






CONNECTED LEARNING INITIATIVE

2015 - 2018

CLI
CONNECTED LEARNING INITIATIVE

Led by

Massachusetts Institute of Technology

An initiative seeded by

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The Connected Learning Initiative (CLIx) is a technology enabled initiative at scale for high school students. The initiative was seeded by Tata Trusts, Mumbai and is led by Tata Institute of Social Sciences, Mumbai and Massachusetts Institute of Technology, Cambridge, MA USA. CLIx offers a scalable and sustainable model of open education, to meet the educational needs of students and teachers. The initiative has won UNESCO's prestigious 2017 King Hamad Bin Isa Al-Khalifa Prize, for the Use of Information and Communication Technology (ICT) in the field of Education.

CLIx incorporates thoughtful pedagogical design and leverages contemporary technology and online capabilities. Resources for students are in the areas of Mathematics, Sciences, Communicative English and Digital Literacy, designed to be interactive, foster collaboration and integrate values and 21st century skills. These are being offered to students of government secondary schools in Chhattisgarh, Mizoram, Rajasthan and Telangana in their regional languages and also released as Open Educational Resources (OERs).

Teacher Professional Development is available through professional communities of practice and the blended Post Graduate Certificate in Reflective Teaching with ICT. Through research and collaborations, CLIx seeks to nurture a vibrant ecosystem of partnerships and innovation to improve schooling for underserved communities.

Collaborators:
Centre for Education Research & Practice – Jaipur, Department of Education, Mizoram University – Aizawl, Eklavya – Bhopal, Homi Bhabha Centre for Science Education, TIFR – Mumbai, National Institute of Advanced Studies – Bengaluru, State Council of Educational Research and Training, Raipur, Chhattisgarh, State Council of Educational Research and Training (SCERT) of Telangana – Hyderabad, Tata Class Edge – Mumbai, Inter-University Centre for Astronomy and Astrophysics – Pune, Govt. of Chhattisgarh, Govt. of Mizoram, Govt. of Rajasthan and Govt. of Telangana.

30th July 2018

Any questions, suggestions or queries may be sent to us at:
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01

WELCOME TO CLIx

The Connected Learning Initiative (CLIx), a collaborative project that won UNESCO's prestigious 2017 **King Hamad Bin Isa Al-Khalifa Prize** earlier this year, believes in developing an ecosystem leading to quality in education. A multi-state, multi-partner initiative seeded by the Tata Trusts, CLIx has been working to improve teacher education and student learning through the use of ICT-enabled Open Education Resources (OER) and is currently in its third operational year. Driven by Tata Trusts' commitment to serve disadvantaged communities in India, CLIx draws on MIT's leadership in platform-based, blended-learning and interactive technologies in education, and TISS' experience of impactful field action programmes for underserved and marginalised communities in school and teacher education to ensure equitable access to educational technology and opportunities to improve learning outcomes.

The initiative has currently partnered with the governments of **Rajasthan, Mizoram, Chhattisgarh and Telangana** to work in government high schools with students and teachers. It has also collaborated with a number of organisations for curriculum development and implementation. These include Eklavya (Bhopal), the Centre for Education Research and Practice (Jaipur), the Homi Bhabha Centre for Science Education (Mumbai), Mizoram University (Aizawl), the Tata Institute of Fundamental Research (Mumbai), the National Institute of Advanced Studies (Bengaluru), State Council of Educational Research and Training, Raipur, Chhattisgarh the State Council of Educational Research and Training, Hyderabad (Telangana), Tata ClassEdge (Mumbai), and the Inter-University Centre for Astronomy

The launch of the Connected Learning Initiative, 27 January 2016, Mumbai

and Astrophysics (Pune).

Currently, CLIx offers **15 modules** in **Digital Literacy, English, Mathematics, Science**, and **Values Education** in **English, Hindi and Telugu,** to **478 schools** in which ICT labs have been activated. **35,074** students in Grades 8 and 9 have benefited from the modules. **2438 teachers** have participated in Teacher Professional Development workshops and are on mobile-phone enabled Communities of Practice. By the end of 2018-2019, CLIx aims to reach 1000 Government schools.

CLIx Principal Investigators receiving UNESCO's King Hamad Bin Isa Al-Khalifa award in Paris, France, on March 7, 2018

The CLIx modules integrate select concepts, topics or skills from subject areas, chosen in collaboration with teachers, teacher educators and academic experts through state-wide workshops and consultations that were conducted between 2015-2016. Guided by the philosophies of **constructivism and constructionism**, CLIx offers students opportunities to work in a hands-on manner to construct knowledge in active ways, and enhances the prospects of professional development for teachers in their respective subjects through the use of ICT. All CLIx content is currently released under the **Creative Commons Licence 4.0.** True to its vision, in the coming year, CLIx aims to convert the modules and other assets into Open Educational Resources (OERs) that can be reused, re-created, modified and adapted to varied contexts. It aims, in the process, to be truly free - where we define 'free' as the spirit of freedom and independence to create, learn and grow!

This document provides an overview of the vision and journey of CLIx. It gives a glimpse of technology in CLIx, the pedagogies and approaches of the student and teacher modules in Digital Literacy, English, Mathematics, Science and Values, the implementation processes, collaborations and partnerships that have enabled the presence of CLIx in the Indian classrooms and the action research accompanying and supporting the programme.

In short, it is the story of the birth and growth of CLIx over the last three years.
We invite you to join us in this journey!

02

INTRODUCTION TO CLIx

CLIx is a bold and innovative experiment that offers a scalable model with global relevance for quality teaching and learning, harnessing modern technology to improve the academic prospects of high school students from underserved communities of India.

Quality at Scale

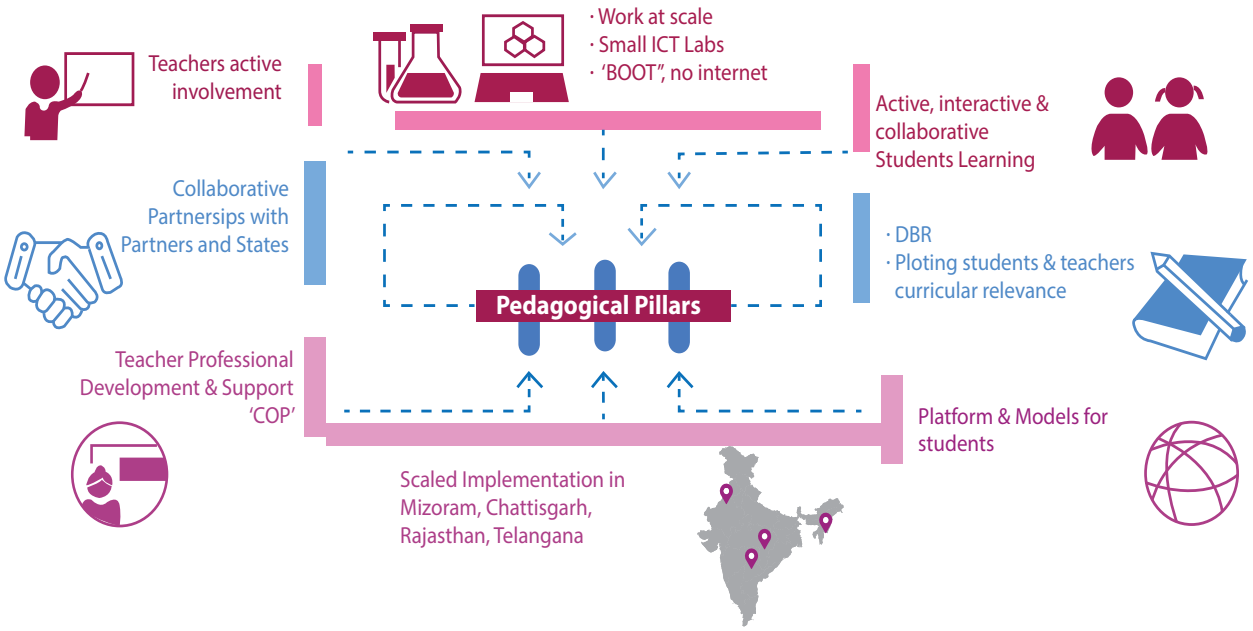
Students
Improve professional and academic prospects of high school students

Teachers
Improve professional and academic prospects of teachers

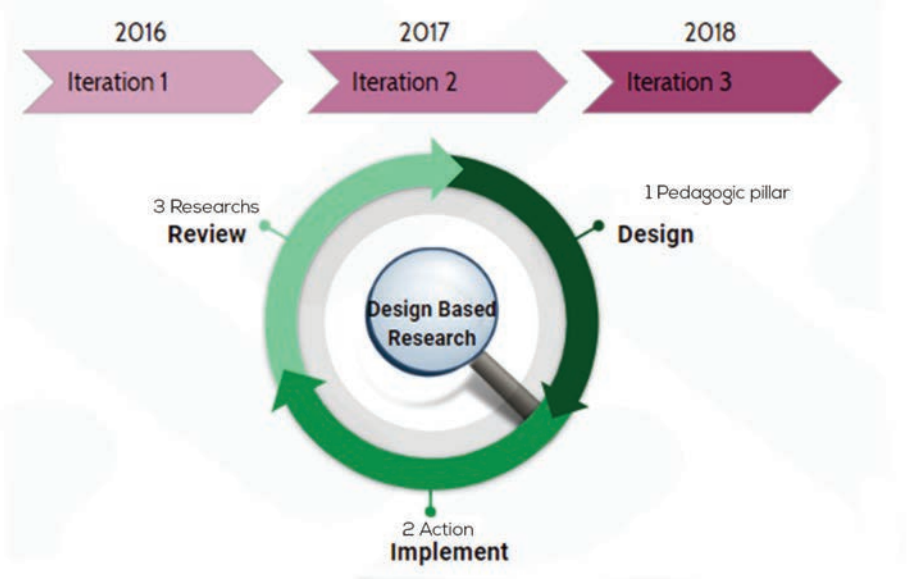
"Platform"
for curricula offering, professional development of teachers, research and innovation in education

With its four-pronged approach that includes classroom activities, lab activities, IT enabled activities and review and assessments, and by integrating educational technologies in pedagogical design, CLIx aims to provide high quality learning experiences to students in Hindi, Telugu and English, focusing on authentic, hands-on, conceptual learning and the development of values, skills and competencies.

Key Aspects of the CLIx Initiative

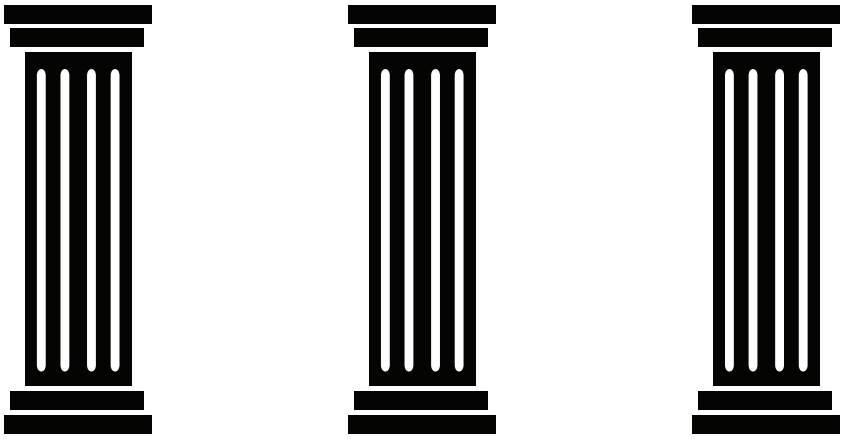


The Design Process



CLIx seeks to demonstrate the transformation that the education system needs, as envisioned in the National Curriculum Framework 2005 (NCF 2005). CLIx module content, technology tools and learning platform were created through a rigorous, iterative process of design based research.

The CLIx Pillars



Collaboration Learning from mistakes Authentic Learning

The design and development of CLIx modules have been guided by these three pillars. These pillars have proved to be invaluable for designers, students and teachers who implement CLIx.

Capacity Building

Two design camps held at MIT, Boston in 2015 and 2016, and one in TISS, Mumbai in 2016, helped build a pool of professionals who would eventually be more well-versed in issues of design thinking, design based research and large scale data.

