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SURA: A Language Teacher

## A Comprehensive Summary of the Issue Being Addressed

How many languages can you speak? In the African country of Nigeria, there are over 500 languages spoken (Translators without Borders). There are native languages, such as Yoruba and Hausa; the government language of English; and western languages used in education, such as French. The number of languages creates communication barriers for people from different areas and backgrounds around the country. Children growing up in rural parts of the country may be raised only speaking their native tongue, hindering their preparation for schooling and work. Furthermore, the government attempts to fix this problem and hire multilingual teachers have not been well executed (Ibrahim and Gwandu).

In addition, rural Nigerian communities often lack internet access. Traditional computer/phone devices are often out of reach due to financial constraints (Tayo et al). Therefore, they cannot just learn another language on their smartphone, as we may be used to in the United States.

## The Target Community

The project focuses on the nation of Nigeria, the most populous nation in Africa. With a population of 200 million, about ⅔ that of the United States, and an annual population growth rate of 2.6% every year, this nation is primed for economic and social growth. On the other hand, Nigeria unfortunately remains a relatively impoverished nation, with a GDP per capita of around $2,200, and about 40% of its population living on less than a dollar a day (Al Jazeera 2020).

Educational advancement is needed to unlock the vast human potential of the Nigerian state. The mean Nigerian has only had 6.5 years of formal schooling. Almost as important is the delivery method of the education (EF Education First 2020). Nigerians collectively speak hundreds of languages, with about 49 million, 42 million, 30 million, and 15 million speakers, respectively, of Hausa-Fulani, Yoruba, Igbo, and Fulfulde, notwithstanding other languages such as Kanuri, Tiv, Gbagyi, and Nupe (World Population Review 2020). However, this linguistic diversity is not reflected in the Nigerian education system, and in Nigerian professional life at large. Even though less than 20% of the nation speaks it as their native language, official policy dictates that all schools in Nigeria must switch from indigenous language to English-exclusive education in the fourth grade. Until this point, students may be educated in their regional languages, but starting in fourth grade, all classes are taught in English.

These policies are not a huge impediment to childhood education in many urban centers such as Lagos and Abuja, where kids tend to be exposed to the English language at an early age. In rural Nigeria, however, kids are much less likely to have English-language experience, even when many teachers begin switching their classrooms to English-medium instruction earlier than the fourth grade. Abba Haladu, secretary for Nigeria's mass literacy commission, calls this policy "ignorant." This quip is largely corroborated by scientific inquiry, with studies finding that students perform better academically across the board when they receive their early education in their native languages (Omeje 2018).

While people across Nigeria are affected by the dominance of the non-native English language across all spheres of life in the nation, it is perhaps the Hausa people for whom this reality has the most historical significance. Hausa is the most commonly spoken native language in Nigeria, and is widespread among the northern savannahs of the nation, as the first language of almost 50 million people. The English language is innately hard for Hausa speakers to learn,

with many English sounds being unintuitive to people who've grown up with Hausa phonology (Keshavarz 2017). This is the target group we aim to serve with our product.

## An Overview of the Solution

To solve the aforementioned issues presented by the target community, our team has created the hardware program SURA. The name SURA stems from the Swahili translation of the word "paraphrase." Essentially, this hardware program would aid young language learners in being proficient in both their country's official languages and their own. SURA will build upon Duolingo's existing software yet do so in a way that will be beneficial directly to speakers of African languages and young children. SURA will make it easy for children to add and practice both African languages and the official languages of their countries.

A vast majority of research conducted by university research teams support the idea that language acquisition is essential for children in their early years, which is why our solution will be catered to a target group of children aged kindergarten to middle elementary school. For example, according to Elissa Newport, a neurology researcher at Georgetown University, "Most of the literature finds that learning the syntax and morphology of a language is done in about [a child's first] five years" (Scientific American). Additionally, according to an internet quiz study conducted by Joshua Hartshorne at Massachusetts Institute of Technology, users were concluded to have their peak language learning age occur before the age of 18. More importantly, to achieve fluency in a particular language, users must have started practicing a language before the age of 10. Because of these statistics, our tablet SURA will be formatted straightforwardly for young children to understand and enjoy. Thus, one primary goal of SURA is to be formatted so that young children will find joy while learning languages.

