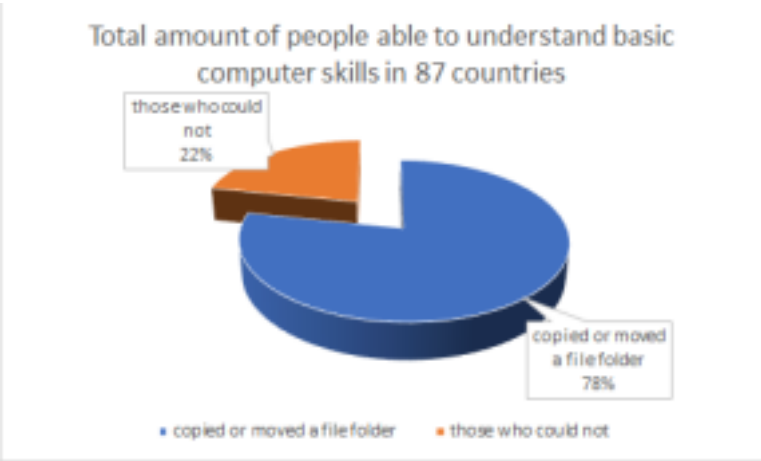


Figure 8 data taken from UNICEF Global database on Information and communications technology (ICT) skills have the figure at the end

Figure 8 illustrates the massive attempt from many developed countries institutions to initiate projects into undeveloped countries to bridge the digital divide. There is no shortage of projects organizations are engaged in to provide specific assistance to communities, highlighting the importance of computer skills and digital education and a crucial skill when it comes to knowledge learning. These projects range from providing financial, infrastructure support to training of teachers and students directly to communities in need. Many universities have also organized social justice projects where faculty and students design projects with an objective to help lessen the digital divide. Most programs have reported challenges surrounding sustainability of the results created by the efforts. The need for universities and organizations to investigate the technological gaps in poor countries and to assemble a team that will implement a cost-effective, sustainable way to address them is increasingly urgent given that the pandemic environment has exacerbated the digital divide in these countries. The team needs to use a flexible engineering-based approach to gather and analyze information about community, government, and economic factors relevant to the project, documenting its methodology along the way.

Partnership between university talents, hardware and software engineering companies and organizations in poor countries should be established to test the technology use and its effectiveness. The findings should be documented reports which describe in detail the considerations needed for its successful and sustainable implementation including community interests, political instability, hardware options, and other specific details relevant to countries. The project should analyze and report the respective advantages and disadvantages of technology choices including software and hardware options keeping in mind the needs of the population and the political climates. It should serve as a guide for future engineering-oriented service-learning endeavors in international settings. To be successful at implementation, vastly different approaches are necessary in drafting technical designs in foreign cultures than for traditional engineering methodology in familiar cultural settings.

Understanding of the critical interplay between their technical design and the culture in question by realizing that choice of technology that will conform to the pre-existing, unknown cultural variable. Necessarily, the choice of project must include an investigative phase in which the team identifies and defines the unknown, cultural variables that will influence their project's success or failure.

This evolving technical design invariably requires the team to have flexible timelines, budgets, technical strategies, and personal attitudes throughout the implementation phase of the project. The best way to achieve this level of flexibility is to involve a pre-existing social system as an equal partner throughout the implementation of the project. This will provide a high degree of support from a partner that understands the culture in question. This partnership will also provide a more established sense of project ownership that will continue to guide the project's success after the team's departure following the project's technical implementation.

Educating the developing population is closely related to the level of trust between the public and the ruling government. Many of the solutions suggested above require that there is a high level of trust of the government and that people believe that their government has the best interest of its people. Trust is built over time however it takes a hit on the level during any crises. We saw the level of trust the population has for their government deteriorated during the COVID-19 crises for many countries. For example, a report from the webinar Trust in Government: Understanding its Territorial Divides stated "The work reveals the importance of trust in government and health authorities in generating compliance with government recommendations and policies, including vaccination campaigns. Vaccine acceptance rates are positively associated with trust and vary significantly across and within countries." (Dijkstra, Lee, Pipa, and Wood, 2021). It is noted that the policy makers must understand the relationship between trust in government and the sustainability of long-term policy choices. Policy makers must enhance citizen participation in creation of policies to improve the trust. Understanding of the analysts, politicians and policy makers of the idea that the distrust of the government as a source of problem to democracy and the misinformation and disinformation play major roles in destroying the progress towards democracy. The level of trust is not equally distributed among the different regions. Government distrust is highest in rural areas and also among poorest countries.

Data from the European Social Survey's (ESS) identified seven trust variables (Trust in the legal system, trust in the police, trust in the United Nations, trust in the country's parliament, trust in politicians, trust in political parties, and trust in the European Parliament). This study applied these variables to 18 countries and found that people in rural areas have lower political trust than urban or peri-urban dwellers.

The last crisis before the COVID-19 crises that contributed to increased distrust in government was the 2008 financial crisis. Some governments implemented successful policies to regain its trust and researchers could use these policies as a guide for maintaining government trust during current and future crises (Dijkstra, Lee, Pipa, and Wood, 2021). A successful trust building government example can be seen by how the Australian government rebuilt the trust during the middle of the COVID-19 pandemic. During, and in the aftermath, government trust was rising. The government was able to convince the Australians to trust them again.

Current Educational Tools

There are several potential reasons for the steady decline of trust experienced by the Australian government. Some of these potential causes include: failures in policy explicitly seen in the housing market, conflicted and vested interests such as lobbying, political favors, and transparency. More so the fragmented nature of the media, as well as democratic system that many do not feel represents their interests as politicians often appear only seeking personal gain or glory all are contributing factors in the disappearance of trust Down Under.

Taking a step back from the most recent Global Pandemic, COVID-19 example. I want to further address the understanding of the critical interplay in education closing the digital and educational divide between educational courier devices/designs and their culture in question. In addressing these issues surrounding the education divide, many innovative companies have come forward with solutions that range from using state of the art technology to minimal technologies. The following 6 selected companies below each have a unique approach to securing educational access to developing countries.

1. *K–12 | Educational Technology | Technology in the Classroom | CDWG :*
   The most popular technology used in the developing world for their remote education delivery system is offered by a company called CDWG. CDWG is a technology software and hardware company allowing developed countries and areas with high connectivity around the world to receive access to education. CDWG is a well instituted modern classroom educational provider. As they phrase it themselves "Welcome to the Modern Learning Environment." CDWG specializes in remote cloud learning for children k-12, providing them with educational resources in an engaging atmosphere. What is great with CDWG is with their cloud hotspot a physical classroom is not needed to provided educational learning, schools do not need one-to-one laptop capability to create education equity and they provide protection for both teachers and students. CDWG is a great indicator when looking at developed worlds educational systems; however, they also provide an illustration of where education and the digital gap play in effect between developed and undeveloped countries.
   Listed below in comparison are the 6 companies and their approach to closing the educational divide through digital informational access.