Design camp at MIT, Boston (2015)

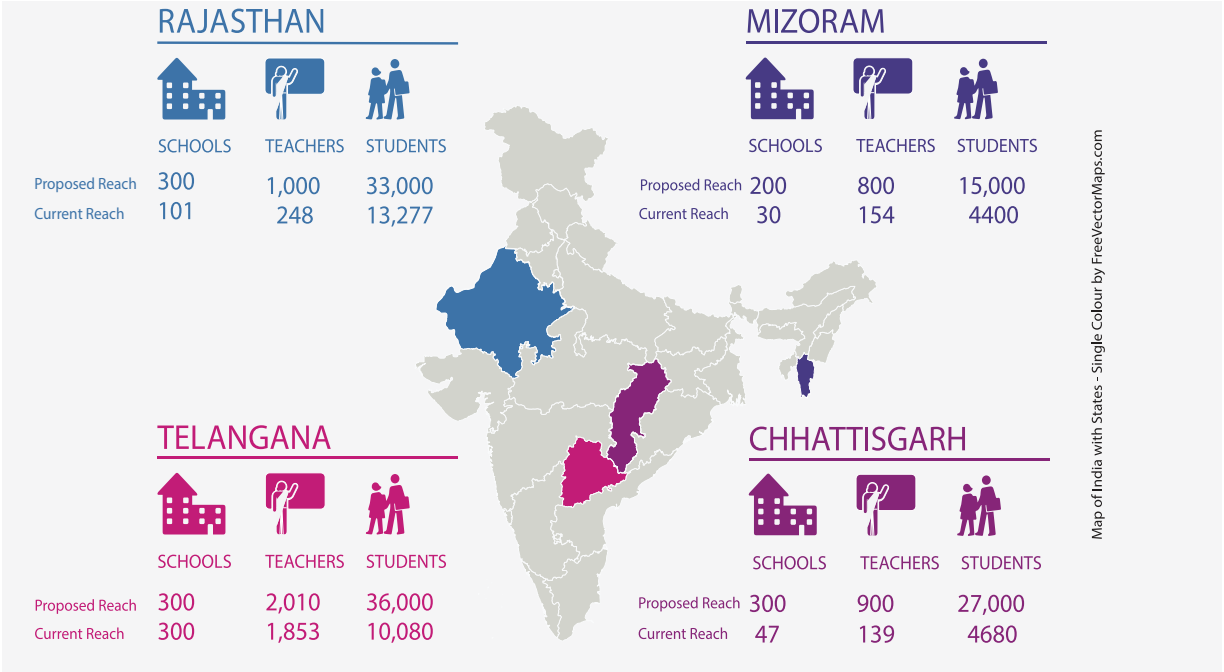
Design camp at MIT, Boston (2016): Team testing a paper prototype of a game for Geometric Reasoning

Participants at the Teacher Professional Development Design Camp in Mumbai in 2016

03

QUALITY AT SCALE IN CLIx

Following the Right to Education Act (RTE), the Indian education system has expanded to near universalisation in secondary education. Curricular and pedagogic reforms are in process to prepare youth to acquire, demonstrate and apply deep conceptual understanding and skills to avail opportunities in a modern, technologically-driven society. However, learning quality is poor. Only 40% students perform at recall levels in Mathematics and Science and only 20% reach higher order problem solving (National Assessment Survey, 2012). The scale of challenges, especially in underprivileged areas, include teacher shortages and quality, poor resources in Indian languages, and the absence of a culture of active, hands-on learning.The challenge to be addressed in the current educational framework in the country is providing quality education at scale.



* As on March 2018

CLIx: A scalable intervention

What is 'quality' in education?
Quality education, which results in valuable learning by students, is marked by

- **authentic and active learning**, with curriculum and assessment components that nurture **higher order cognitive development**, self-confidence and consolidated learning through the **mother tongue**,
- valuable and powerful **content-knowledge** and **skills** that contribute to capabilities and understanding
- **development of the self** as a social being, citizen and learner
- promotion of pedagogies for **self-paced learning, individualised support** and **development**, which involve teacher support and development,
- access to and **interaction within peer group and expert groups** to link to new and wider circles of opportunities
- **feedback** and **credible assessment** leading to certification.

Innovation in education can take advantage of technological advances and can be harnessed to address areas of need such as conceptual learning, the development of values, citizenship, professional skills and competencies, and facility in English. Innovative applications of educational technology can be leveraged to address the needs of underserved youth to access education and contribute to their life opportunities. Such learning opportunities should not only make a difference to success in high school examinations, but should also be empowering and visible when youth access higher education, professional development programs and the world of work.

Technology applications, in particular simulations, games, visualizations, and online labs, have been used across the world to create powerful and authentic learning experiences at scale through quality curriculum, as well as to provide access to resources to communities of learners. The availability of the edX platform offers the possibility of unprecedented scaling of these high-quality interactive learning opportunities in the form of 'courses of study'. The new affordances of communication and openness also allow for scalability to become an intrinsic part of design and offer a sustainable and comprehensive solution to India's educational needs of the 21st century.

Achieving Quality in Learning at Scale:

Each aspect of CLIx has been guided by this commitment to quality. Connected and collaborative learning manifest in active partnerships between members of subject

Implementation workshops, 2016 and 2017

domains, states and teachers, evolving into a vision of developing learning communities. Teachers form the core of this learning community, ensuring quality learning through timely inputs that can enable constructivist and active learning. All these aspects have shaped curricular, technology and implementation design to move towards the larger vision of reaching the underserved, unreached communities in English, and 2 other Indian languages - Hindi and Telugu

CLIx in schools

From the classroom to the CLIx lab

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TECHNOLOGY IN CLIx

CLIx learning technologies is an **ecosystem** of thoughtfully designed, developed and customized learning tools, based on the CLIx pedagogical pillars. These learning solutions are a collaborative effort of TISS, MIT and HBCSE. The CLIx learning technologies have evolved through a grounds-up approach to provide quality education, despite the resource-constrained contexts they operate in.

Use of Technology in CLIx:
Technology has been used to

enhance opportunities for hands on learning and experimentation,

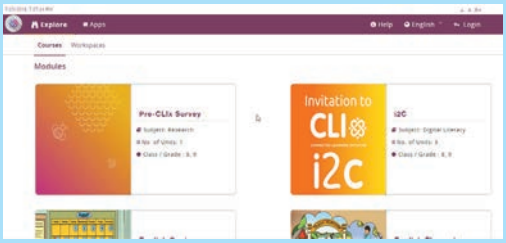
enhance the learning process through new pedagogical affordances for investigation, inquiry and reflection, revision assessment and collaboration.

enable access to knowledge, content and experts, and communities of peers and practitioners.

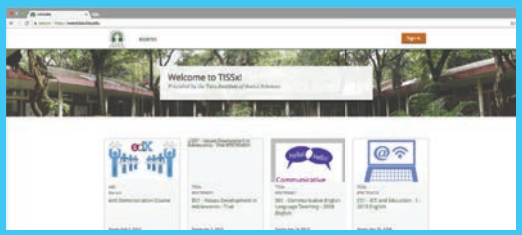
The CLIx platform is suitable for resource constrained conditions, which include limited devices and lack of or intermittent internet. At CLIx, the ICT labs that already existed in schools were enhanced, making the intervention cost-effective and economically viable.

ICT lab before and after the CLIx intervention

The CLIx learning technologies include



the CLIx Platform, which is the learning platform for students

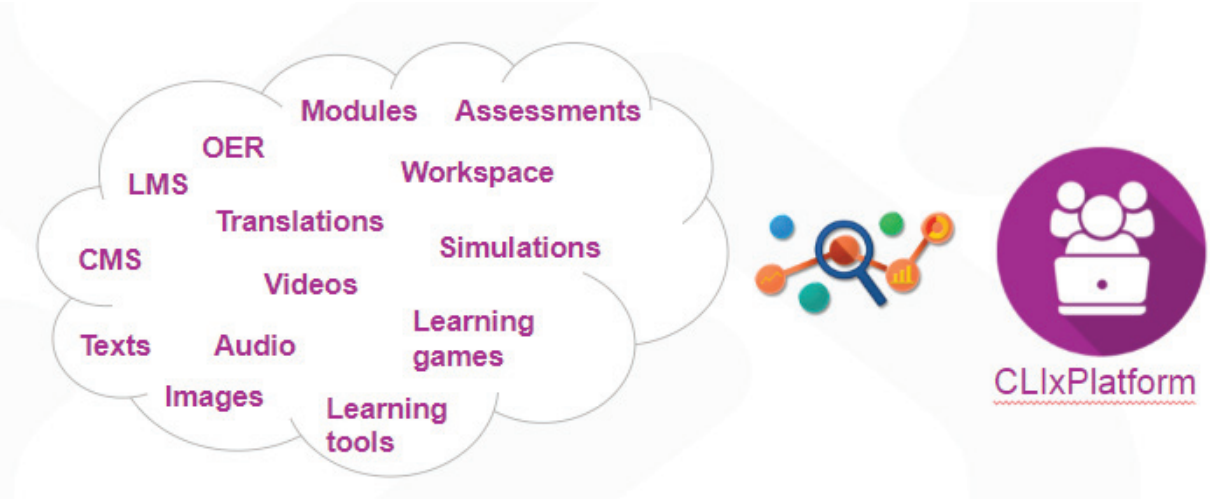


the TISSx, which is a platform that teachers access for their professional development courses

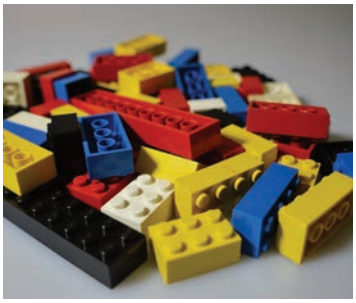
Telegram

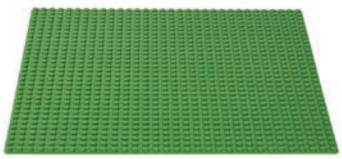
the open source technologies for Communities of Practice

The Design



Key Elements: CLIx Student Platform	Innovative Design Features
• Indigenously designed makerspace → promotes exploration and creation	• Connected learning experience even without internet "internet-in-a-box" / DOER
• Buddy login feature → promotes collaborative learning	• Built on gStudio
• Content management system (CMS) → enables easy course creation	• OpenSource
• Learning Management System (LMS) → enables easy access to courses	• Lego modelled
• Open Educational Resources (OER) Repository	• Opportunistic use of internet for updating content and data collection
	• Unplatform for standalone computers



APPS +  PLATFORM =  NGDLE

The platform acts as a lego-board for learning apps, where externally developed digital learning tools can be embedded. The l**atest version 18.06 released in June 2018** (https://demo-clix.tiss.edu) hosts 1**5 modules and 30 course units**, integrates **16 types of Open Assessments**, offers **interactivity, collaborative and constructionist learning** features such as buddy login, workspace, discussion, creation and sharing of artefacts, to provide a virtual makerspace and integrates more than 20 learning tools including open-source tools such as TurtleBlocks, SugarLabs, PhET and GeoGebra.

The platform works both online and offline. The **online** version uses a **cloud-based** model of anytime anywhere access, while the **offline** version is modelled as an "**internet in a box**". In this set-up, a **local server** in a LAN mimics the online version to provide a connected learning experience that includes collaborative features like creation, sharing and discussion of student artefacts, without internet.

The platform is **powered by gStudio**[1] and complies with open-standards (SCORM, OSID, LTI, QTI), positing elasticity in design and interoperability of content and courses with other learning platforms/LMSes. It is also **API enabled**, allowing for an easy to fetch interface for anyone who would like to import content.

