Operational Plan for Scaling Teacher Access to Training and Support for Integrating ICT and Interactive Pedagogy with Virtual Reality in two Indian States: Maharashtra and Telangana

ICT India Working Paper   #18

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August 2019

Center for Sustainable Development
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Executive Summary

Technology has many uses to improve the quality of education. This paper uses Virtual Reality (VR) as a medium to improve teacher's teaching styles. The objective of the paper is to use a reliable technology that can help to improve the teacher training techniques. Instead of relying on traditional teacher training methods, these simulated modules will help the teachers to get a refresher training very close to the schools.

The VR platform developed with the support of Ericsson has been piloted in Myanmar based secondary schools before. The Ministry of Education helped to implement VR based teacher training for secondary school teachers in Myanmar. The teachers provided useful feedback and the modules were further revised.

The modules focus on teaching styles. How should the classroom be made more inclusive? Is the teacher giving every student a chance to speak-up? What are the ways that the teachers can engage the students in the classroom? Irrespective of the content being taught, some generic principles on teacher training pedagogies could be made an integral part of any teacher training.

This study will help to see if the modules will help the teachers in two states in India-Telangana and Maharashtra. VR will be employed in the States' teacher training center in Maharashtra and a DIET in a district in Telangana. The trainers attending the trainings in the two States will be very different, for Telangana it will be the DIET faculty. For Maharashtra, it could be the State level teacher trainers. Therefore, the modalities of how the teacher training is delivered and to whom will be different and thus the modules can also tested in the two States.

A research component will follow the trainings. Observations of the trainings and classrooms, interviews with the teachers, surveys will be used to collect data to understand the mechanisms on how VR could be used in these settings.

This report includes the rationale of using VR in the two States. It also provides a brief on the previous Myanmar deployment. The report further explains the engagement with the Government in the two States and the people/centers that the study will be using for contextualization of VR to the Indian setting. It also presents how VR will be operationalized and the timeline for the 2019 academic year for the two States.

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Introduction

Since 2005 the Earth Institute at Columbia University (EI) has led the Millennium Villages Project in sub-Saharan Africa. The Millennium Villages Project (MVP) is a proof of concept that the Millennium Development Goals, including MDG 2, can be achieved even among the poorest communities in sub-Saharan Africa by simultaneous investments in agriculture, education, health, infrastructure and business development.

MVP's Project Leads Professor Jeffrey Sachs and Dr. Nirupam Bajpai had a similar integrated rural development vision for India, but at the district level. India's scale is just too big to focus on villages. This project wants to demonstrate that targeted innovations and spending are high-impact and scalable. According to the 2001 Census, there are over 600,000 villages in India, so even if a project does great work in a set of villages, it's still quite difficult to prove scalability. Alternatively, the districts are substantial – from 1.5 to 4 million people, and hundreds of villages each, but more viable models than, say, a state. This was the geographic premise for the Model District Project (MDP) in India (see details of the project at the end of the section).

In both these cases-Millennium Villages Project in Africa and Model District Project in India there are key commonalities-
1. **Scale:** Cost efficient strategies that are contextualized to the setting were used to benefit maximum people. Multi-state, multi country projects with policy borrowing and lending frameworks were preferred.
2. **Science based interventions:** Based at Columbia University, state of the art research was utilized in designing, planning and implementing interventions.
3. **Policy relevance:** All interventions were planned with a vision of them being integrated into government policies. This also ensured sustainability of the interventions
4. **Multi-stakeholders:** The main stakeholder for the two programs is the national and local government agencies. The other stakeholders include, community, UN agencies, other NGOs as well as local institutions.

India relevance

Following the above given principles of the Model District Project, this document outlines some broad strategic vision. The Earth Institute team would also like to take advantage of all the stakeholders including District Administrators/Collectors, Education Officials at the district, state and national level to be a part of this next phase of interventions.

Digital Literacy as a Key Strategy for the Education Sector

ICT holds an important promise for education in rural areas, if it is optimized. In principle, schools ought to have highly educated and specialized staff, buildings with laboratories, and a

considerable stock of materials. However, such support is missing. Math and science teachers are scarce and often absent, so students may get little of the intended syllabus. Often even the textbooks are absent.   As a result, students who are already weak attend institutions that cannot teach them the basics. Thus, they may get diplomas but no skills. Therefore, the proposed intervention is to capitalize on inexpensive mobile technology for improving teachers' ability to deliver quality instruction to enhance basic literacy and numeracy as well as build digital skills. A key strategy to enable teacher training for enhancing student skills in literacy and numeracy is through using Virtual Reality.