The solution which SURA presents is exceptionally multifaceted. While our overarching goal involves teaching official government languages to children, SURA would incorporate a

"power saving model," which also caters positively to the environment. While the power saving model will be explored more in the next section, SURA will be able to, through the power saving model, account for sustainability and pricing in addition to its primary goal as a language aid.

## The Technology Used to Implement the Solution

There is already existing free software to teach languages entertainingly and effectively: Duolingo. Since 2012, Duolingo has expanded from 300,000 daily users to serve 8.2 million today (Statistica). Duolingo emphasizes gamifying learning, making it less like a textbook and giving the user points. The web application features 19 different languages, including adding Swahili, the most prevalent language in Africa, in 2017. Duolingo also stated plans to add Zulu and Xhosa in 2022, the two most widely used African languages (Mureithi).

Despite Duolingo's language additions, there are still thousands of other African languages that the software does not support (Languages). This is where SURA comes in. We propose a new language development section of Duolingo, where the user can input a new language to Duolingo. The user could submit a request for a language creation if their preferred language is not present. If enough users submit the same language, Duolingo could add the language to its web application. The process would include Duolingo submitting translation requests from its users to crowdsource the development. Duolingo could also employ a group of verified individuals to check for the correctness of the translation. The goal would be that as these tablets are distributed, they would lead to the creation of all kinds of new languages being added to Duolingo.

As far as the hardware of the device, there are relatively affordable tablets for sale that have more than enough processing power and storage to run duolingo, whether using online or downloaded lessons. The best tablets appear to be Amazon's Fire line, which are both reliable while inexpensive. A brand new Amazon Fire 7 with 16 GB of storage is on sale for $49.99

USD. Yet, this tablet price can be decreased further by purchasing a used tablet, with used Amazon 7's currently on sale for under $25 (Madison). A possible partnership with Amazon could allow SURA to purchase devices for an even cheaper price. As new tablets are released and the value of older generation Fire tablets fall, SURA could bulk buy used tablets at a special price. The technology included in older generation tablets would be substantial for language education, since SURA tablets will only need to run the simple Duolingo programs.

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Another addition to SURA could be a power-saving model. This power save model would feature electronic ink technology screens that change colors based on small amounts of charge. Screens in similar devices, such as Kindle Paperwhite, have been known to last up to eight weeks without a single charge (Papiewski). This perk would be highly beneficial to students who don't have easy or consistent access to electricity to keep up with their learning.

## The Potential Impact of the Solution

Considering the preceding information, it is now appropriate to look towards SURA's potential influences in the world, particularly concerning the future of education in Nigeria and

beyond. Initial manufacturing called for a simple, easily fabricated tablet with software equipped for elementary language learning. Essentially, the prototypical design could quickly reach communities in Hausaland and simultaneously promote sustainable production and consumption practices (sustainable development goal no. twelve). Furthermore, the solar-powered features of this device diminish our organization's reliance upon malignant non-renewable sources such as coal, which is the primary fossil fuel used for electricity generation. However, SURA's sustainable strides are not without error, as even solar energy carries numerous environmental hindrances and overarching inconveniences. Namely, the mining for non-renewable metals such as cadmium, gallium, and germanium, and general intermittency of photovoltaic cell technology are significant drawbacks upon our current design plants (EIA). However, with conscious progression, SURA aspires to move towards a zero-waste model that instead utilizes compostable materials like enzyme-activated compostable plastic in our product construction. Unlike other biodegradable plastics that break down into harmful microplastics and enter the Earth's waterways, enzyme-infused plastics made with Burkholderia cepacia lipase and random heteropolymer (RHPs) completely decompose, leaving no trace of their manufacturing behind.

Furthermore, by enhancing SURA's internal software and applications our development team hopes to take language learning one step further and create a complete educational immersion program. Instead of solely coding language-based applications, we will expand our programs to cover all elementary subjects such as mathematics, science, literature, history, etc. Moreover, this elementary education will be provided to users in over one hundred languages, and will be available in several countries across the globe. It is up to each student as to which language they wish to be instructed in. When discussing the Hausa community in northern Nigeria, English will be the most encouraging language of instruction to prepare children for future schooling and the professional world. SURA aims for a future where children around the

globe are ready for any educational or professional situation that presents itself. Thus, through sustainable production measures, our team is optimistic that we can aid children along their educational pathways by providing them with the educational tools necessary to navigate the language-driven realm of professional life.

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