The key development features are:

1. Unplatform, a lightweight content player (LMX) that can be installed on standalone computers. The courses can be exported as epub files from the CLIx Platform, which can then be imported and played on the Unplatform

2. The TISSx[2] or the teacher platform that hosts the Teacher Professional Development courses. This is powered by Open-edX and acts as a MOOC platform that allows massive scale-up. The teacher professional development courses are hosted online on a cloud-based model that provides an anytime-anywhere access. The TISSx android app provides easy access to the course and the discussion forum on a mobile device. TISSx provides learning analytics and engagement data

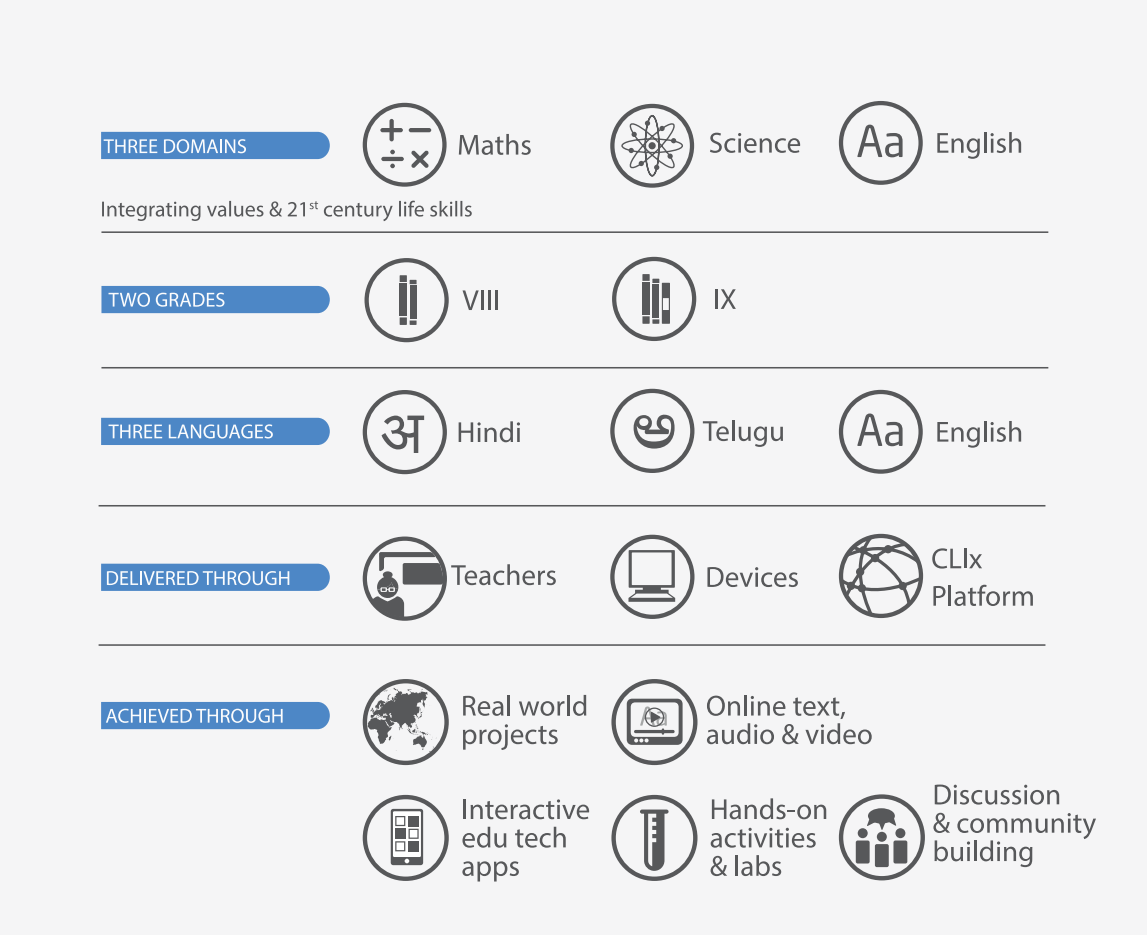
(1. https://gitlab.com/gnowledge/gstudio

2. www.tissx.tiss.edu)

05

THE CLIx STUDENT MODULES

The student modules use a **combination of digital and non-digital tools** and **low cost, locally available materials** for lab activities to enable **students to be creators**, and not merely consumers, of content. The topics of the modules are mapped to the state curriculum and selected **based on hard-spots**. Relevant research literature relating to the topics were drawn upon while creating the contents. Feedback was sought from teacher educators and subject experts from state governments before the **contents** were authored and **reviewed multiple times for Quality Assurance**. This is supported by feedback from teachers in real time, which is a paradigmatic shift from trends where technology is used to either teacher-proof curricula, or micro-manage teachers..



The CLIx student modules

The following sections outline the approach, pedagogy and objectives for the modules developed for students in CLIx.

DIGITAL LITERACY

ENGLISH

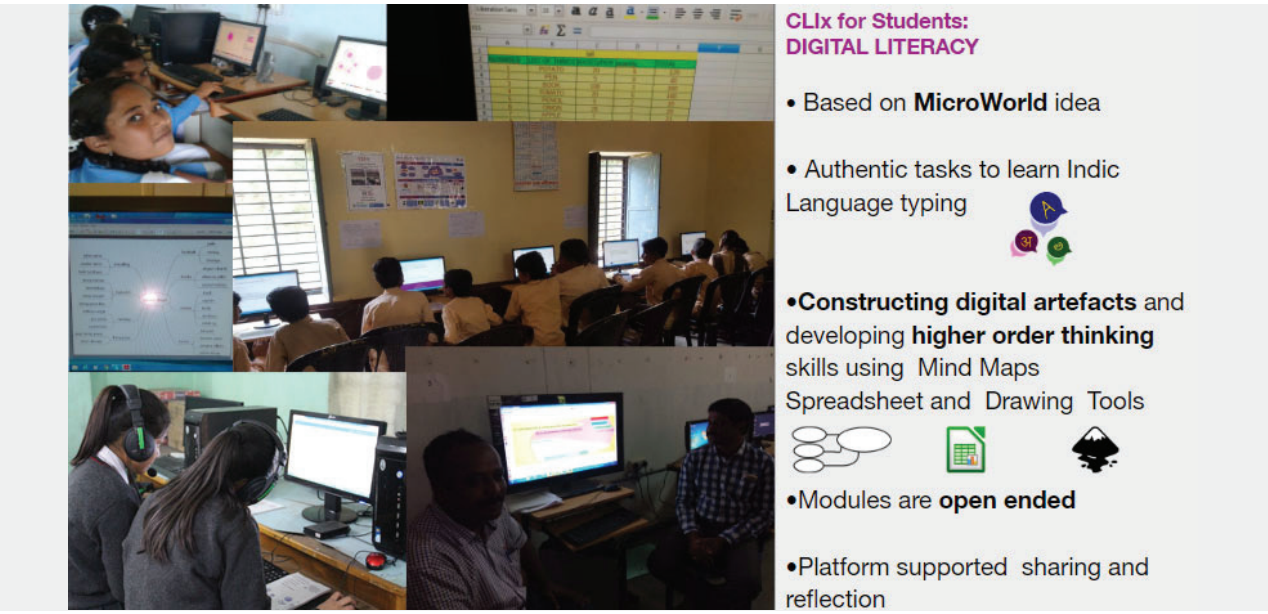
MATHEMATICS

SCIENCE

VALUES

DIGITAL LITERACY

One of the first offerings in the the CLIx project, Invitation to CLIx (i2C) provides learners with an innovatively designed digital literacy course that is available in English, Hindi and Telugu. i2C is designed to be an easy and exemplary connected learning experience, facilitated through a platform where collaborative interactions happen. i2C aims to prepare learners for conceptual and investigative engagements in English, Mathematics and Science offered through CLIx.



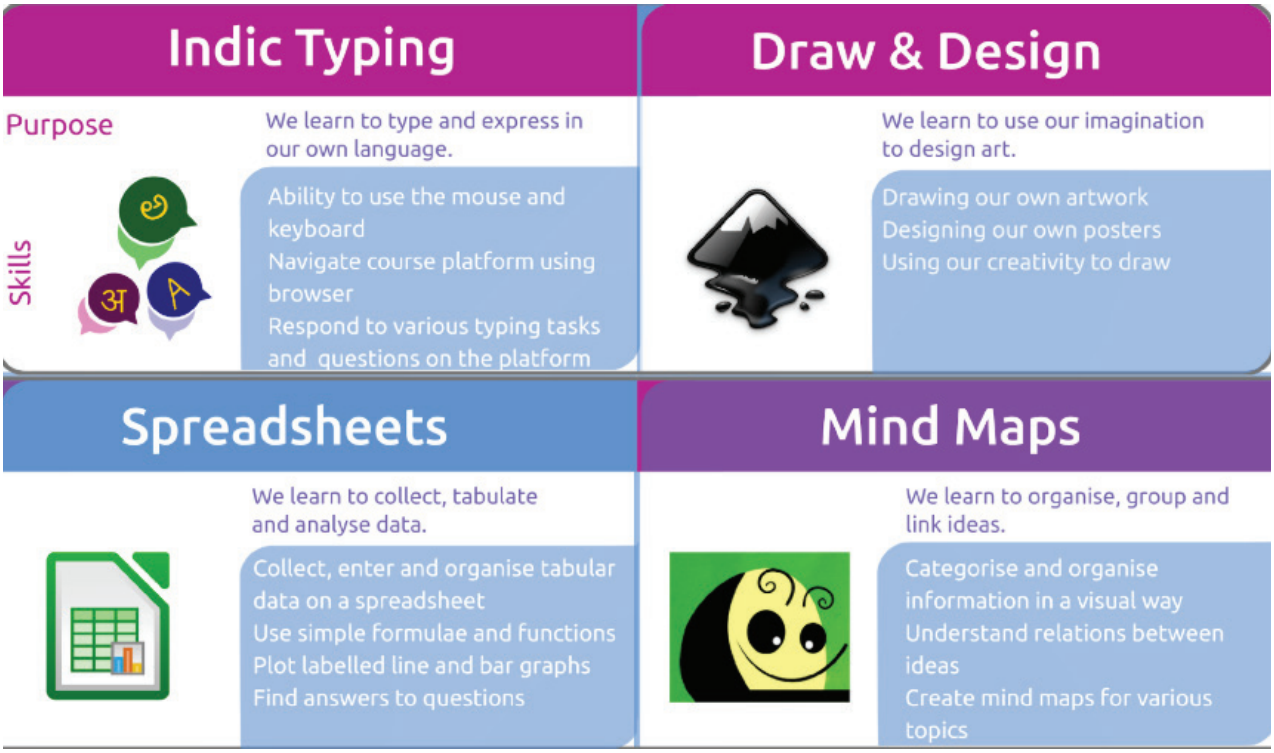
Approach and Pedagogy

The i2C course draws on the pedagogical approaches of **constructivism, constructionism and connectionism**, incorporating the CLIx pedagogical pillars in its design principles. Free and Open Source Software (FOSS) has been used in alignment with the vision of CLIx to provide quality learning materials at scale to underserved communities in India.

Curricular Objectives

- Equip students and teachers with technology skills
- Enable media literacy in students and teachers to analyse, explore and create media for self-expression
- Enable data literacy in students and teachers to use the internet, digital resources and platforms (eg. Moodle, MOOCs etc.) for locating and using relevant data ethically
- Equip learners with transdisciplinary digital skills to use resources in and outside classrooms in all contexts

Being a skill based course, the assessment is continuous and is done by peers and mentors on the platform. The platform includes the necessary infrastructure for providing activity profiles of the students. The clearly stated task deliverables make it easy for students and teachers to assess the results. The platform also traces and provides analytics on students' actions. This includes the files uploaded, e-notebook entries made, comments and ratings given, and quizzes solved. The analytics for the entire class are visible to the mentor for overview.



Grades: 6 -10, Hours of e-content: 22
Development Partners: Homi Bhabha Centre for Science Education (TIFR)

ENGLISH Aa

The CLIx English course aims to use ICT tools to provide access to authentic, communicative material in English, a safe space to learn and practice English with peers and opportunities to use English meaningfully and purposefully in the classroom.

Curricular Objectives

- Focus on listening and speaking skills.
- Enhance communication skills and fluency in English.
- Foster autonomous and lifelong language learners.
- Promote critical and creative thinking among learners.

The key features of the modules include:

Use of multimedia and multimodal digital tools

Promoting self-paced and collaborative learning

The Pedagogy:

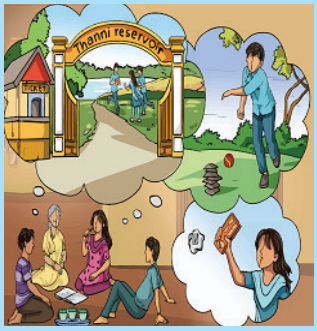
The CLIx English program adopts a **learner-centred, task-based approach** where language is learnt by using it in **practical, authentic contexts**. Research shows that to learn a language one must constantly listen to it and speak it. Accordingly, the CLIx English course uses **ICT to create an immersive experience** by providing audio-visual and textual inputs of language as it is used in real contexts.