2. *OLPC XO Laptop| Fuseproject*
   An 8-year-old project providing school children in developing worlds a cheap alternative to a laptop like device via a tablet. The OLPC XO laptop (XO) is lightweight for its relative category of device and durable for rural and remote environments. The tablet comes with a durable rubber protector and the usual tablet functions, volume control, headphone jack, and variable apps functions. Internet is required for some apps; however, the laptop-like device functions without internet access in remote locations with downloaded content and offline apps.

3. *Kio Kit | BRCK*
   A current product designed to help bridge the educational and digital divide in developing countries. Kio- Kit is a ready to use box of digital educational tools designed for schools in low-income communities in primary emerging markets. This current kit comes with 40 "Kio tablets," and is preloaded with "engaging education content" divided into three key sections: academic content aligned to local curriculum, games for stimulation " critical thinking", and content focused on responsible citizenship and environmental conservation. On top of all that the box Kio Kit comes in offers storage for all the devices and a large battery life, along with a durable safety protection. There are many pros to the Kio Kit in developing countries. However the price tag of $5,000 dollars for just 40 tablets limits the reachability of fast paced connectivity.

4. *Learning Equality | Kolibri*
   Another great software application platform using the cloud as its technology platform to bridge the educational and digital divide with its open-source content. Kolibri can be used on Tablets, phones, and laptops and can function in offline areas to bring needed content and transmit education. Like other applications, Kolibri needs Wi-Fi to transmit new data to selected devices. Once the device is offline again users can use new data and transmit data to different devices. However, it appears the user can sync new content data offline between tablets, similar to airdropping. Computers will have to have internet access to obtain new data or a hard data upload. As an app, Kolbri doesn't provide much hands-on support and assistance compared to other companies who are helping bridge the educational divide.

5. *Ushaidi | group project*
   A web-based platform sending needed information via mobile device. Ushaidi was arguably one of the first successful created technology software to bridge the educational and informational divide in Kenya. It is a web-based platform where users are able to crowd surf "first-hand reports'' from citizens by SMS and the web. This was designed to bring crucial information to many in Kenya who had no information on what was happening after the election of a new president. This platform has evolved to allow for many in Kenya to stay up to date on what is happening and how to stay safe within their environment. They currently have 50 million reports on Ushahidi and are deployed in 160 countries keeping many safe. It is important to note that while Ushaidi was created to get important information in the hands of vulnerable people without access to information due to political instability and lack of internet; however it is not used as an educational platform tool.

6. *Think Zone | Education in a Box*
   Education in a box is a low-cost technology that was created to support at home learning. Think Zone's technology relies on the use of voice and SMS for interactive learning to provide to families and communities. Like others, ThinkZone India utilizes offline-enabled mobile application solutions for training and "equipping you to become educators." Think Zone focuses on early education and creating social change through youth intervention.

7. *Learn Kernel| Navigator and Cruise*
   Learn Kernel is an educational tool released in 2020 to combat the "digital and educational divide." Opposed to a software application, content manager or SMS based platform Learn Kernel is an engineered device carrier for content. The Learn Kernel is small, lightweight, and pocket size for "on-the-go" learning. Like many others, Learn Kernel focuses on offline connectivity and contains minimal features providing low cost ($19) for efficient learning. The device is charged via traditional method or by solar, can be airdropped and has its own safety features built into its software and hard case for the user's protection. Learn Kernel has multiple devices (like iPhone generations) to fit the user segment of learning. Learn Kernel also engages not just children, but also adults to improve the socio-economic status of underdeveloped countries.

VI. Disruptive Innovative Technology Solution: Case Study of Learn Kernel

Among all the technologies discussed above, Learn Kernel seems to be the most promising for several reasons. First and foremost, it is the most cost-effective mode of information transfer to communities in the developing world. This is important because to close the educational divide one must make access to education knowledge easy to obtain. While many other organizations listed above and not mentioned have great ideas they are missing the elementary root of the problem: many lack the funds to pay for expensive educational tools. Also, it is important to note the more expensive and modern technology in an underdeveloped world is the higher target it will be for theft. Learn Kernel really understood not just the educational divide but the cultural divide amongst the developed and undeveloped worlds.

Second, the actual device does not require any internet access to function. Most applications know that the vast majority of individuals amongst the world have zero or very poor access to the internet. Third, there are numerous devices to fit the market needs. Learn Kernel works in multiple sectors of education (school education, agriculture education, medical education business education and governmental information). Each sector is vastly different from the other and as talked about previously though the sections they are important in upbringing urban environments in both the developed and underdeveloped worlds. While many organizations focus on children and education, Learn Kernel focuses on critical information to both children and adults in order to build a sustainable urban development in countries. Fourth, as Learn Kernel is an actual hard device, it keeps the environments they implement into "green" with their environmentally green initiative and available solar charging for the Learn Kernels. Fifth, Learn Kernel is encrypted both in software and by its hard case.

Learn Kernel is an engineering company that focuses on custom designing products for its clients with optimal level of technology to meet their specific needs. It entered this remote learning solutions market like a storm. It has several significant advantages over its competitors. It uses a "Judo in Action" strategy. "Judo in Action" applies to situations in which small competitors exploit the size and incumbency of a larger firm to find opportunities to make inroads against the large firm without effective retaliation or defense (just as, some authors argue, a small person can throw a large person with judo techniques by using the larger person's weight and inertia against him)" (Corts, Kenneth S., and Deborah Freier, 2003)

Learn Kernel and Judo in Action

Learn Kernel is a great example of Judo in action because it is opposing the lack of education available to individuals in developing countries. Learn Kernel takes what has happened as the educational solutions and its barriers to entry, its "how it happened" by fixating on how current technologies work and do not work in the field and compiling them into "what future implications will be" or in other words the Learn Kernel deice. As stated earlier, Learn Kernel is a connector to bridge modern technology and information to those in developing countries who lack connectivity. In doing this, Learn Kernel exemplifies the idea of taking a large problem and delivering a solution that fits both culture and technology together to deliver a positive impact in a peaceful and widely adaptable use.

To further exemplify this, Learn Kernel has created a piece of technology that allows for low-level theft compared to modern technology like a laptop or tablet. With easy functionality, learners can learn and implement the knowledge they are given without distraction. These learners are therefore able to create a more sustainable impact on their future and their communities future than individuals given advanced technology that forces its way into cultures instead of a harmonious implementation.

Learn Kernel brought a new perspective and view of how to solve the world's educational gap and digital divide. The next section below reviews a few of the projects that were undertaken by Learn Kernel.

