Teaching, Technology, and Teacher Education During the COVID-19 Pandemic:

Stories from the Field

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"Therefore encourage one another and build one another up, just as you are doing."
(1 Thessalonians 5:11; ESV)

Use of ICT for Active Teaching and Learning in the Indian Government Secondary Schools during the Lockdown 2020

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The paper highlights the use of ICT enabled active teaching and learning by teachers and students in the COVID-19 lockdown period in some of the government schools (low resourced) in Eastern India. Some of these activities included participating and facilitating online WebQuests: creating online quizzes, discussing online with experts, using online collaborative tools. Other strategies included leveraging teaching and learning through online chat platforms in the low network areas and creating and presenting ICT enabled projects online across states. The teachers and students in these schools had prior experience of using ICT enabled project based learning under a large scale program and the teachers had undergone continuous professional development in meaningful use of ICT in secondary schools. Suggestions are made to integrate learners as producers' approach, foster agency in teachers through continuous professional development, and demonstrate WebQuests like activities to help teachers adopt constructive use of technologies in the lockdown period.

INTRODUCTION

The context of the paper is situated within a large scale program called Integrated approach to Technology in Education (ITE) (ITE Manual, 2013). Unlike other ICT based initiatives for the students of the lower Socio-Economic-Status (SES) where technologies are used for drill and practice and remedial work (Hohlfeld, Ritzhaupt, Dawson & Wilson 2017), ITE program offered students an opportunity to create their own ICT enabled projects within the curriculum topics (Charania & Davis, 2016). An Initiative of Tata Trusts (Philanthropy in India), ITE is implemented in government secondary schools (lower SES) in four states, reaching about 33000 students and 3500 teachers. Teachers are central agents in this approach who creatively adapt to poor infrastructure to design lesson activities which enable students to create their learning artefacts situated within the curriculum and their local context. Teacher professional development is continuous to facilitate implementation of ITE in classrooms and starts with a four months certificate course in the blended mode offered by a deemed university, Tata Institute of Social Sciences. In the course, the teachers develop critical understanding of meaningful and relevant use of technology in school education. Digital agency (Passey, 2018) is central to the ITE program and the student learning best resonates with Papert's (1991) and Jonasen (1999) claims that learners should be actively engaged in constructing artifacts using technology for constructing knowledge.

INNOVATION

In January 2020, for the first time since its inception, the students presented their ITE projects online at interstate level, with support from their teachers. In the month of March, 2020, when the COVID-19 locked down period started in India, ITE team at TISS launched an online series of webinars whereby the students and teachers independently participated in WebQuests "an inquiry-oriented lesson format in which most or all the information that learners work with comes from the web" (WebQuest.org) using their mobile devices at home. The teachers and students' engagement in the synchronous WebQuest was phenomenal and suggested leveraging digital agency (Passey, 2018) that ITE offered them in the pre-lockdown period. It seemed they used their competence, confidence and autonomy (willingness to participate, choosing their subtopics, projects and tools) in adapting with distance and other technology applications in the lockdown period. Teachers participated with enthusiasm supporting their students during the WebQuests. About 300 students and teachers participated in these WebQuests, however, this experience became an exemplar for many ITE and non ITE teachers and students to use distance technologies for project and problem based learning.

After the webinar in March, students and teachers volunteered to conduct such webinars for other students and teachers, showcasing how they made ITE projects using SCRATCH and Python in subjects like Math and Geography. The ITE team at TISS coached and prepared a platform for them to conduct such webinars across ITE locations. The WebQuest resources and guidelines are given in the table below.