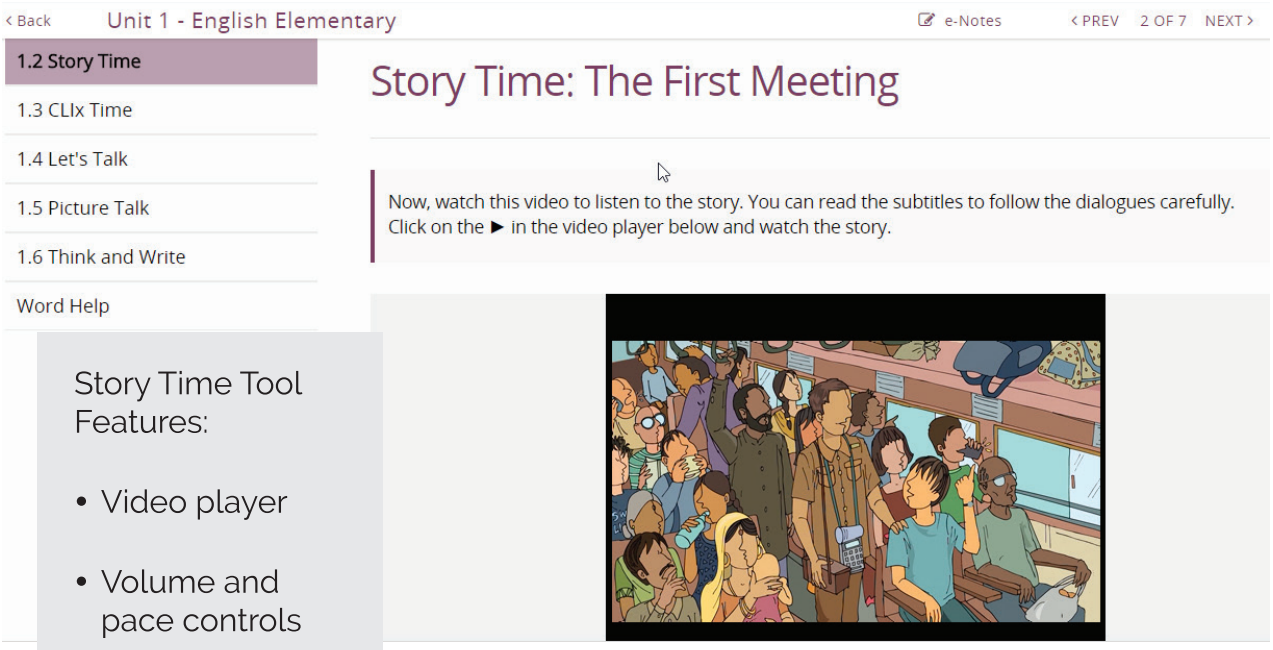
CLIx English is a Computer Assisted Language Learning program (CALL) located within the school ICT lab, where language tasks are designed to encourage peer learning and collaborative dialogue. Though there is an integration of the four skills - Listening, Speaking, Reading and Writing - the focus of the module is on Listening and Speaking, two skills that are under-represented in the regular English classroom.

The Approach

40 hours of content differentiated at **two levels, English Beginner (CEFR A2 level)** and **English Elementary (CEFR B1 level)** are available for all schools. Teachers are free to decide which level their students must begin with. The English Beginner module focuses on listening comprehension, basic vocabulary and encourages short open-ended responses to audio visual stories that students listen to. The English Elementary modules focus on communicative and functional use of language in everyday life and

include speaking tasks that emphasise collaborative work. As recommended by NCF (2005) and NFG English (2006), CLIx uses stories as a central artefact to teach language and to integrate language learning with creative self-expression.

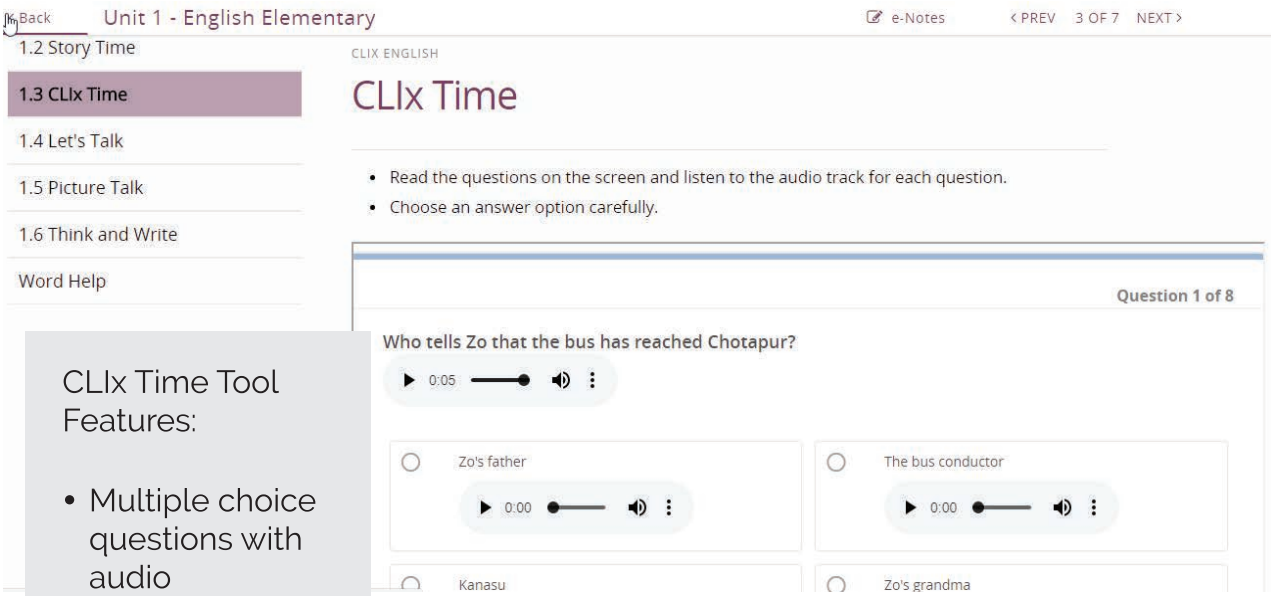
	Module	Description
1	English Beginner 	• Grades: 6-10 • Hours of e-content: 20 English Beginner is for students whose English vocabulary and grammar skills are limited. Theme-based lessons build vocabulary and improve listening skills. Short audio stories in later lessons improve listening skills and encourage students to speak in English.
2	English Elementary 	• Grades: 6-10 • Hours of e-content: 20 English Elementary is for students who feel confident about English grammar and vocabulary and are now ready to learn to use English in real-life situations. Woven around audio stories, the lessons show how language functions are communicated through conversations.



Story Time Tool Features:

- Video player
- Volume and pace controls
- Same Language Subtitles

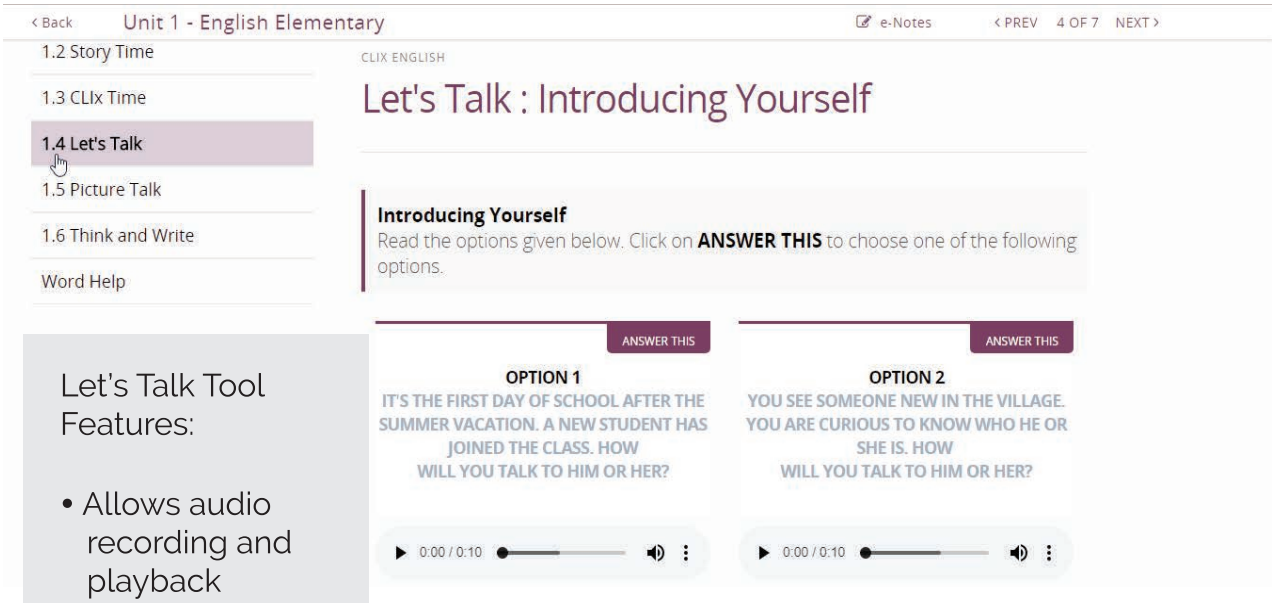
Story Time in CLIx English



CLIx Time in CLIx English

CLIx Time Tool Features:

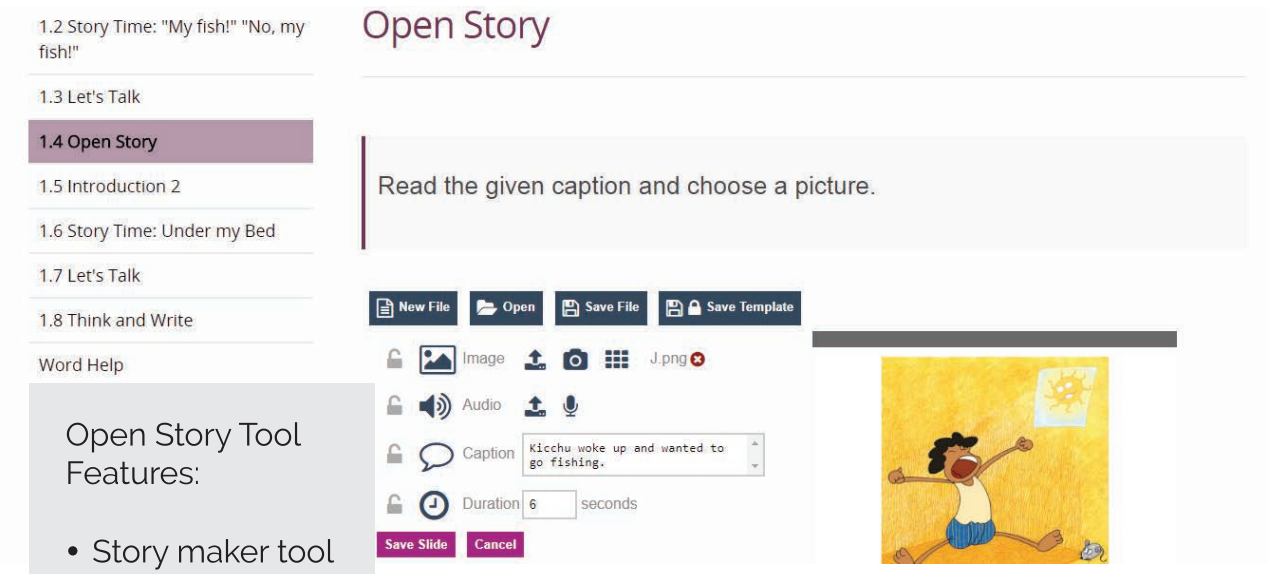
- Multiple choice questions with audio
- Allows multiple attempts
- Immediate audio feedback on answers



Let's Talk in CLIx English

Let's Talk Tool Features:

- Allows audio recording and playback
- Allows multiple attempts
- Provides model conversations and vocabulary support



Open Story Tool Features:

- Story maker tool
- Photo gallery
- Allows audio & text input
- Allows replay as a movie

Open Story in CLIx English

"I like the speaking and recording activity... because its the only time we get to speak a few sentences in English and we can also record and hear ourselves."
Std. IX Student, Aizawl