Learn Kernel Country Programs

1. *Democratic Republic of Congo (DRC)- Learn Kernel is working with an organization called Congo Love and the government of DRC to implement an 8 million Learn Kernel roll out over the next 5-7 years. This will enable children of DRC to receive education that many have not had since COVID-19 has swept the earth in 2019. And for a few, it will impact them in receiving some of the first education they will receive.*

2. *Honduras- Learn Kernel is working with an organization called Hope for Honduran Children (H4HC) to implement education in low connectivity areas throughout Honduras. Learn Kernel has worked with H4HC for the past 7 months rolling out 118 Learn Kernels assisting children to improve their math, English, Spanish and science in grades 4-9. Learn Kernel is in a long-term partner agreement with H4HC implementing another 1200 Learn Kernels at the start of the new school season in 2021.*

3. *Iraq - Learn Kernel is implementing its first pilot program into the middle east working with the Kurdistan government, Barzani Foundation, Pass, Latter Day Saints and Mega corporation to deliver critical informational messages to create positive information transfer for those on the Kurdistan/Syria border for COVID-19 vaccines.*

4. *Kenya- Learn Kernel worked with an organization called International Centre of Insect Physiology and Ecology (ICIPE) to prove the efficiency and efficacy of the Learn Kernel cards when preventing crop spoils and providing a better harvest time for small farmers throughout Kenya. The effects were that 500 small farmers were able to Learn the same information and protect their crops from spoil.*

5. *Philippines- Learn Kernel is working with a local organization called Project Propel to address the environmental sustainability impact the Philippines communities can create. Learn Kernel will help with the initiative of locals to eliminate the vast amount of pollution on the islands of the Philippines. Learn Kernel has been the carrier to illustrate how locals can create EcoBricks and EcoToilets for childhood and adult programs.*

6. *Tanzania-Learn Kernel is working with an organization called Camara Education to illustrate the efficacy and efficiency Learn Kernel devices have on 5th and 6th grade students in Tanzania.*

7. *Venezuela- Learn Kernel is working with a local organization called The E-ROQ Project to prove the efficiency of Learn Kernels on a socio-economic impact level. The E-ROQ Project is hoping that the use of the Learn Kernel will allow its dominant Spanish speaking population to learn English. With the Los Roques economy being centered around English-speaking tourism, learning English will help adults and children receive jobs on the island and increase the overall standard of living on Los Roques.*

Learn Kernel Key Performance Indicators

The Following metric of Learn Kernels effectiveness was observed in our detailed analysis. Learn Kernels seems to be meeting the needs of the developing world's current situation by providing a promising technology that will close the educational divide faster than its predecessor of the cell phone, laptop, and tablet like devices.

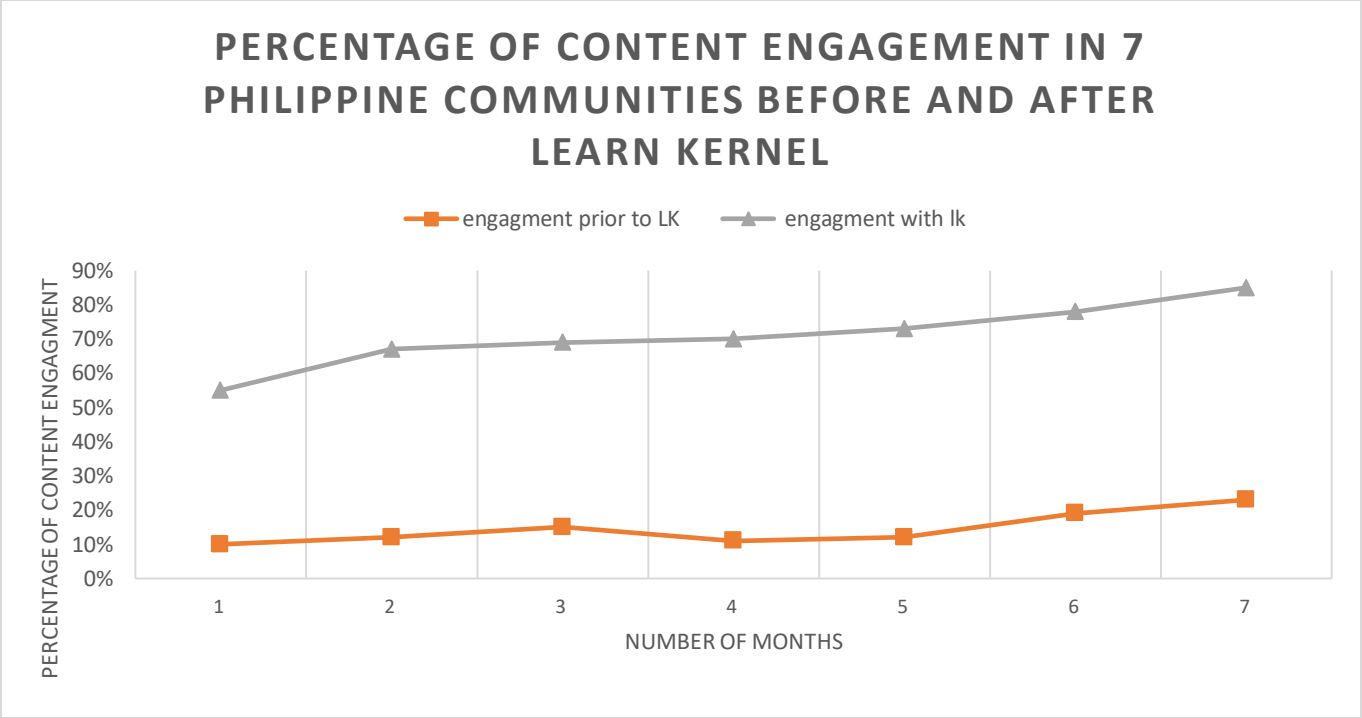
Measure of Effectiveness:

- *Learn Kernel allowed Project Propel to engage in educational information dissemination 33% more than its current rate when distributing learning materials to their 7 communities.*
- *Project Propel also found there was a 90% increase in engagement of material which leads to a important instructions for environmental sustainability impact* ***(see figure 9****).*
- *7 new communities were introduced to technology in the Philippines, they have never seen (any type of technology) before or yet to see since Covid-2020 lockdown* ***(See figure 10).***
- *43% more engage to read: 210 people in all 7 communities in Philippines*
- *Project Propel has accounted for a 30% increase in the Learn Kernel implementation and action of the content compared to group presentation alone*
- *Learn Kernel has accounted for a 70% academic grade level increase in 7 months in grades 4 through 9 in Honduras vs. non-Learn Kernel students*

Measure of Performance:

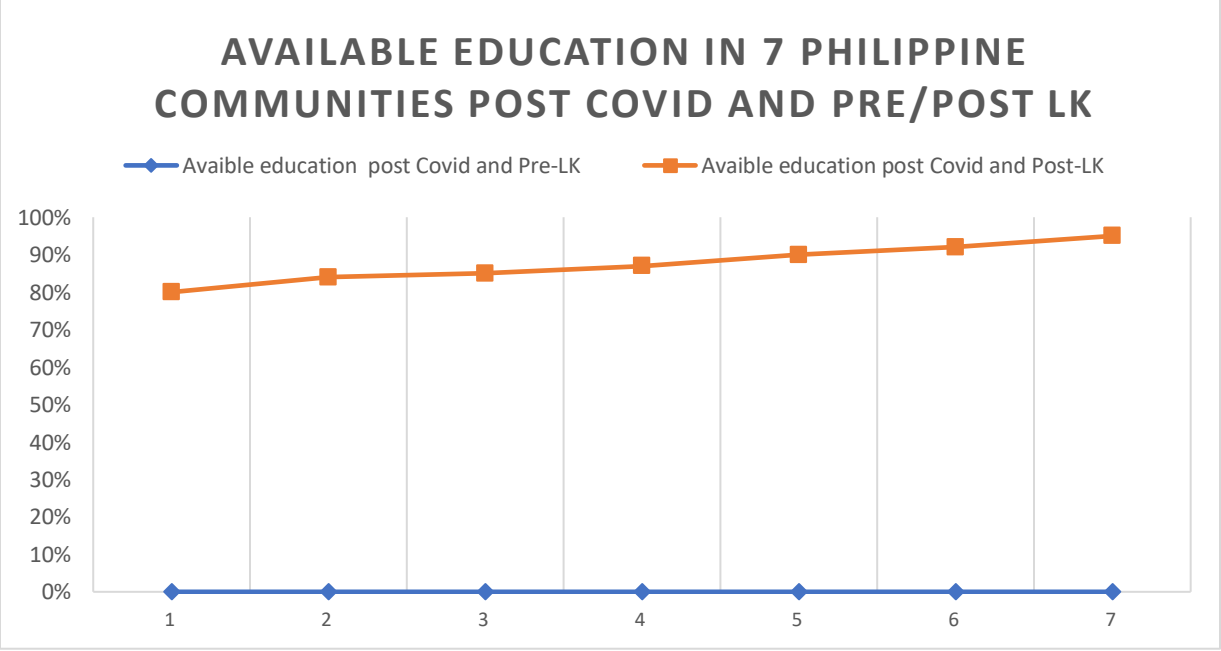
- *7 new communities allowed for partnerships with leader of light to charge Learn Kernels via solar power in rural communities*
- *In 6 months Learn Kernel remains at a 96% effectiveness rate for function use in the Philippines where 24/25 cards are still in use and communities can learn.*
- *After 6 months of use Learn Kernel has a 97.87% function effectiveness rate (94) in Honduras. This means that of the 94 Learn Kernels only 2 children broke their Learn Kernel* ***(see figure 11).***
- *After 6 months, Learn Kernel introduced grade 4 to Learn Kernel cards, the youngest Learners to date. Learn Kernel has a function use of 97.05% effectiveness rate after 7 months. This means that of the now 112 cards Learn Kernels in current use only 1 child broke their Learn Kernel* ***(see figure 11).***

Figure 9



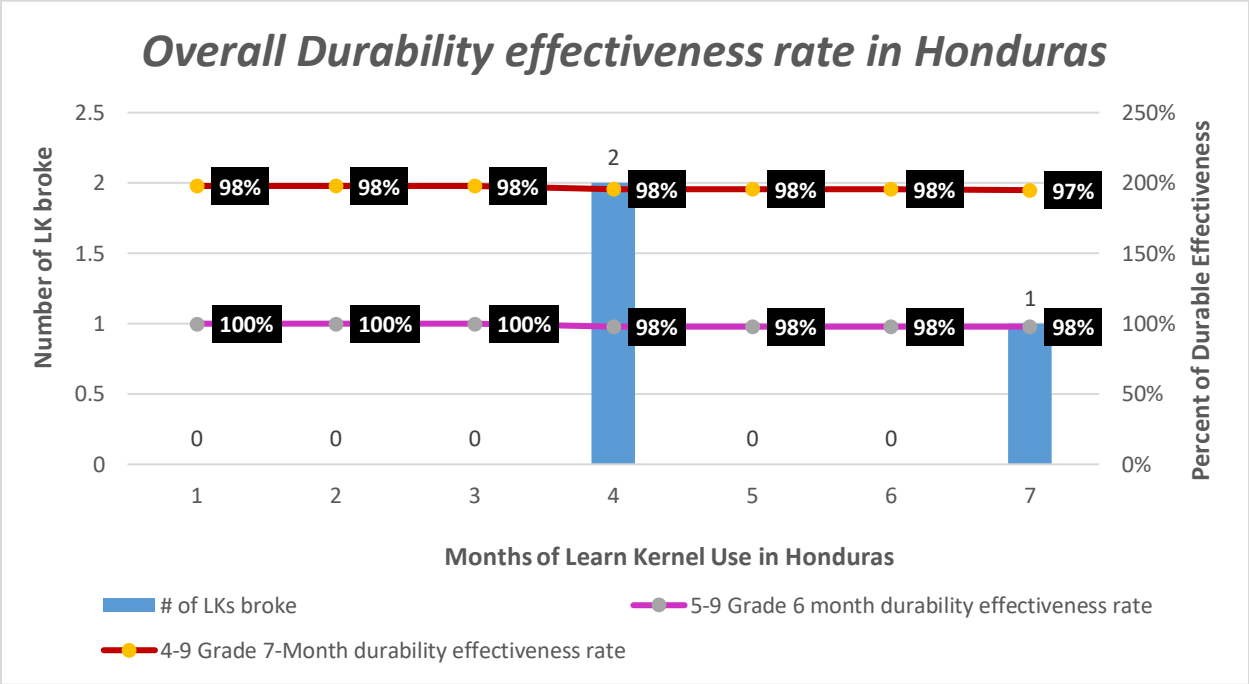
Note: Figure 9 data Taken from Learn Kernel Pilot Programs, 2021.

Figure 10



Note: Figure 10 data Taken from Learn Kernel Pilot Programs, 2021.

Figure 11



Note: Figure 11 data Taken from Learn Kernel Pilot Programs, 2021.

VII. Conclusion

Overall, to bridge the educational and digital divide, internet connectivity and educational devices will need to be made more cost efficient to allow for greater availability to those who lack the current means to obtain connectivity in hopes to create a sustainable future.

There are strides to be made in bridging the connectivity divide to that of the developed world's standard. It is evident that the world is forming a movement to create access to connectivity worldwide. The 21st century is home to some of the most important innovative initiatives to date. Educational technology or EdTech is changing the way the world receives education, as well as the accessibility to educational resources. In order to provide the most opportunity and get educational material into the hands of more children, the solutions need to offer efficiency in both the cost and the material retention.

Based on a detailed study, we recommend that the developing world use Learn Kernel. Learn Kernel is a small company that is willing to work with anyone. They have accomplished many deployments in third world countries while utilizing many vertices. Learn Kernel is able to educate the public on topics like how to monitor COVID-19 vaccination and direct information about crops. Learn Kernel is the perfect example of Judo in Action!

VIII. About author:

Dr. Simran Kahai is a Chandigarh, India native who graduated with a bachelor's degree in Economics from Punjab University at age 19 and moved to the US. Dr. Kahai attended Auburn University and graduated with a master's degree and a Phd. in Economics. Dr. Kahai then joined Tuskegee University as an assistant Professor of Economics. During her time there, she was recognized with awards for outstanding teaching, outstanding research, and obtained numerous grants that helped internationalize the business school's curriculum. Later, Dr. Kahai and her family moved to Ohio. After teaching in the Executive MBA Program at Kent State University, Dr. Kahai then joined the University of Akron as a Visiting Assistant Professor of Economics where she taught graduate level courses. Currently, Dr. Kahai is an endowed Koch Professor of International Business where she teaches international Expansion plans to International Business Majors. She also teaches classes like Applied Global Health Economics and Global Issues in Economics and Business, Economics of Regulation. Her research has been published in top tier academic economics Journals. Currently, her research focuses on the global pandemic impact on education divide. In September of 2021, she published a paper on the determinants of Covid-19 Vaccine Hesitancy in the US.