Title	Description	Link	Contents
WebQuest 1-Communicable diseases	A three-day interstate ITE Web Quest (6 hours) on "Communicable Diseases" was organized by ITE Resource team at the Tata Institute of Social Sciences, Mumbai in collaboration with ITE teachers from Kolkata, Assam and Madrasah, West Bengal for students of class VII to X. The main activities in the WebQuest were students undertaking a web search, asking questions to the experts on the panel, making quizzes and participating in a synchronous quiz on Kahoot.	https://sites.google.com/view/iteWebQuest1-com-disease/	• Step by step instruction related to the WebQuest for the participants (students and teachers) Manual for teachers to replicate the webinar and learning Youtube link to a short video regarding the WebQuest

Title	Description	Link	Contents
WebQuest 2- Air Quality evaluation	A two-day (4 hours) Web Quest was designed for students of class VII-XII for them to research and compare the "Air Quality Evaluation" across districts and states. They conducted a web-search on AQI and in virtual groups plotted a graph depicting depleting AQI in multiple locations. The students then researched and presented reasons for AQI depletion and other environmental effects of locked down using Piktochart, spreadsheets, programming sensors using Arduino uno kits, scratch, posters etc.	https://sites.google.com/view/airquality-evaluation	- Step by step instructions related to the WebQuest for the participants (students and teachers) - Presentation used during the WebQuest by the facilitators of the WebQuest to guide the participants
Sample ITE projects in the pre-lockdown and during lockdown period	Some of the projects made by the ITE students using different forms of technology.	https://youtu.be/hnsdm8Wa5QQ https://youtu.be/gtMPeXQ9DQk https://youtu.be/AJwrPQOpzOU	1. Pre-Lockdown period. Webinar organized in January 2020 with ITE students from three states, Uttar Pradesh, West Bengal and Assam took part in the webinar along with their teachers on the topic, Role of technology in water conservation 2. Lockdown period. A project made by students of Kolkata using Mblock and Arduino UNO kit in the lockdown period. 3. Pre-Lockdown period. This project is a video made by ITE students on changing the course of the Kopai river affecting the farmers in Reendanga (Kamla Kantapur), West Bengal.
Constructive teaching and learning with technology-Part 1	This course was offered to teachers in government schools. This enabled them to implement ITE. The objectives of the course are to develop critical awareness and a deeper understanding of the role of technology in teaching and learning. The course draws on contemporary like Digital agency, TPACK, ISTE, NCF 2005. This course is developed from the four month blended course in ICT and Education.	https://www.tissx.tiss.edu/courses/course-v1:TISSx+ICTC02+2020_C02_EN_001/about	- Objectives and introduction to the course - Description of course units and pedagogy
Constructive Teaching & Learning with Technology Part 2	The course delves into how teachers may use technology for continuous professional development with their peers by creating and managing a Community of Practice using virtual and blended platforms. This course is developed from the four month blended course in ICT and Education.	https://www.tissx.tiss.edu/courses/course-v1:TISSx+RTICTENC03+2019_C03_EN_001/about	- Objectives and introduction to the course - Description of course units and pedagogy

After the first WebQuest, interviews were conducted with seven ITE implementing teachers involved in the WebQuesst. The purpose of these interviews was to study the relevance of ITE implementation, the TISS course, and their pedagogies in teaching and participation in WebQuest in the lockdown period.

RESULTS

The interview data indicated that the experience and learning of technical skills, confidence and understanding of using technology for active learning in the certificate course and ITE project implementation during the pre-lockdown period helped them to teach in the lock-down period. Some of the interviewed teachers also supported other teachers in their schools to teach at distance. Teachers in rural areas used WhatsApp to communicate and distribute lesson activities and readings as video conferencing was not possible due to poor Internet connections. Most of the teachers interviewed used the WhatsApp groups with their students they had already created for sharing ITE projects just after the certificate course. Out of the seven teachers interviewed, three used active pedagogies in the online classes like whiteboard for discussions, conducted virtual project based learning for example, assigned small video making of science experiments at home, and posted on WhatsApp and School websites. The excerpts below from two of the teachers narrate the activity centered approach in their conducting of classes in the lockdown period. Both the teachers were ITE implementing teachers from a government aided school who completed the certificate course in 2017 (translated in English).