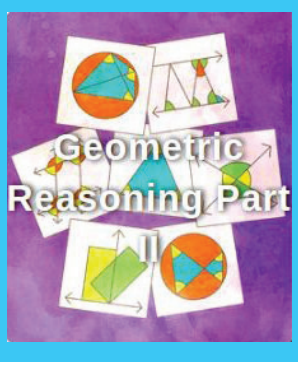
"These are innovative and exciting materials which break away from the traditional coursebook norms [...] They also follow second language acquisition findings in attempting to stimulate affective and cognitive engagement through humour, impact, challenge and involvement in problematic issues. They apply these principles through the use of a continuing, colourful and coherent audio-visual story with interesting characters and events, and through activities encouraging the learners to connect the materials to their experience and to express their own views initially in their own language and eventually in English. The activities respect the learners by being challenging but support is always on offer through subtitles, transcripts, word clouds and glossaries."
Professor Brian Tomlinson, University of Liverpool, Shanghai International Studies University, Anaheim University

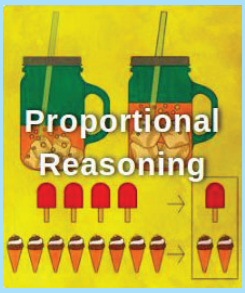
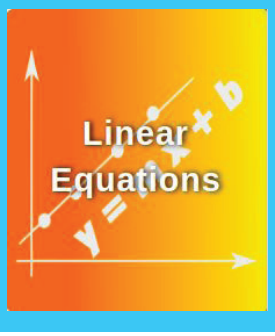
MATHEMATICS

The CLIx Math modules focus on conceptual understanding, reasoning, and communication of Math ideas. The modules emphasise peer learning through discussions in small groups, with the teacher's role as facilitator being a key element. The Maths modules also focus on problem-solving skills and teach learners to appreciate the nature and beauty of Mathematics as a subject. The contents in the three modules have been mapped to the States and NCERT Mathematics curriculum of Classes 8 and 9. Pre- and post-assessment and formative assessments are integral parts of the module.

Curricular objectives

- Understand and develop mathematical processes – deductive and inductive reasoning, exploring, making and testing conjectures and communicating mathematical ideas
- Develop conceptual understanding of geometric shapes and property-based reasoning
- Formulate and write a deductive proof by following through connected ideas
- Understand quantitative reasoning using additive and multiplicative thinking that involve comparison, sharing and scaling, and develop robust understanding of proportional reasoning
- Model a real life situation and interpret the mathematical expression of a situation in the content of linear equations

	Module	
1	Geometric Reasoning 	• Grades: 8-9 • Hours of e-content: 11 Analysis of geometric shapes and their properties, informal deduction, gradual building of the reasoning faculty, and the need for formal deductive proofs.

	Module	
2	Proportional Reasoning 	• Grades: 8-9 • Hours of e-content: 7 Enables students to identify and understand multiplicative relationships in contexts involving comparisons, sharing, and scaling, leading to conceptual applications both within and across subject domains.
3	Linear Equations 	• Grades: 8-9 • Hours of e-content: 4 Develops a conceptual understanding of linear equations through activities involving collecting data, and modelling situations using this data. The focus is also on developing an understanding of the physical meaning of the slope of a line in different situations.

Key Features

- **Re-interpreting the Curriculum:** Strengthening the intended curriculum by using parts of the textbook content for building foundational concepts, reinforcing reasoning ability, and understanding core ideas

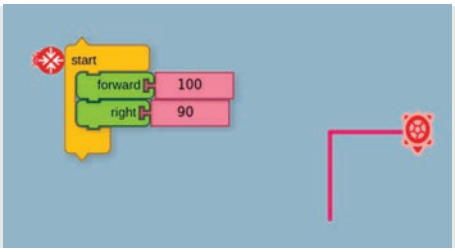
- **Transforming the Pedagogy:** Learning through meaningful explorations and games, discussion of mathematical ideas, and focusing on the processes of math

- **Engaging and Supporting the Teacher (through TPD):** Providing teachers access to high quality resources, helping them develop a better understanding both of mathematics as a discipline, and of the specific content to be taught and its purpose

The Pedagogy:

The CLIx Maths classrooms are organized in two batches, with recommended batch sizes of 20-30. Each batch is structured into fixed small groups of 2-3 students that work together for the duration of the module. For digital activities, when one batch is in the computer lab with the teacher, the other works independently on hands-on tasks or worksheets.

All modules also have digital activities that teachers are expected to offer to their students to work with, in pairs or in small groups, in the computer labs.



Turtle Logo:

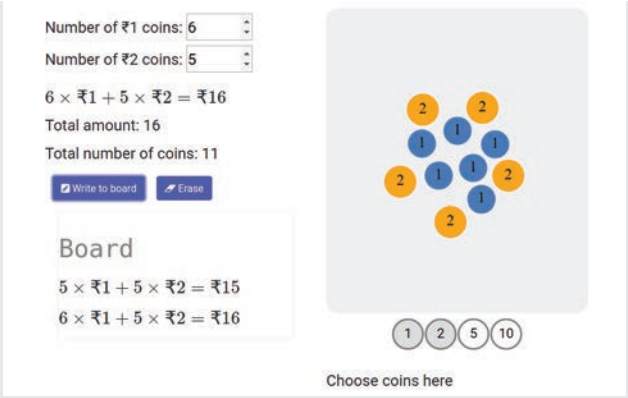
- Promotes geometric reasoning
- Create shapes based on commands
- Helps analyse properties of shapes

Police Quad:

- Promotes geometric reasoning
- Game-based learning
- 4 missions with increasing levels of challenge

Pattern Tool:

- Promotes proportional reasoning
- Allows scaling up & down with a specific scale factor



Coins Puzzle:

- Used in linear equations
- Interactive design for creating new puzzles

"Before CLIx I never knew that mathematics will be so much fun. It feels like we are playing game. Well, we were actually solving geometry."
Ms. Wendy - A student from Mizoram

"I think that in the long term if teachers can use it properly then it will help them in strengthening their concepts. "
Mr. David, Mizoram Board of School Education (MBSE) and Math domain advisor

"The objectives are clear and comprehensible. The objectives focus on developing the reasoning power of the students from additive thinking to multiplicative thinking. The arrangement of the units from basic to higher order is in a good sequential manner. The important concepts like sharing, comparing, equal distribution are selected."
Mr Robert Lalngaihawma (From Proportional Reasoning module review)

SCIENCE

Science is a compulsory subject during school years and scientific literacy is one of the aims of science education. The NCF 2005 position paper on 'Teaching of Science' points out three problems in the current state of science education. It is far from equity, it does not encourage creativity and it is dictated by requirements of the examination system. It strongly recommends incorporating 'Nature of Science', and inquiry into the science curriculum. In order to incorporate these features and student centred active learning, CLIx science modules are based on three pedagogic pillars: Collaborative learning, learning from mistakes and authentic learning.

Research in science education has shown that understanding topics such as sound, motion, atomic structure, etc., are usually difficult for learners. Some phenomena require longer duration of time and sustained observations for learners to understand their pattern and explanations behind them. Digital activities can be used along with the observations, hands-on activities and experiments, to develop richer understanding of science among students. Alternate pedagogy that inculcates experiential learning with understanding is essential if student learning is to move away from rote learning methods.

The Approach

Based on suggestions from teachers, CLIx developed six modules , 3 Physics, 2 Biology and 1 Chemistry for std. IX. These modules are informed by contemporary research in science education and created using a rigorous iterative design process. They use technology to enable both teachers and students to engage in experiential learning in accordance with the nature of science within the ambit of school curriculum.

All the modules in science aim to inculcate the culture of rational thinking through questioning, observation, categorization, experimentation and hypothesis building. They involve both classroom activities and digital activities. About 20 to 25% part of each module is digital. The remaining is to be covered in classrooms and involves hands-on activities and discussion around them.

Objectives

To help students

- To understand basic scientific concepts and rules from each topic (e.g. frequency and amplitude in sound; valency and rule of 8 in atomic structure; displacement, velocity and acceleration in motion)
- To develop skills required for scientific enquiry such as observation, data analysis, different kinds of reasoning, visualization, representational competence
- To inculcate curiosity, open-mindedness, rationality and positive attitude towards science

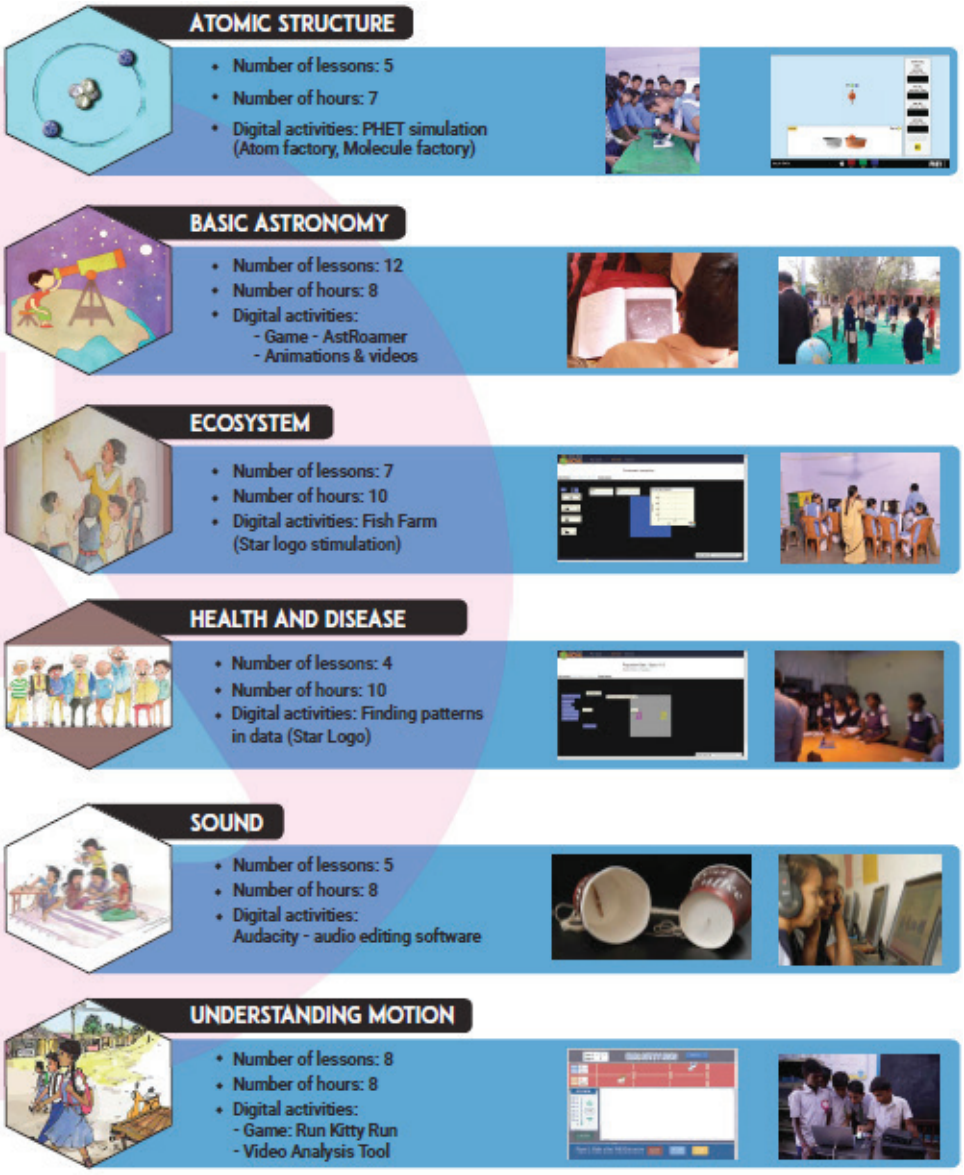
Pedagogy

Scientific inquiry involves observation of surrounding and experimentation. Table 1 gives a summary of all modules. Every lesson incorporates activity based approach blended with classroom lectures and discussions. Some activities are hands on that require experimentation using apparatus or demonstration by the teacher using an experimental set up, while others require guided field visit for observation and data gathering. All modules also have digital activities that teachers are expected to offer to their students to work with, in pairs or in small groups, in the computer labs. This is to encourage collaborative learning among students. There are open-ended tasks in the modules and reflective questions in between the lessons that provide space for students to apply their knowledge in meaningful ways.