Dr. Kahai specializations are Industrial Organization and Econometrics. Her research interests have focused on topics in Regulation of the Telecommunications and Trucking Industries, Economic Development of Developing Countries, and Foreign Direct Investment. Her research has been published in Journal of Law and Economics, Transportation Research, The Review of Industrial Organization, Antitrust Bulletin, Applied Business Research, Business and Economic Review, and Global Business and Economic Review, International Business & Economics Research Journal (IBER), International Business & Economics Studies. She has also conducted research on projects funded by Lucent Technologies, Morehouse Research Institute, and the U.S. Department of Education. Foreign She has contributed to a book Investment in Developing Countries published by Palgrave Macmillan and edited by Dr. Harbhajan S. Kehal of University of Western Sydney Australia.

She heads the American Academy for Global Education headquartered in Copley, Ohio. American Academy for Global Education (AAGEDU) founded in 2009, is an academic consulting company that focuses on facilitating the creation of global business education, leadership, and management development programs. She has helped many universities in the Asia region develop new programs and conducted faculty development seminars.

Dr. Simran Kahai is also involved with many community organizations in the U.S. and abroad. As a talented jewelry designer, she travels to many Asian - Pacific countries and helps artists find opportunities for their contributions to society. In 2009, she founded her design company, Designs Beautiful. She works with many micro entrepreneurs and artists from remote areas of the world. She is especially interested in discovering artisans in remote global regions and

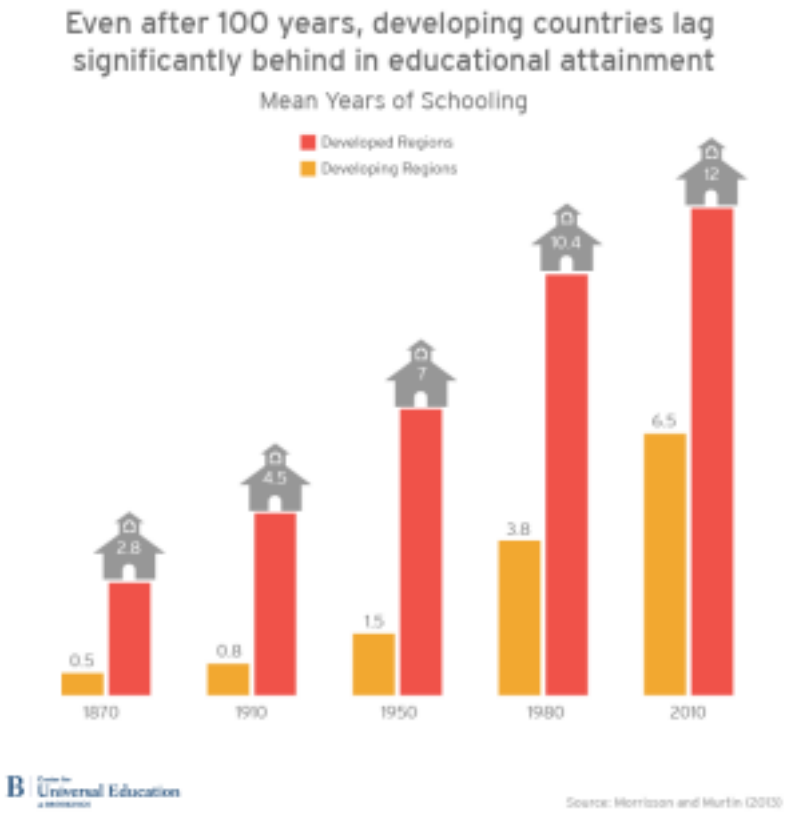
helping improve their position in life through programs that create human capital development, export opportunities, and entrepreneurship.

As the VP of the Board of Directors for the International Services Center, she had helped refugees significantly through fundraising, hands-on training, and leadership programs. Through her Global Entrepreneurship programs, she has provided training to many micro entrepreneurs in Asian countries. She has won many awards for her contributions to women organizations. To name a few, in 2019, she was awarded the Service award by She Elevates. She also was named the Women of the year on international women's day in New Delhi. She chaired Elite Women arounds of the world in 2018. She is currently working with universities in remote India to make online education accessible to disadvantaged rural populations. As a director of the Global Entrepreneurship program at John Carroll University, she has designed a curriculum for entrepreneurs that have earned the certificates for Global Entrepreneurship training program from John Carroll Boler College of Business.

As the Koch chair of International Business, she is in charge of developing partnership with institutions in India, Nepal and other Asian countries. She also is a leader of study tours by students to many Asian countries. She has led students to India, Singapore, Thailand, Taiwan and Hong Kong.

Appendix A: Figures

Figure 1



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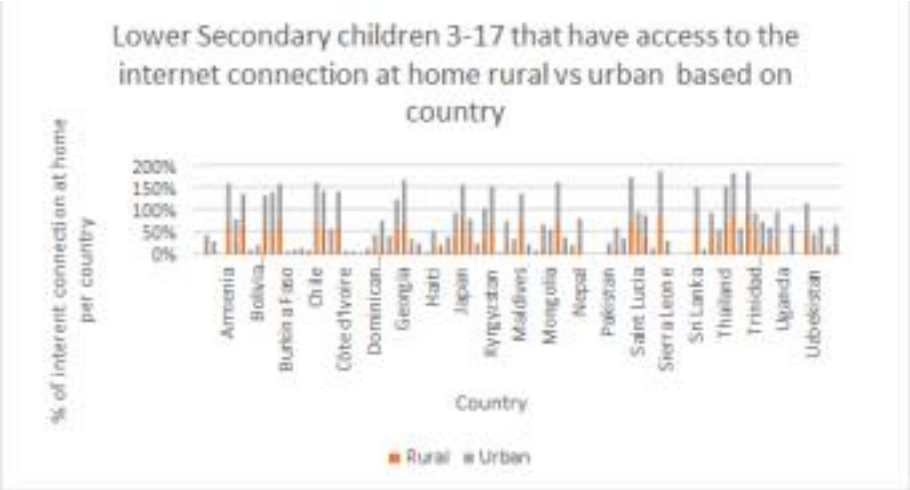

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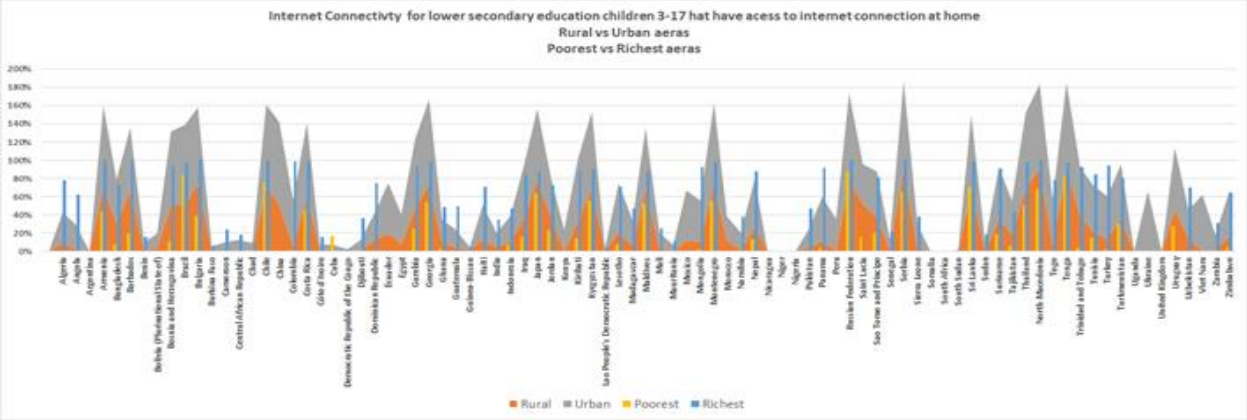

