



The Computerworld Honors Program

Honoring those who use Information Technology to benefit society

Final Copy of Case Study

YEAR:
2012

STATUS:
Laureate

Organization name:
Carnegie Mellon University

Organization URL:
<http://www.cs.cmu.edu/~mattkam/lab>

Project Name:
MILLEE: Mobile and Immersive Learning for Literacy in Emerging Economies

What social/humanitarian issue was the project designed to address? What specific metrics did you use to measure the project's success?

This project aims to improve English as a Second Language literacy among poor children living in the rural villages and urban slums in the developing world. Public schools in developing countries such as India struggle to provide quality English instruction, for reasons that include teacher absenteeism, shortage of qualified English-speaking teachers and irregular school attendance by children because they need to work for the family in the fields or households. Literacy in ESL is an important pathway to socioeconomic empowerment, higher education and social status. A British Council report estimates that the salary gap between professionals with and without English skills in some developing countries is 20% to 30%. In this project, we provide English instruction in the form of English literacy learning games that children can access on affordable cell phones, in places and times more convenient than conventional schools. Learning outcomes are quantified using pre- and post-test measures of English learning, as well as data logging of learner actions in the cell phone games.

Please describe the technologies used and how those technologies were deployed in an innovative way. Also, please include any technical or other challenges that were overcome for the successful implementation of the project.

For cost reasons, we develop English literacy games to run on cell phones, the most widely adopted technology platform in the developing world. In particular, these are Java Microedition (J2ME) phones, which are an order of magnitude cheaper than emerging Android phones.

Technical barriers include having to optimize for memory usage on low-resource devices, as well as the need to organize the English language learning content (i.e., graphics and voiceover files) on the phone's storage such that file input/output remain efficient. More importantly, designing culturally appropriate games is a design challenge. Our initial game designs were unintuitive to rural children in India. This forced us to take a step back, study 28 of their traditional village games, and perform a cross-cultural analysis of the systematic differences between their traditional games and contemporary Western videogames. This analysis provided us with a set of guidelines on how to design educational games for non-Western users. Our games have also undergone numerous rounds of field testing and refinements so as to work in a culturally diverse environment.

Please list the specific humanitarian benefits the project has yielded so far.

In a semester-long study that took the form of an after-school program in a village school in North India, we demonstrate statistically significant learning benefits on spelling skills, as measured on post-test gains over a pre-test baseline. This study was funded by Qualcomm's Wireless Reach program. Subsequently, we set out to examine if children would be sufficiently motivated to play and learn from the games outside an after-school program, where caregivers such as parents and facilitators are not present to supervise them to play these games. Funded by the MacArthur Foundation's inaugural round of Digital Media and Learning grants, we ran a second semester-long study in which children from two villages in India were given access to phones with our games over an entire semester. We learned that the children voluntarily played these games in the absence of adult supervision, and found ways to work around infrastructural issues such as irregular electricity for charging the phones. More importantly, the amount of English vocabulary that the children learned from the games was comparable to one-third of the vocabulary that second-language teachers recommend that students in developed country conditions with excellent classroom infrastructure and qualified teachers acquire. In other words, the out-of-school learning that our solution facilitates alone accounts for one-third of the vocabulary learning that their "First World" counterparts should acquire in well-equipped classrooms.

Please provide the best example of how the project has benefited a specific individual, enterprise or organization. Feel free to include personal quotes from individuals who have directly benefited from the work.

Some quotes from principals and teachers at our pilot schools: "I have seen an improvement in the attendance of students in the 5th grade. I have also heard a lot of positive feedback from parents on how their children are liking the MILLEE games." "I have parents of children in their 4th grade and 6th grade coming to me and asking me why we are only introducing this program for kids in 5th grade. Can we expand the program to them? Overall, I am very happy with the MILLEE game and proud to see my grandson take so much responsibility to make sure that this program is running well at our school." "I am happy to see the level of confidence with which the children are playing the games and are handling the cell phones. When we began first, they needed a lot of help from the teachers. However, they manage very well on their own now. I would like to know if you have any plans of introducing MILLEE to teach other subjects like Math and Science for other grades (lower grades to 8th)."