Table 1: Exemplars of experiential learning approach in the science modules:

	Module Name	
1	Atomic Structure 	Provides opportunity for students to create virtual models of atoms and molecules using digital tools and make predictions to understand imperceptible models and processes. Development Partner: Eklavya
2	Basic Astronomy 	Helps students construct mental models to explain commonplace astronomical phenomena. Since visuospatial thinking plays an important role in this process, the module relies on spatial tools such as concrete models, gestures, role-plays, photographs, animations and diagrams. It also connects indigenous knowledge to observations and textbooks. Development Partner: TISS and IUCAA

	Module Name	
3	Ecosystem 	Introduces students to different kinds ecosystems (which may not be accessible to them) using videos. It uses a blend of physical and digital activities to help students grasp key concepts in Ecology. Development Partner: NIAS & Eklavya
4	Health and Disease 	Helps students observe, collect data through surveys and design hypotheses based on their observations. It includes hands-on activities where students collect and analyze data and weaves episodes from the history of science to shed light on the nature of science. Development Partner: Eklavya
5	Sound 	Encourages students to learn the basics of sound by following the process of science. The activities motivate students to investigate rather than rely on readymade answers. Development Partner: Eklavya
6	Understanding Motion 	Builds on students' experiences and intuitive knowledge about motion. It gives opportunity to students to replicate Galileo Galilei's classic 'Rolling Ball Experiment". Development Partner: Eklavya



"Teaching using the module is much better. Textbook diagrams and text was not clear to understand. Some things like rotation - revolution cannot be seen and hence we can't explain it very well. . . . . We learnt it for the first time. Now we understood that we can teach this things so easily to children."
Sunita Gupta, Teacher at GGSS, Sheetla Mata, Chaksu, Rajasthan on 'Basic Astronomy'

"These are very simple activities, we never thought that we can do so much even with the paper cup telephone only. We ourselves become students while doing the activities, children will also enjoy."
Ashok Kumar Yogi, Teacher and Teacher Educator, Gov. Sr. Secondary school, chhabra, baran, Rajasthan, on 'Sound' module

VALUES

Traditionally, values have been taught moralistically as do's and don'ts. Research however, shows that this didactic approach is not very effective with adolescents. The CLIx Values course uses critical thinking and reflection-based exercises to help students:

1. reflect critically on values rather than being 'told' what is right or wrong
2. reflect on personal choices and decisions from different perspectives
3. resolve conflicts in a positive manner and make decisions in alignment with universal values

The Approach

Values offers 35 hours of content across 20 lessons for the learners.

The lessons focus on exploring and understanding one's beliefs, emotions, strengths and weaknesses by reading stories and short cases. Questions, discussions and group activities help the learners understand the values emphasized in the lessons, reflect on their own values and motivate them to act in line with universal values. This also includes career guidance videos which provide glimpses of different professions and basic information related to these careers.

Module Objectives

- Develop self-awareness by understanding how our values, beliefs and emotions influence our behaviour and actions
- Learn to appreciate others and build interdependent relationships
- Learn to think critically and make informed decisions
- Identify one's strengths, weaknesses, interests and skills and be informed about career choices

The Pedagogy

We believe that values cannot be 'transmitted' by moralizing or laying down a code of conduct. The CLIx values program facilitates values development by presenting learners with nuanced ethical dilemmas involving competing values in realistic contexts that they can relate to. Learners are encouraged to reflect on choices and decisions from different perspectives.

The CLIx Values course uses short digital stories, cases and diary entries followed by multiple-choice as well as open-ended questions, individual and group activities, questionnaires and discussions. This provides opportunities to all types of learners to reflect on their own values, identify positive values and imbibe them.

"I like the stories. They are fun to read and also teach us something. We can choose answers for the questions just by clicking with the mouse!"
Std. VIII Student, Noida

"Students to get to read the stories and then they discuss it with their friends. They learn on their own without much help from the teacher. They enjoy this independence."
Assistant teacher, Vidya and Child (NGO), Noida

06

TEACHER PROFESSIONAL DEVELOPMENT

The professional development of teachers is a core concern in CLIx. The programme rests on the belief that true learning happens through a constant dialogue between students, teachers and the curricular materials. Transacting curricular materials effectively in class requires teachers to be proactively involved in building on their knowledge and skills, which will in turn enable them to foster active learning among students. A continuous Teacher Professional Development (TPD) is one way in which CLIx uses technology to bring about changes in classroom practice.

The CLIx TPD programme looks at alternative modes of delivery of professional development through a sustained engagement with the teacher. This contact is necessary to support the implementation of CLIx student modules in the classrooms as well. The TPD operates through the creation and sustenance of teacher communities of practice and online learning platforms by leveraging the affordances of new technologies. Through this engagement, CLIx aims to contribute to policy by building a robust continuous professional development framework for school teachers in India, based on empirical evidence from implementation.

Teacher workshop for professional development

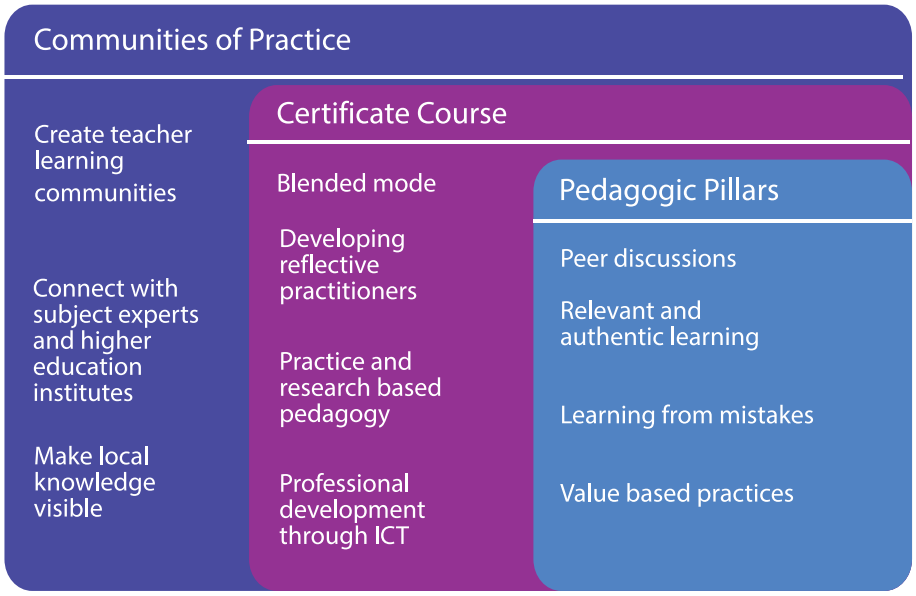
Teacher workshop for professional development

Teacher Professional Development: Objectives

- To develop understanding and skills to nurture an interactive, active and inclusive classroom
- To develop critical perspective, understanding and skills of ICT use for professional development and teaching learning
- To become an active member and participant of a community of professional practice

Pedagogy and Approach

The Teacher Professional Development (TPD) in CLIx is delivered via a 17-Credit Post Graduate Certification Programme - Reflective Teaching with ICT (PGC RTICT) offered by the Tata Institute of Social Science (TISS), Mumbai. The PGC RTICT offers **blended, practice-based** courses that run partly on TISSx using an Open edX platform built for



interactivity, discussions, peer feedback, assessment and certification. **Face-to-face workshops** are an integral part of the course design since the teachers require extensive facilitation in adapting to the new design of MOOCs and the CLIx student modules. Smartphones and android devices are used to develop **Communities of Practice (CoP)** in which expert faculty and educators interact with teachers in domain specific pedagogy and technology related discussions. The courses use short videos, write ups, quizzes, discussions and assignments. The structure and design of the courses have been guided by international studies, best practices and research on MOOCs. Field trials have also contributed to iterations and modifications in design and content. The courses encourage teachers to experiment with pedagogy using exemplar OER in their classrooms and share their experience with peers for feedback on the CoPs. The electives cater to individual interests and provide new perspectives and skills for professional advancement. The certification offered to teachers encourages them to view professional development as a lifelong learning and not limited to delivery of specific project-based content. Scale is being leveraged as an input to increase possibilities of peer to peer learning and motivation among teachers, both in the online learning platform and in the mobile based communities of practice.

The PGC RTICT programme can be completed in two time slots, where teachers enroll in one foundation course [ICT and Education] (4-credits) and one subject specialisation course [English, Mathematics or Science] (4 credits) in time period-1 and one action research study and three elective courses (1x 3 credit + 3 x 2-credit) in time period-2 to earn the 17-credits for the programme certification.

Certificate Course Overview

- To develope one's practice as a reflective teacher
- To develope understanding and skills to nurture an interactive, active and inclusive classroom
- To develope understanding and skills of ICT use for professional development and teaching learning
- To become an active member and participant of a community of professional practice

Course name	Duration (weeks)	Credits
Compulsory		
Introduction to ICT	12	4
Action Research or Digital Portfolio	12	3
Subject Specific Courses		
Communicative English language Teaching	12	4
Reflective Maths	12	4
Interactive Science Teaching	12	4
Electives		
Values Development in Adolescents	6	2
Media in classroom	6	2
Hands-on learning through Toy-making *Total 12 electives are available	6	2

Blended mode of delivery: Online/ face to face/ Practice
Total hours + 60,90,120,for courses with credits 2,3,4 respectively

Course Modalities

Open-edX

(Robust, sustains large groups open-sourced)

Videos, readings, Quizzes & activites

Online/digital skills for lifelong learning

F2F workshop & meet-ups

Conducted by TISS faculty

A hands-on experience of technology-based learning

Local meet-ups led by peer facilitators

Who can take the course

All practising middle school and secondary teachers (TGT/PGT/D.Ed/B.A.,B.Sc.) with access to an ICT lab

State governments, school managements can nominate teachers, NOC required

Flexibility

1-2 courses (max) at a time complete anytime within 5 years

To earn 17 credits

Attend 90% of F2F components
75% participation in CoP
Implementation of activities in classroom
Completion of assignments
Submission of AR/digital portfolio

Pedagogic Modalities

Self-study

Adapted course readings & material

Individual & group assignment

Action research projects, etc

Classroom Practice/ Implementation

Implement an exemplar tech-based module and reflect on practice

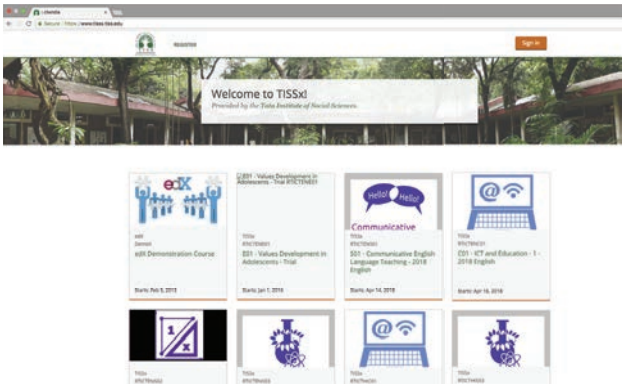
Table 1- Reflective Teaching with ICT Course Outline

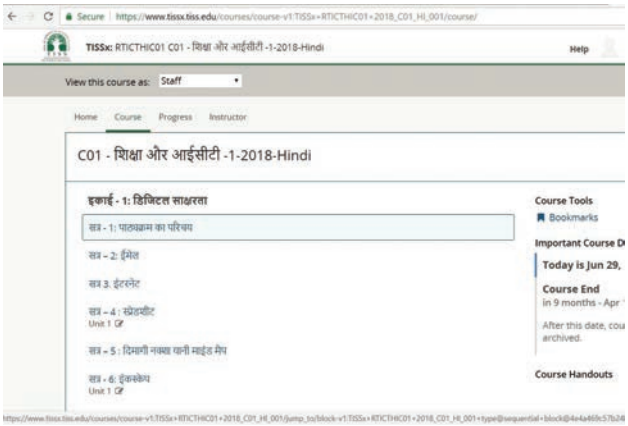
	Course	Mode/Credits
1	C01: ICT and Education	Blended/ 4 credit
2	S01: Communicative English Language Teaching	Blended/ 4 credit
3	S02: Reflective Mathematics Teaching	Blended/ 4 credit
4	S03: Interactive Science Teaching	Blended/ 4 credit
5	E-03: Hands-on Learning through Toy-making	Online/ 2 credits
	UNDER DEVELOPMENT	
6	C04: Action Research / Digital Portfolio	Online/ 3 credits
7	E-01: Nurturing Values Development in Adolescents	Online/ 2 credits
8	E-04: Designing Learning Experiences for the English Classroom	Online/ 2 credits