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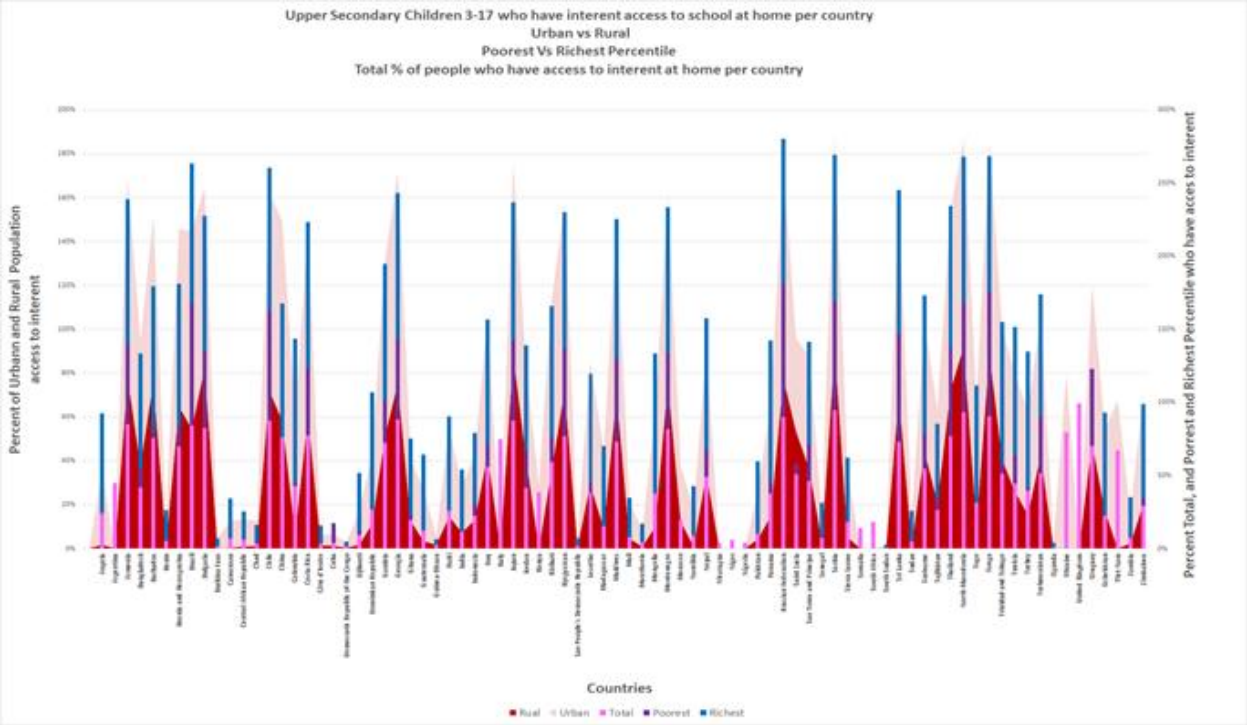

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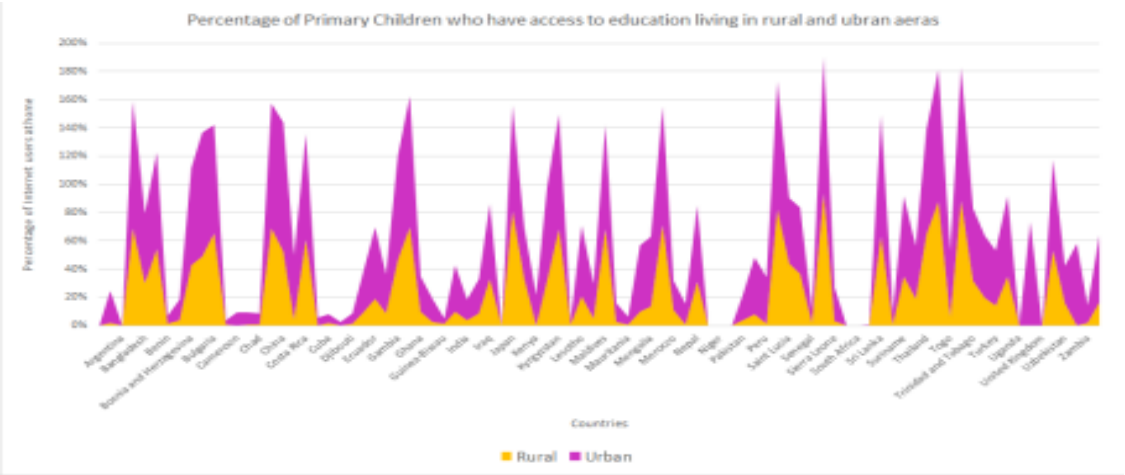

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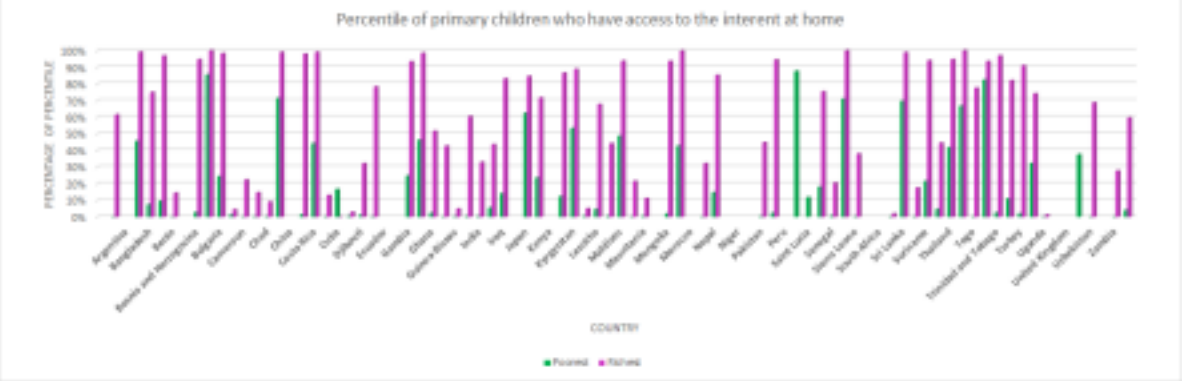