1. I am doing different projects with my students in this lockdown condition. Recently we have completed a project called a flying game on scratch. This is related to the geography subject and topic is atmosphere. ... Thereafter we are going to complete our syllabus in lockdown.
2. After teaching, I give them assignments related to real life experience ... Over Google classroom, the students are allotted definite problems and time to submit the given assignment. Students are more responsive online than the face to face regular classes and they solve the problem very quickly. Using the white board features, I use different colour pens to highlight the hurdles and I get an excellent result. I do not solve the sum for them, I call the students one by one and they solve the problem…

The interviews were conducted before the second WebQuest, and six out of the seven teachers interviewed participated very actively in the first WebQuest. Some of the responses from the teachers indicated that students enjoyed and actively participated in synchronous quiz, presented projects to audiences across states, researched on the given topics, and learned new technical skills such as creating an online quiz. Some of the constraints were network connectivity and understanding the languages used (Hindi and English) by the hosts.

The ITE implementation and the certificate course in the pre-locked down period allowed teachers and students to design, create ICT artifacts while creatively adapting with inadequate ICT infrastructure in government schools (Charania, Kaur, Paltiwale & Sarkar, 2020). However, it cannot be directly implied that all teachers who implemented ITE and took the certificate course will start teaching using an activity based approach in the distance mode. Only three of the seven teachers interviewed indicated using project based learning and other active engagement strategies in their virtual classrooms in the COVID-period.

IMPLICATIONS

Exploring activity based technology tools in the lockdown

Instead of heavily relying on online content and teacher directed videos, project and problem based learning pedagogies using WebQuests can be explored in the lockdown period. The teacher interviews indicated WebQuest allowed students' collaboration and active participation, critical thinking and deep conceptual understanding of concepts; similar findings are documented in the WebQuest studies (Alias et al., 2013). Problem and project based learning using technology makes learners more responsible and active in the learning process (Grant, 2002) it allows young learners to develop an

understanding of new concepts in a real life context (Wirkala & Kuhn, 2011). Besides being rich in fostering problem and project based learning, the WebQuest in this study also demonstrated the complex integration of technology, content and pedagogy (Koehler & Mishra, 2006) and therefore an attractive tool for teachers to cover the syllabus in the lockdown period.

Building teachers' capacity in the lockdown

Providing teachers with direct and concrete examples of including technology in specific contexts may be helpful (Ertmer 2010) and will encourage teachers to use such platforms with their students (Nanjappa & Grant, 2003). Although teachers involved in WebQuests in this study had gone through rigorous professional development through courses and other activities, they were not all able to transfer this learning into active teaching in the lockdown-distance period. The WebQuests for students conducted by the university team served as useful demonstrations for them. Further, structured instructions and resources for the WebQuests (as in this table) for at scale dissemination with language and cultural adaptations by teachers can be encouraged.

Continuous Teacher Professional Development

A rigorous CPD for in-service teachers in ICT integration should not only enhance technical skills but constructivist ways of using technologies (Kim & Sharp, 2000) and a sense of agency in teachers empowering them to choose, design and use ICT resources in usual and unusual times. The certificate course curriculum provided in the Table can provide guidelines to integrate ICT in curriculum and pedagogy at both pre-service and in-service level.

Relevance of the ITE approach

Currently in India, the national and state digital platforms focus on online resources or content for students, but not much thought has gone into learners as producers of resources (LeaP, 2019). The project based learning approach of ITE should be integrated in the national efforts towards ICT in Education.

FUTURE RESEARCH

Comparative research is required to study the relationship between using ITE approach and professional development, and readiness and adaptability of teachers to use ICT for active learning in the distance mode. It will also be interesting to study the video recordings of the WebQuests to compare participation and artefacts created by the ITE students (government schools) and other private and elite schools' students in the WebQuests. This will also shed more light on the findings of Hohlfeld, et (2017) study on differential technology use across Socio-Economic-Sections in India.

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