9	E-05: Assessment for Learning in Mathematics Education	Online/ 2 credits
10	E-06: Teaching Short Stories	Online/ 2 credits
11	E-07: Lesson Study Based Professional Development for Mathematics Teachers	Online/ 2 credits
12	E-08: Mentoring for Teacher Professional Development	Online/ 2 credits
13	E-09: The School ICT Lab	Online/ 2 credits
14	E-10: The School Science Lab	Online/ 2 credits
15	E-11: The Nature of Science and Science Education	Online/ 2 credits
16	E-12: Evaluation in ELT	Online/ 2 credits
17	E-13: Teaching Mathematics and Science Using Dynamic Mathematics Software	Online/ 2 credits

Technology Tools

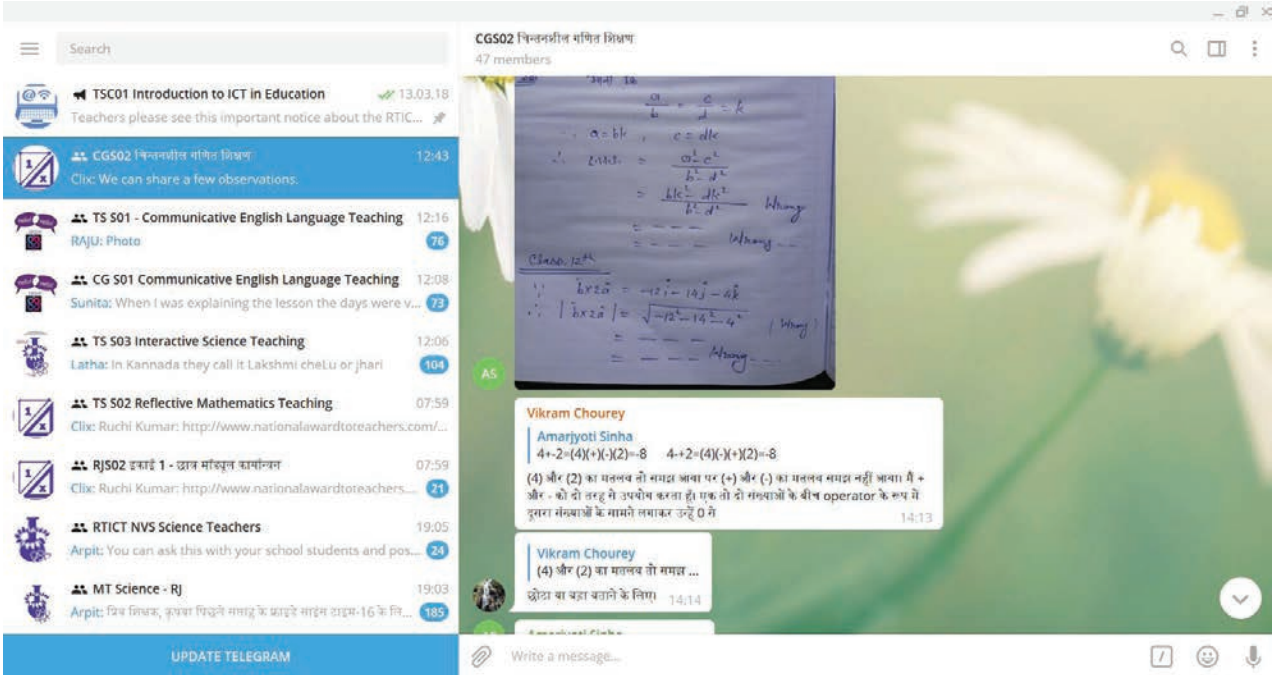
Teachers engage with each course curriculum and course assignments online via the TISSx (Open Edx) Platform to complete the course.





TISSx

Teachers share their experiences of implementing the CLIx student module and participate in discussions with their peers and TISS faculty in their subject-based Community of Practice (CoP) via **Telegram**, a mobile messaging app.



Communities of practice on Telegram

"Nice way to connect technology with class room teaching but it should be more strong if Internet facilities will be more effective in every Jnv's"
C01 - ICT and Education workshop, Teacher, Jawahar Navodaya Vidyalayas School, Chhattisgarh.

"This type of workshops is very important for the present and future for the teachers professional development. I request for more and more workshops for teachers in future also."
S01 - English workshop , Teacher, Government High School, Telangana

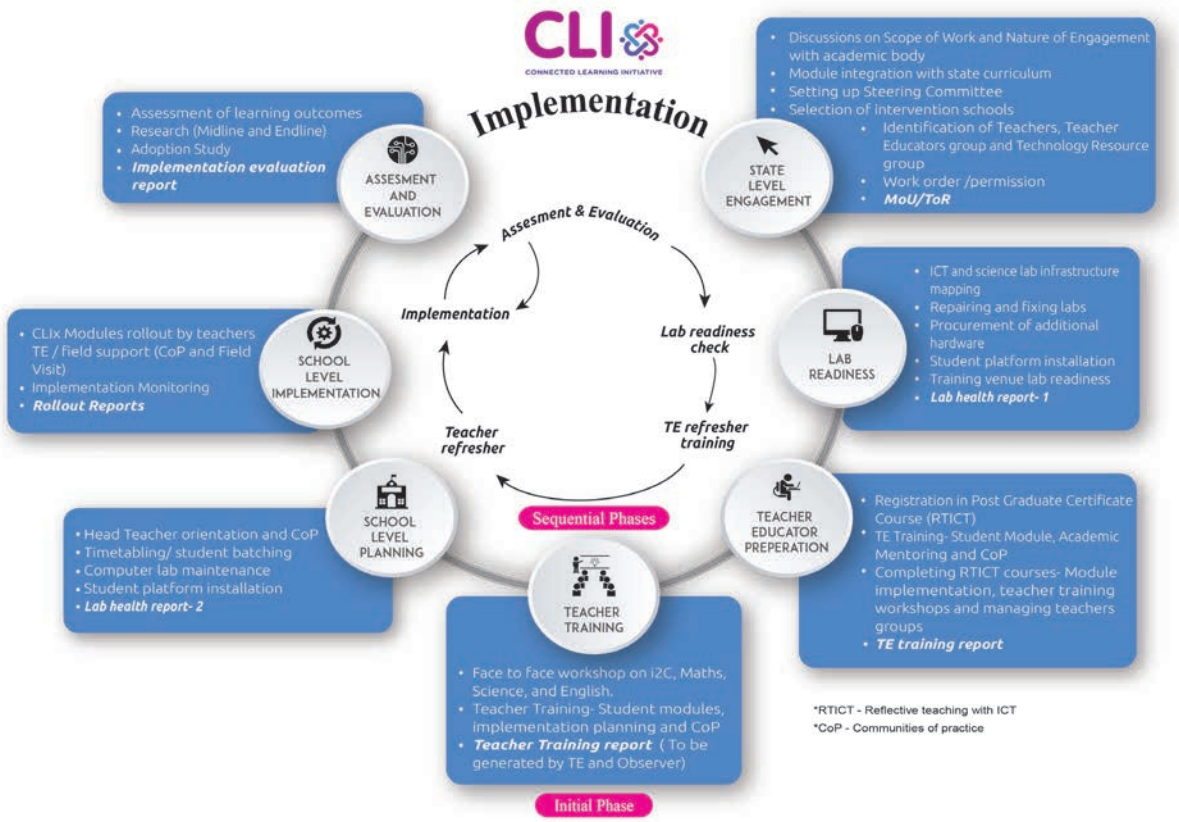
"The CLIx training is the first step in modernising teaching learning classes in my professional period. This made me to update myself that too in a short period."
S02 - Mathematics workshop, Teacher, Government High School, Telangana

"Things we learned during this period gave me an idea how to inculcate scientific attitude to the student, thanks to CLIx team. "
S03 - Science workshop, Teacher , 'Government High School, Mizoram

07

CLIx IMPLEMENTATION

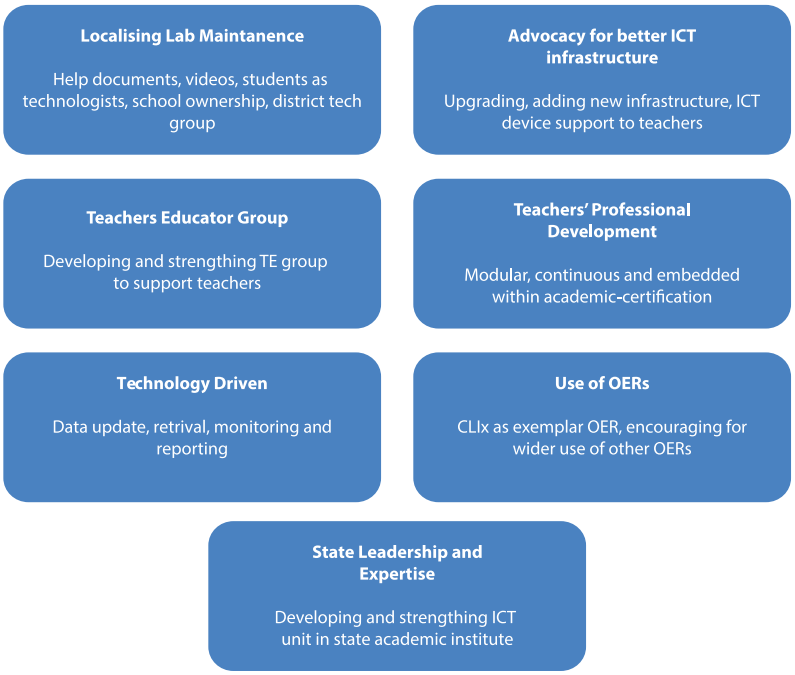
CLIx Implementation is responsible for taking the various courses and curricular modules to the schools, students and teachers. The design of implementation is guided by the vision of making CLIx locally and financially sustainable. Broadly, the implementation design involves partnerships between multiple stakeholder, which includes state departments and local implementation partners. Flexibility is, however, retained in this structure to adapt to local strengths and available resources. So, for instance, CLIx implementation is conducted in Telangana and Chhattisgarh by the respective State Councils of Educational Research and Training (SCERTs). In Rajasthan and Mizoram, on the other hand, the Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Centre for Education Research & Practice and the Directorate of School Education, Mizoram University are the respective implementation partners.



Parts of CLIx implementation

Implementation in CLIx draws on several principles of design, working closely with states to target financial and systemic sustainability through local capacity-building and integration of the programme within state schemes. It also works to build a strong group of officials in the states for policy decisions, along with a teacher educator cadre to support professional development of teachers.