Background to Justify the Need for Virtual Reality

The Earth Institute proposes to pilot its Virtual Reality Teacher Training Platform currently used in 3 states in Myanmar to two Indian States Maharashtra and Telangana, India. In Maharashtra, the Maharashtra State Council of Educational Research and Training (MSCERT) and Leadership for Equity (LFE) will lead the efforts with support from CSD. For Telangana, the DIET in Telangana's Mahbubnagar District will be the implementing partners. The Virtual Reality (VR) platform was developed in 2017 by EI's Connect to Learn initiative – a partnership with global telecommunications company Ericsson. Platform development was supported by Qualcomm Wireless Reach, and was designed as a follow-up to a 2-year engagement in Myanmar supported by UK Aid's Girls' Education Challenge, during which 31 schools received installations of teacher computer kits and student tablets, and were equipped with connectivity. Teacher trainers from the Myanmar Ministry of Education received training in integration of ICT into classroom practice, which they then implemented with teachers from participating schools. To sustain progress on teacher uptake of technology in classrooms, the initiative needed to identify a low-cost approach to ensure teachers would have ongoing access to training and support. This is where Virtual Reality came in. By designing a localized series of modules that could be used and reused by teachers with many different pathways, the Ministry of Education could achieve similar results as would otherwise require the high costs of training venues, per diems, transport, and missed days in the classroom.

EI and Ericsson, together with a UK-based VR firm, developed a series of four modules to help 1000 plus teachers understand the goals of student-centered, ICT-integrated pedagogy and explore various approaches to integrating it in the classroom. The approaches and sample activities that are covered in the modules are based on a global literature review of recommended pedagogical practices from country curricula in order to ensure that the activities covered are applicable in different country contexts.

Adapting the VR Teacher Training Platform

Maharashtra

Since 2018, the CSD education team has been engaged with MSCERT and LFE in Maharashtra, conducting action research to support the state's efforts to strengthen strategies for increasing quality of education through integration of ICT in schools. One strand of the education research involves looking at different models of conducting teacher training in integration of ICT for more interactive, learner-centered classroom practice to understand what approaches work best for the various diverse contexts within Maharashtra, in alignment with the state's strong commitment to identifying effective, scalable solutions for equipping Maharashtra's massive population of teachers with these skills. CSD's VR Teacher Training Platform offers the possibility of bringing individualized training and practice opportunities to pre-service teachers-in-training and teachers even in remote areas of the state where in-person training is more difficult. The platform offers an individual space where teachers and teachers-in-training can practice using a breadth of pedagogies, student-centered activities, and ways of using technology, all in a virtual classroom that mirrors their own classroom, and which are based in their curriculum. The existing modules developed for Myanmar can be adapted for the context and curriculum in Maharashtra, focusing on pedagogies and classroom management strategies that are applicable across subjects, including skills in setting clear learning objectives, conducting formative assessment, integerating ICT in classroom practice, providing encouraging feedback to students, and moving through the room to provide more direct support and feedback to students.

Telangana

Under the umbrella of Earth Institute's Models District project, multiple health and education sector interventions have been planned and executed in collaboration with the District Office in Mahbubnagar since 2014. The interventions include school –based strategies to improve enrollment especially for girls, improvements in class-based instruction in literacy among others. In 2018, in collaboration with the Mahbubnagar District Government, a Center for Sustainable Development led curriculum has been implemented in an ICT Center for women. More than 100 adolescent girls have participated in various batches at the Center. The interventions have helped the girls to become job ready by focusing on social emotional learning, preparation for interview skills, computer literacy as well as skills in conversational English literacy. As a part of the interventions, the District Institute for Education and Training (DIET), the Government's teacher training institute at the District level, has also collaborated with the ICT Center to start their own computer program at the college. As a result, all primary school teachers in training will receive the State mandated computer education before they are placed at the Government schools across the District. The computer program benefits more than 150 student teachers each year. The District Magistrate and Collector has approved using VR in the District at the DIET. This will be a core strategy of improving teacher education at the DIET in the district.

Overall, the Earth Institute recognizes the irreplaceable value and role of teachers in the education process, and plans to incorporate training and professional development for teachers as well as research what enables best practices in classroom teaching and incorporation of ICT

as part of the intervention. The Earth Institute plans to refine and streamline teacher training, delivery and assessment processes, given students' and teachers' realistic capacities in poor areas, and research how technology-enabled teacher professional development and support impacts teacher practice at early primary and lower secondary levels. To boost literacy and numeracy development, VR modules can be developed to guide student teachers in how to conduct remedial lessons for students behind grade level, and train teachers on the language knowledge, reading, estimation and automatization competencies through continued practice in languages and math.

VR for the State of Maharashtra is a statewide intervention and will target the teacher training institutes with the help of LFE, targeting 1-2 regional academic authorities to start. The VR intervention in Telangana, will be targeted at a DIET (around 150 student teachers each year) with placements at schools to understand the implementation at the rural District level. The State wide intervention in Maharashtra along with a tighter much closer to the school intervention in Telagana, will provide us a robust set of variables that could be used to scale-up the intervention with Government support in year 2 and year 3.

