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LumenEd: Localized and Cost-Effective Education in Rural India

Testing Core Ideas, Assumptions and Product Design
National Capital Region, India

Summary: This project proposal describes LumenEd, an innovative new mobile learning device that provides public schools in rural India access to the latest digital educational content independent of the internet.

Background and Context: The National Census of India (2011) shows that the literacy rate in India is only 74%, with the rate for rural areas even lower at 69%. Recent studies have shown that across rural India, more than half of the children enrolled in fifth grade cannot read English, and more than 75% are incapable of performing basic arithmetic¹. Efforts have been made to combat this social trend through traditional teaching methods. However, a shortage of trained teachers and overly expensive class materials has limited the success of schools in combating this problem. Innovations in technology have introduced new teaching methods that offer a solution to this troubling issue².

But, for many of the proposed solutions, access to network infrastructure and significant capital is crucial. However, more than 87% of India's population is without internet and 400 million Indians are without any electricity. The World Bank also estimates more than 68.7% of Indians live on less than US \$2 per day. Prevalent technology based education solutions (e.g. One-Laptop-Per-Child and the Aakash tablet) ignore these challenges by relying on nonexistent infrastructure. The LumenEd project overcomes these barriers by providing an inexpensive device without the need for internet access and constant power supply.

Project Overview: Our project will realize this effort by providing customized educational content to local Indian communities through an affordable and sustainable device. This device integrates a projector, speakers and an intuitive interface to aid teachers in provide a rich and engaging learning environment. It is powered by a solar-charged battery, making it fully operational without need for any electricity. Educational content is stored on a flash drive inside the device. New content can be mailed to any village in the country through India's reputable postal service, keeping syllabi up to date and doing away with the need for internet-based updates.

The educational content for our device will be customized for local communities. The basic curriculum we envision comprises of three global languages: English, Math, and Technology, all in accordance with government mandated syllabi. The content will be sourced from multiple educators in India already developing audiovisual educational content. In this pursuit, we have contacted NGOs like Pratham and the Azim Premji Foundation along with governmental agencies like the Central Board for Secondary Education and the National Council of Educational Research and Training. In addition, we have begun the process of translating educational content from a free, open-source content provider: Khan Academy.

This project is a refinement of a pilot program conducted over the past summer. We used a prototype of our device to teach a group of twenty-five fourth graders over a two week period. This was accomplished through an after school program at Sanskriti School, New Delhi, where underprivileged children from nearby slums were taught Hindi, English and Math. Over the course of our trial run, the hardware performed exceptionally and the open-source content was effective in engaging students. Over the course of the summer, we learned that our solution could work as an effective learning tool. With funding from Davis Projects for Peace, we can build on the successes of our pilot program and overcome many of the challenges facing the Indian education system.

¹ Pratham. "Annual Status of Education Report" Pratham Resource Center: Mumbai, 2012.

² Banerjee, Abhijit V., et al. "Remedying education: Evidence from two randomized experiments in India." The Quarterly Journal of Economics, 2007. In this study, economists affiliated with MIT's Abdul Jameel Poverty Action Lab performed randomized experiments in schools in urban India. A computer-assisted learning program for targeted children resulted in significant, lasting progress in test scores. We can only imagine the dramatic progress that will take place once a similar levels of educational services and individual attention can be offered to eager learners in rural India.

Project Objectives

1. Use the funding from the Davis Projects for Peace to produce, distribute and deploy ten devices in the beginning of July across the National Capital Region of India.
2. Review the efficiency and effectiveness for both the device and its content.
3. Create community partnerships to establish the sustainability of the LumenEd project beyond the summer.

Implementation

1. We will leverage positive responses from our pilot program in Sanskriti School last summer to reach out to organizations interested in partnering with us on this project. We will use the existing distribution channels of NGO partners to reach a more diverse community base.
2. We will hold classes in all participating schools from July through August. This will allow us to conduct rigorous tests of hardware (ruggedness, power consumption, intuitive control) and software (ease of use and relevance of content). We will ensure that these five locations cover a variety of contexts -- urban centers, rural villages, differing standards of education, and diverse socioeconomic groups.
3. In the last week of August, we will conduct an exhaustive review, comprising assessment of taught material, and feedback from students, teachers and community members. We will meet in New Delhi on the weekend before September to compile and collate evaluations and summarize our project outcomes.
4. Beyond the summer, the devices will continue to be used by community leaders and teachers. From Oberlin, we will continue to provide new content for the devices already on the ground. We believe that the sustainability and potential for growth of this project will maximize the long-term impact it has on each and every one of our target communities.

Team: Our team consists of three Oberlin College students possessing a wide variety of skill sets, consisting primarily of community organizing, business and economic modeling, and hardware and software engineering. Saksham and Shiva are Indian citizens, Prakash is Nepali, and all three have families in New Delhi. We are well equipped to negotiate the cultural contexts crucial for making this project a success. We have experience working with children in pedagogical environments – Saksham taught basic English and Math to children from disadvantaged backgrounds in Delhi; Shiva has worked with differently-abled students in Delhi and Hyderabad; and Prakash led a computer literacy program in Bangladesh. All three of us were enriched from the experience in the Sanskriti School last summer and are excited to return to Delhi and continue working where we left off.

Impact: That a literate population is inherently more peaceful is a truism that hardly bears repeating, especially as a necessary condition for peace and economic progress in developing nations. Too many tragic and avoidable incidents of hate, discrimination and conflict occur in India on a daily basis given the multiple conflicting hierarchies of gender, caste, religion and ethnicity. By providing a democratic instrument to the youth for furthering their education, we seek to counter the harmful influence of communalistic politics, the frustrations of unemployment and an incredibly skewed sex ratio. While we cannot expect immediate shifts in reigning attitudes, we present LumenEd as a unique initiative for reform and a promising experiment in technology-driven education.

Our project offers a solution that expands the reach of education to locations that lack the necessary infrastructure. While India is our initial testing location given the institutional and cultural knowledge we possess, many other nations face similar issues with respect to education. Countries across the Global South possess diverse populations that could benefit from widespread adoption of our devices. LumenEd, thus, has the potential to have a positive impact not just in India but in the rest of the world.