Online Learning Across Diverse Low-Resource Indian Contexts

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Abstract

Online learning environments have been deployed globally to offer learning opportunities to diverse student communities. In this paper, we ask whether it would make sense to deploy such environments in middle-income afterschool settings in low-resource environments across India. To determine whether technology could have a role to play in learning environments in low-resource contexts, we commenced an interview study of educators across diverse socioeconomic contexts in India. We present the preliminary results of this study, highlighting the kind of technology solutions that we received inputs about from these educators. Our larger goal is to (1) support tutors in curating and distributing learning content to students, (2) engage students in a mobile networked learning environment where they can share and collaborate, and (3) evaluate the potential of online learning environments for low-resource contexts. In this submission, our focus is on the differences across low-resource contexts and the how these differences can influence our design approach.

Author Keywords

ICTD; HCI; learning; India

ACM Classification Keywords

H.5.0 [Information Interfaces and Presentation]: General.

Introduction

Until recently, learning environments in the global South have been too under-resourced (and thus underexplored) for feasible technology initiatives. However, growing penetration of mobile technologies and internet connectivity drives us to explore the potential of these state-of-the-art and relatively low cost technologies to enhance learning experiences for low-resource contexts.

Our research aims to incorporate the inputs of various stakeholders in the education space, including children, educators, and NGO volunteers in the design of rural online learning communities. As part of this endeavor, we actively sought feedback from educators about our proposed online learning environments. Their experiences with digital technologies and learning media were especially important for us to learn from. We now present our research questions.

Research Questions

We aim to address two problems with our research in the longer term. First, there is an access problem. Students and educators in low-resource settings have limited access to learning/teaching content. Second, there is an opportunity to address a learning problem as well. The quality of teaching can occasionally be sub-par – this is a part-time job for the educators, they are compensated little for their efforts, they may be ill-equipped to teach– and the students must learn alongside peers across a spectrum of ages and backgrounds. The first problem is more straightforwardly addressed by making content available (whether or not through technological means). For the second, we aim to enhance pedagogical intent and capacity of functional learning environments, as recommended in [2]. Our primary and immediate goal is to integrate low-cost technology in low-resource learning environments to address an access problem. Our secondary, longer term goal is to address a learning problem, improving learning outcomes through engaged, situated interactions with tutors and other students. Our research questions are thus as follows:

1. Teaching: Can educators constrained for time and money benefit from an online learning platform? Do they value having access to varied educational content online? Can they successfully adapt their teaching style to integrate online learning? Do they have the necessary technological expertise to do so?

2. Learning: Do students engage and adapt easily to online learning? What aspects of online sharing and collaboration do they value? Do they show measurable improvement in learning outcomes, in the long term?

3. Feasibility: Can existing and relatively low-cost technology be leveraged to enhance the learning experience for students and educators in low-resource environments? What implications might this have for testing larger-scale MOOC-style learning environments for rural users?

Prior Work

In [1] we published preliminary findings from the needs assessment we conducted last summer at one set of after-school classrooms we target. We deployed a tablet (Android) application for Math learning and iterated on its design during a six-week study. We found that tablet applications were appropriate and feasible learning and assessment tools, opened up

avenues for personalized learning, led to improved learning outcomes (as assessed by the tutors), and allowed for the consideration of different kinds of learning content (e.g. Math and English, which students in Tamil Nadu have been found to be weakest in [9]). These findings and subsequent discussions with the NGO and tutors we worked with as well as a new set of teachers located in different low-resource regions motivate us to propose and deploy a holistic model that integrates mobile technologies and curated media into an online learning network of classrooms.

Web Content Providers

There is a growing number of suppliers of educational content online. Instead of reinventing the wheel and crafting/providing this content ourselves, we decided to first conducted a survey of existing content. We surveyed forty web content providers, and compared and contrasted the key features of each provider's content – their target audiences, their focus areas, and their pedagogical foundations. We share here what we found.

A large number of online content providers are not in the open source domain, and most of the services and packages provided, such as practice problem sets and lecture videos, don't come for free. This might restrict us in curating the content, since a large chunk of the content is under a privately held license. Additionally, most of the content that we surveyed was directed to high school students, either focusing on grades 9 to 12, or on competitive examinations for universities. However, in low-resource contexts, before 9th grade is when the drop-out rate suddenly increases, implying that learning/teaching interventions could potentially have a greater impact at that stage.

We found a substantial repository of learning content in the open source domain as well. A significant portion of this content is aligned to an Indian curriculum system. Many of the content providers provide software and hardware solutions, such as learning platforms and tablets/laptops respectively, packaged with their online learning content. We name below a few of the novel web-based learning tools that we surveyed.

The Educomp Smart School Program [3] is a comprehensive learning package that includes a complete digital repository of classroom learning content, bundled with learning and lesson plans, simulations, assessments and virtual laboratories. This Smart School Project also contains an "English Mentor", which is an English language tutor tool that simulates an English language learning course in an Indian accent, using suitable examples for a student studying in an Indian setting.

Nytra is an augmented reality application offered by the MBD Group [4] that works in hand with the Nytra textbooks to create augmented reality animations alongside course textual material. The app animates existing images and illustrations in the book with voiceovers and videos, with an aim to increase student engagement while reading. The MBD Group also provides apps for kindergarten learning, in the form of an assortment of rhymes in English and Hindi. The goal is to create a blend of traditional rhymes and modern techniques of learning, and are accompanied with music and animations.

Among other providers, there was Magic Pathshala [5], which provided students with a large open source repository of organized and categorized Math and

English content, sorted by skills and grades. WybeeTab [6], produced by CarveNiche Technologies, is a comprehensive tablet based learning platform and content provider. Here, all of the content is remotely stored, and hence the entire system works offline. The online-offline balance is one that is of central concern to us, given that much of our targeted audience would have only intermittent access to connectivity, even if they do have regular access.

In addition to the above set of private providers, we also obtained access to the online versions of state-approved curricula. This will be our primary guide as we select the content we would like to integrate into our platform. We certainly mean to take inputs from the educators we speak with as we go along.

Talking to Educators

Our study in summer 2015 was limited to a school setting in rural Tamil Nadu [1]. Therefore, we ventured to schools in other low-resource settings in India – in an urban slum in Mumbai (in the West) and in a peri-urban setting near Kolkata (in the East). Talking to teachers/tutors and NGO volunteers from different parts of India, and in different socio-economically situated after-school centers/schools, we learned that some aspects of using digital media are common across socioeconomic and geographic boundaries: children are more engaged when digital media (photographs/videos) are used to explain concepts. Another common theme that emerged was that the students were definitively enthusiastic and likely to accept the idea of an online learning environment, more so than their teachers. Their reasons ranged from content not being in a language they are comfortable in (regional languages like Marathi/Bengali) to the content

not having "local flavor", to even not having enough training to use emerging technologies and digital media. We are working to explore this further.

Next Steps

Having completed a survey of web-based content providers across India and of educators and their expertise in using digital content, we plan to look into building a repository that can serve educators and teachers, allowing them to curate content (instead of creating it on their own). We have surveyed learning environments in three locations (with different socioeconomic backgrounds) and we would like to attain a deeper understanding of how these schools would (differently) like to approach the task of designing an online curriculum for their students. These are the boundaries that our work tries to cross, by aiming for a deeper understanding of the challenges that lie in the path of a technology-based solution for learning environments in low-resource settings.

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