Proposed Operational Plan for Maharashtra

Adaptation and piloting of the VR platform in Maharashtra would entail the below listed activities during the 2019-20 academic year:
1. **Sep-Oct 2019:** Adapt existing modules and training guide to Maharashtrian curriculum, targeting ICT skill gaps, in consultation with MSCERT, DIECPDs aligned with module subject areas, LFE and other NGOs involved in the education sector, and tech savvy teachers identified by state leadership and DIECPDs.
2. **Nov-Dec 2019:** Conduct 2 days training of trainers (ToTs) with MSCERT leadership, select DIECPD staff in regions focused on pre-service training and professional development in aligned subjects, and block resource persons for in-service trainings. For the first year, CSD proposes piloting with DIECPDs for pre-service instruction, and in 2 blocks, working with 20-30 in-service teachers per block, and reaching 10-15 schools per block, delivering training focused on 1) use of the hardware, 2) functionalities within the modules, 3) module content, and 4) monitoring and support mechanisms. Support DIECPDs and block resource persons in carrying out 2-day teacher trainings in use of the VR platform and collecting feedback from teachers.

3. **Jan-Apr 2020:** Conduct two rounds of classroom observations and teacher focus groups/interviews to observe changes in teacher practice and teachers' perceived confidence and skills for integrating ICT. Similar research will be going on in parallel with other approaches to teacher training.
4. **May 2020:** Produce report of findings comparing utility of VR platform for inculcating teacher confidence and skills for integrating ICT into their practice to other approaches to teacher training being used in Maharashtra. Comparative analysis will look at cost, time commitments required by trainees and trainers, teacher satisfaction with training content and support, and correlation with changes in teacher practice.

These proposed activities and timeline are further detailed out in the Gantt Chart [linked here](#).

Proposed Operational Plan for Telangana

Adaptation and piloting of the VR platform outlined above in Telangana would entail the below listed activities during the 2019-20 academic year:
5. **Sep-Oct 2019:** Adapt existing modules and training guide to Telangana primary curriculum, focused on classroom management strategies and learner center pedagogies that can be applied across subjects.
6. **Nov-Dec 2019:** Conduct training of trainers with DIET leadership.
7. **Jan-Apr 2020:** Conduct two rounds of student teacher focus groups/interviews to understand student teacher perspectives on the utility of the VR platform for their training.
8. **May 2020:** Produce report of findings on utility of VR platform for inculcating student teacher confidence and skills for integrating effective classroom management practices and approached to early literacy ICT into their practice, with recommendations for scale-up.

The stakeholders needed for successful implementation of this project include the following:
- Ericsson – for management of VR module adaptation
- MSCERT – for oversight of and input into module development, training development and implementation, and monitoring
- DIET in Telangana for coordinating trainings and integration of VR platform into their pre-service curriculum
- DIECPDs in Maharashtra (particularly the regions working on math, science and/or language) – for input into module development (2 days), training development (4 days) and implementation. (4 days)
- BRPs – training (2 days) implementation (4 days) and monitoring (8 days)
- LFE – for input into module development, training development, implementation, monitoring and report writing

- CSD & TERI – for overall coordination of pilot, facilitation of input into module development, module design, training development and implementation, monitoring, data analysis, dissemination of findings
- NGOs – input into module development

APPENDIX

Virtual Reality Teacher Training Platform Overview

The **objectives** of the training platform are for teachers to:
- Practice using **backward design** that helps clarify lesson objectives and activities
- Engage students with **learner-centered**, inquiry-based methods
- Practice using different pedagogies while **integrating ICT**
- Make lessons **relevant** to students' lives
- Build in **formative assessment** activities to your lessons

Teachers are guided through facilitation of learner-centered activities that use different **pedagogical approaches**, including:

- Recalling prior knowledge
- Open-ended questions
- Pair and Group work
- Individual practice
- Discussion
- And more!

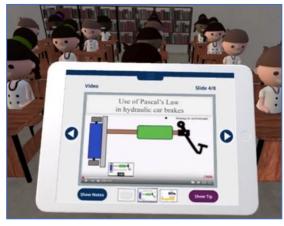Each module includes different ways of **integrating ICT**, including:
- Finding videos on YouTube
- Using tablet applications to facilitate practice exercises
- Pair and Group work
- Conducting Google search/image search
- Word processing
- Using Google maps
- And more!

Teachers are encouraged to **answer student questions with thoughtful responses** that help students understand how they can improve, and your response choices will be analyzed by the platform, with feedback provided at the end.

When teachers put on the headset, they are transported into the virtual world of the training classroom. Teachers begin in front of a teaching podium where they find most of the information needed to teach the class. Functionalities found at the podium include:
- **Slides** – just like a PowerPoint presentation in a real-life classroom, the slides on the podium are what virtual students will see projected to them, and which the teacher can use them as the basis of what they'll present to their students
- **Interactions** – By pulling down the menu at the top

of the podium, teachers see options for engaging their students, such as asking students a
question or assigning an online activity

- **Tips** – On the bottom right of the podium, teachers see a "Tooltip" feature where they can
go to get extra guidance on how to present or facilitate each element of the lesson

Teachers receive feedback on both **Lesson Content** and **Classroom Management** in the form of
a score card at the end of each module, offering detailed feedback for further practice.

Lesson Content metrics consider:
- activity choices
- pedagogical methods used
- integration of ICT
- sequencing of activities

Classroom Management metrics consider:
- duration of interactions
- volume and tone of voice
- eye contact
- correct responses to students
- time taken to call on students with
  questions
- movement around the room

A video of the flow of activity selection and setup captured from within the environment can be
viewed [here](#).