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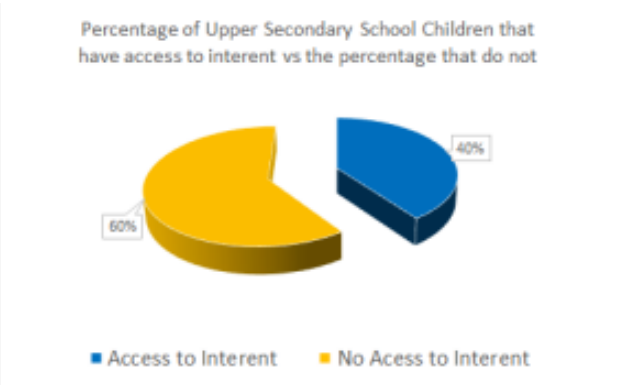

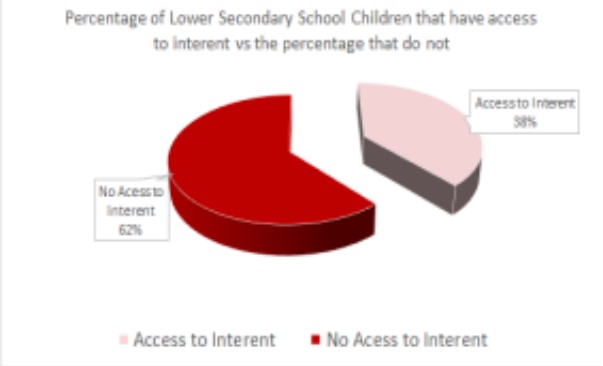

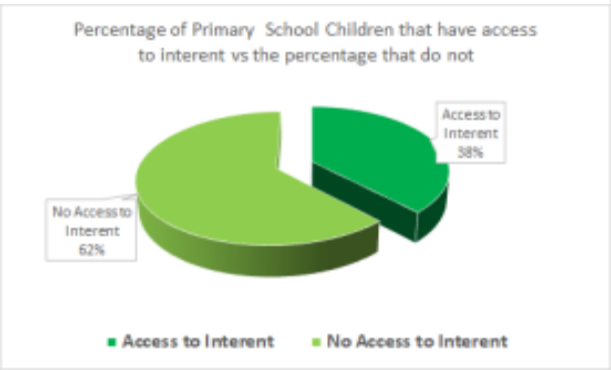

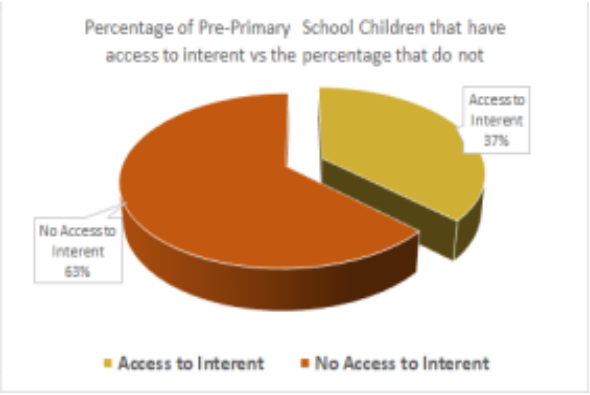

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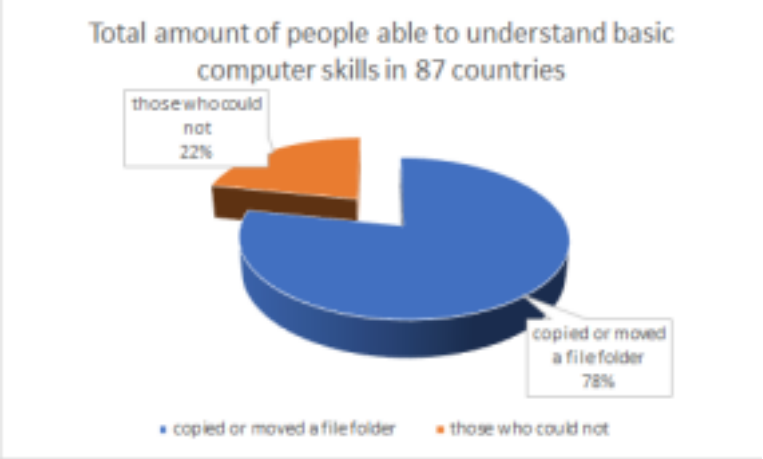
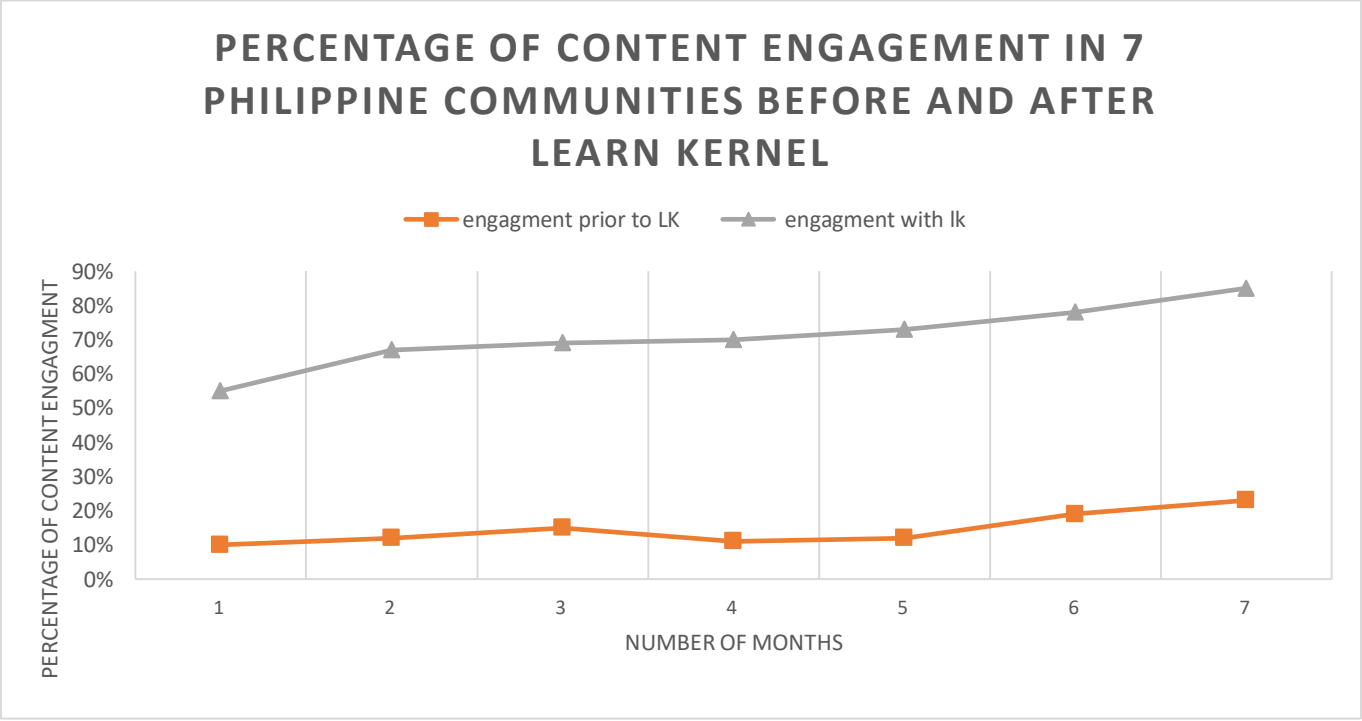


Figure 9



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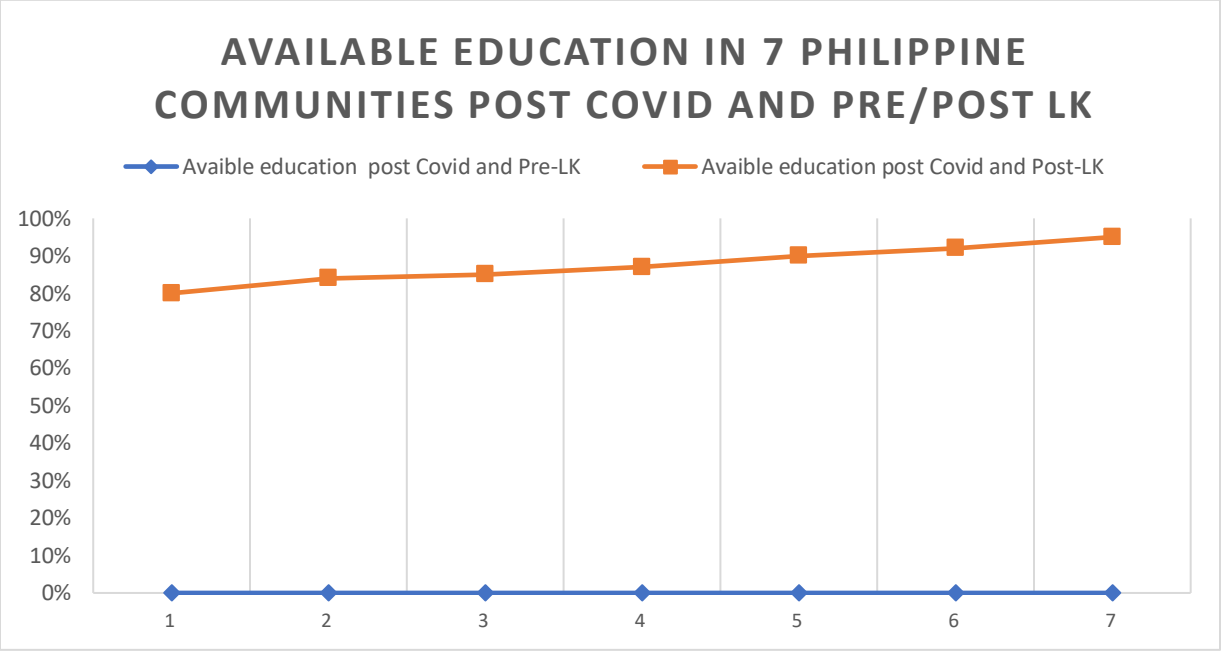
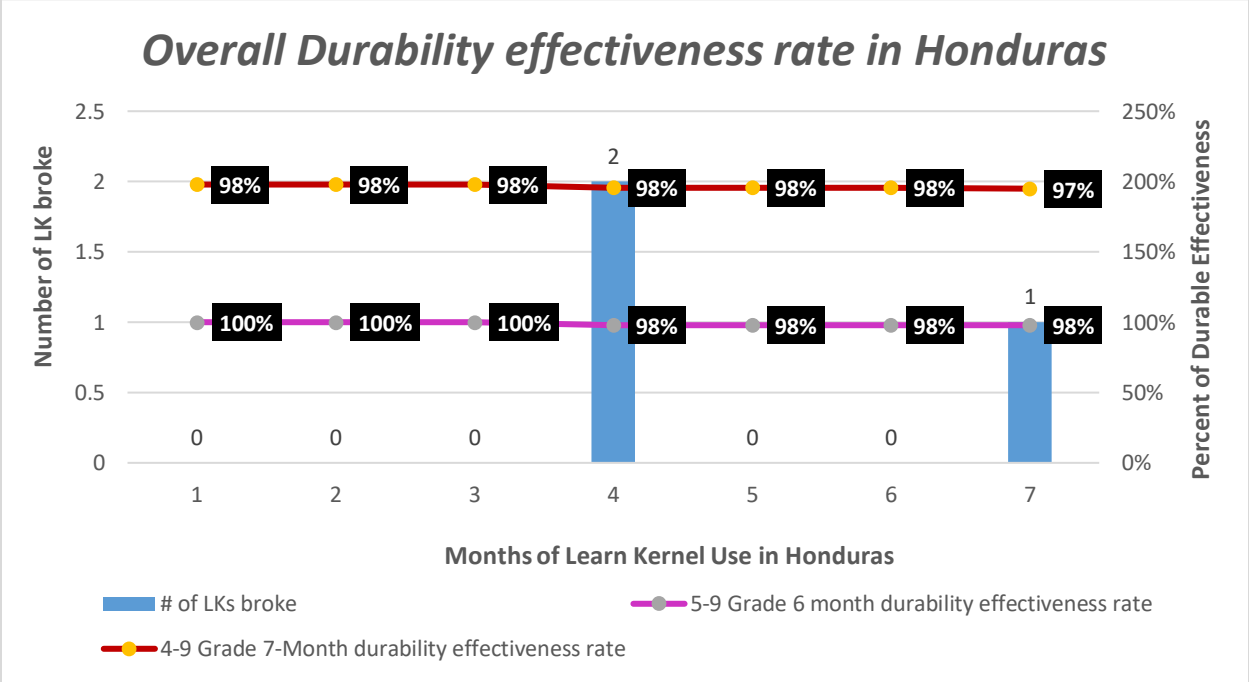


Figure 11



Appendix B: Tables

Table 1

Time in School							
Demand Side Intervention		School Input		Teaching Pedagogy		School Governance	
What Works	What's Promising	What Works	What's Promising	What Works	What's Promising	What Works	What's Promising
Compassion Cultivation Training (CCTs)	Merit Based Scholarship Information on returns to education Labeled Cash Transfer Bicycle Program Matching Remittances funds School Counselling Unconditional Cash Transfer	Building New Schools School Meals	Extra Teachers/ Materials Multi-level Materials Deworming Medicine Support Circles Take Home Rations School Meals	N/A	N/A	Private Schools (Vouchers)	Single Sex Schools

Table 2

Test Scores							
Demand Side Intervention		School Input		Teaching Pedagogy		School Governance	
What Works	What's Promising	What Works	What's Promising	What Works	What's Promising	What Works	What's Promising
Merit Based Scholarships Compassion Cultivation Training (CCTs)	Mother on Child Learning Combined Mother Literacy Class and Mother Class on Child Learning	Teacher-Pupil Ratio Building New Schools School Meals	Hours per School Day Multi-level teaching materials and parent-teacher partnerships Take Home Rations Provision of Eyeglasses Unexpected School Block Grant Iron Supplement Attending an Elite Public School Infrastructure /materials /training Multi-Level Learning Materials	Computers /Electronic Games Teaching at the Right Level/ Supplemental Instruction	Tracking/ Streaming	School-Based Management Teacher Performance Pay Private School (Vouchers)	Contract Teachers

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