Principles of Implementation Design



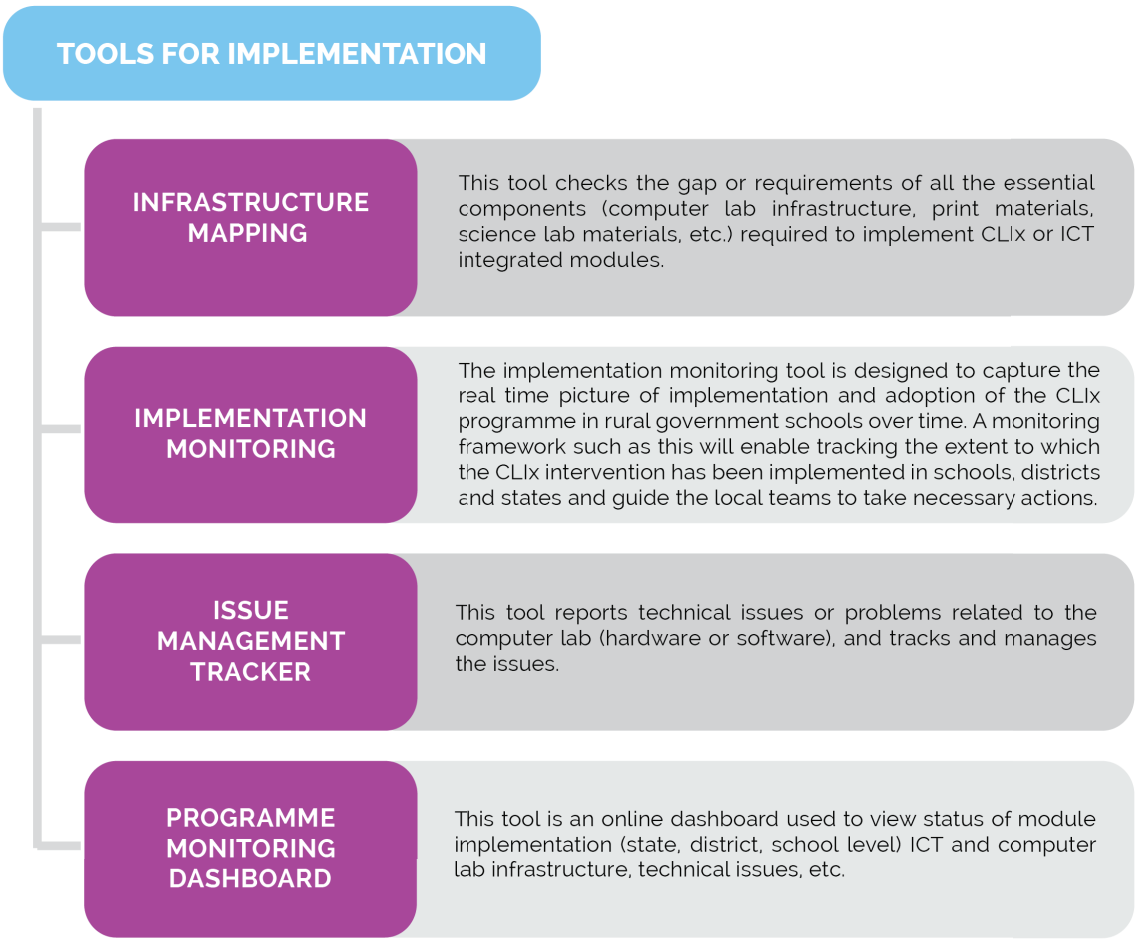
Student modules work synergistically with facilitation by the field support personnel and the subject teachers in schools. Field support professionals ensure lab readiness and delivery of the resources to schools. They also ensure that science labs and relevant equipment are available before a module is implemented. They support the teacher in conducting interactive ICT based classes and in promoting digital literacy skills for teachers in their schoollabs. Teachers facilitate the implementation of student modules and their learning outcomes by strategic timetabling of their classes and lab hours to map the modules to the topics being taught in their classroom. Their presence in the lab also ensures continuous monitoring and evaluation of students' progress through the modules.

School heads have provided local leadership in the following matters:

- Overseeing the activation of their school ICT lab including using the school fund for repairs
- Releasing teachers for workshops
- Facilitating the use of ICT labs and CLIx resources by adjustments in the school timetable
- Batching and logistics for use of labs
- Negotiating (by school leaders) with service providers (vendors) for regular maintenance of labs

Implementation Tools:

To ensure sustained and successful implementation, a number of technology-enabled tools are being used. These have been designed to work both online and offline to check field readiness, manage and resolve technical issues and regularly monitor programme implementation in schools. All the data gathered through these tools is aggregated, analysed and reported on a dashboard. Provision is also made for reports to be generated at the state, district and school levels.



Sustainability

Sustainability is an important guiding pillar for implementation design. Strong leadership, ownership at various levels, localization of solutions and financial viability are key to sustainability of CLIx.

Financial Sustainability:

Certain core elements of the intervention have been integrated into existing government schemes and activities to ensure financial sustainability:

(i) ICT lab maintenance is sustainable in states like Telangana that have allocated funds for repairs and upgradations.

(ii) Teacher Professional Development is sustainable to the extent of the RMSA grants allocated by the states for the continuous professional development of teachers. Further a fee-based model that partially meets the costs of the capacity building programmes has been developed for long term sustainability of the TPD where about 60% running costs can be met.

(iii) State funds in RMSA have been used towards printing workbooks for students.

Local Capacity Building:

(i) In large states like Telangana, training and development of a group of subject-wise resource groups is undertaken to support TPD in the long run. This includes State and District-level resource groups. Resources and kits to support them are under development.

(ii) A model of school-based ICT lab maintenance is being established by building technology-hardware expertise at the school level. This involves an ICT-in-charge and a group of students in each school being trained with hardware and maintenance capacity.

Systemic Sustainability:

(i) India has just launched a National Teacher Platform (Diksha) to host resources developed for teachers. The CLIx TPD resources have been shared here. The Digital Literacy Foundation Course for Teachers is the first course currently hosted nationally on the NTP. Student module resources of CLIx are being released under OER and on the National Repository of Open Education Resources (NROER).

(ii) SCERTs (ie State Academic Institutes) in two states (Chhattisgarh and Telangana) are being supported to develop expertise in developing and curating OERs and strengthen their units for ET. Complete avoidance of proprietary softwares and utilization of FOSS that are open, interoperable and comply with accessibility guidelines is used for viability, inclusivity and sustainability.

(iii) By offering professional development in a 'course' format, TISS is building long-term sustainability, and opening up TPD in other parts of the country for wider adoption.

(iv) Expansion to the next phase adopts a process of increasing school ownership of lab readiness, focusing TISS's contributions on core subject expertise and enabling greater localised solutions for the lab. For this, resources and help/FAQs (posters and videos) are being developed.

(v) The team has focussed on Central and State-level advocacy on ICT-integration to inform design of educational technology schemes and initiatives.

08

CLIx ACTION RESEARCH

Research is an integral component of CLIx and guides every aspect of the intervention – from design-based research to ongoing monitoring and evaluation. CLIx engages in two kinds of research: research *about* the project and research generated *from* the project. Accordingly, it factors in more than one intervention design as applicable to the study to help us compare the results of the intervention across states and districts.

Why Research?

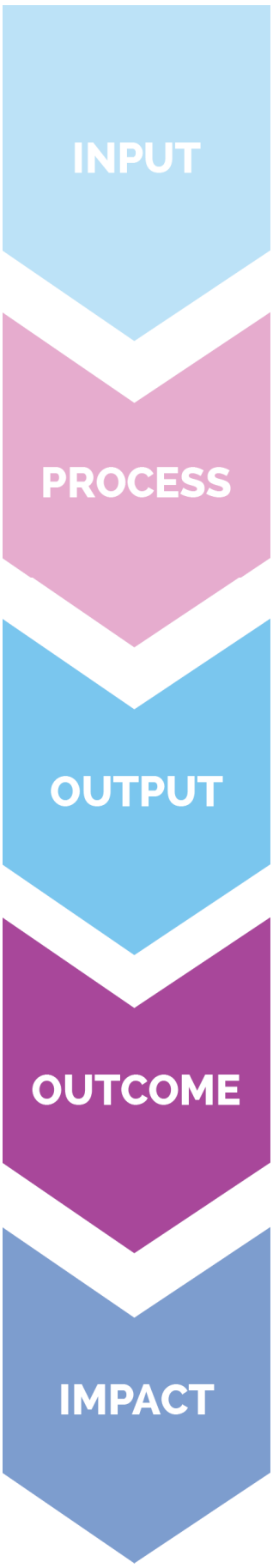
- **Analyse impact** on students, teachers, classroom processes, school systems and pedagogic cultures
- **Strengthen intervention** through design based research and intervention monitoring
- **Draw evidence-based lessons** through understanding of innovation diffusion, communities of practice, models of intervention etc.
- **Contribute to literature and policy** through publications and dialogue with policy makers

Our focus is on asking questions about **what works in the field**, what **kinds of technological designs** work most effectively in under-resourced schools, how **classroom processes transform and evolve** as technology-enabled teaching-learning practices are introduced in classrooms, what impact the specific nature of learning through CLIx (technology-enabled, collaborative, connected, concept-based, authentic, blended learning) has on **student learning outcomes**, how the concerns of various stakeholders evolve over a period of time, and **how innovations get adopted and diffused** at a systemic level.

Research workshops

Some Research Questions

- How does a technology-enabled intervention like CLIx help in transforming pedagogical processes?
- How do communities of practice contribute to teacher professional development?
- How does scale become an input in a technology enabled intervention like CLIx?
- What are the pathways to create digital learning among school communities?
- How can large scale innovative practices like CLIx work towards impact through collaborations?



1. Infrastructure Mapping: School survey in terms of number of computers, internet availability, LAN and power backup

2. Design Based Research: Studies for English, Maths and Science modules in partnership with MIT, leveraging design principles in real contextualised settings

3. Innovation Diffusion Process Documentation: Involves documentation and analysis of unfolding of an innovative intervention in the eld and the evolution of concerns, roles and expectation of external and internal stakeholders, across macro, meso and micro levels

4. Case Studies: Exploration of thematic areas in field intervention (i.e. questions on teacher motivation, technological challenges, student ownership and autonomy, models of implementation and best practices in schools)

5. Platform Data Analytics of key diagnostics to help inform the extent, depth and nature of student engagement with the CLIx modules

6. Learning Outcomes Studies in the three subjects to assess the impact of CLIx modules on student learning outcome when implemented in a focused manner

7. Non-Cognitive Learning Gains Assessments built into CLIx platform measure such constructs as self-e cacy and student agency for learning, value and quality of collaboration and learning from mistakes

8. Classroom Observation Exercise planned among select schools to closely observe the teaching-learning process in the CLIx classrooms vis-a-vis others

9. Pre-Post Assessments embedded in modules to measure the student learning gains related to CLIx subjects

10.Concerns Based Adoption Model (CBAM) framework to identify and provide ways to assess stages of concerns as experienced by the teachers along their journey of engagement with the intervention

11. Baseline–Midline–Endline Surveys involving students, teachers and principals to gauge the change with regard to knowledge, attitude and practice of teaching and learning

Methodology and Research Designs	Tools Developed for Data Collection
•Large scale quantitative surveys •Qualitative case studies •Network analysis •Mixed methods studies •Secondary reviews •Policy analysis	•Digital surveys administered through hand-held devices •Platform based assessments and surveys •Audio-visual tools •Optical mark recognition tools

Ongoing Research:

Design Based Research and Design Based Implementation Research

These studies are carried out by the English, Math and Science teams in partnership with colleagues at MIT. These studies seek to identify, explore and analyse the design principles in real contextualised settings of CLIx interventions and document the multiple iterations in module design attempted during the CLIx intervention period.

Innovation Diffusion Process Documentation

This study intends to document and analyse how an innovative intervention unfolds in the field and how the key concerns, roles, expectations and ideas of innovation of different internal and external stakeholders evolve during the course of the intervention lifespan. This would help understand the process of diffusion of innovation at three levels – the macro level (consisting of the CLIx core community), the meso level (state officials and field implementing partners) and the micro level (school principals, teachers, students and parents)

The Learning Outcomes Study

In addition to the ongoing baseline and endline surveys of students and teachers, we are also conducting an intensive study to assess the impact on student learning outcomes when the CLIx student modules are implemented in a focused manner with maximum fidelity to implementation design.

Non- Cognitive Learning Gains

Apart from tools that are geared to capture the student learning gains in the subject

domains, tools measuring constructs of self-efficacy for learning, learning from mistakes, value of collaboration, student agency, quality of collaboration, effort, interest and task value have been developed and built into the CLIx platform. These will help measure the non-cognitive learning gains of the students.

CLIx Adoption Study

A comprehensive multi-pronged approach involving different stakeholders is being adopted to capture the entire process of teacher-student learning in this study of the schools' adoption of CLIx into their system. Inferences will be drawn from various data sources that are being collected through different tools and methodologies.

Baseline – Midline – Endline:

The ongoing impact-evaluation strand of the research work commenced in August 2015 when 11 tools developed in four languages (English, Hindi, Mizo and Telugu) were piloted and developed as digital tools. Since then, the following rounds of data collection have been undertaken:

- Baseline for Grade 9 at the beginning of AY 2016-17 in Rajasthan, Mizoram, Chhattisgarh and Telangana
- Midline-1 for Grade 9 in select schools (20) of the states of Chhattisgarh, Mizoram and Rajasthan at the end of AY 2016-17
- Baseline for Grade 9 expansion in Chhattisgarh for Navodaya Schools in AY 2017-18
- Midline-2 for Grade 9 in the states of Chhattisgarh, Mizoram and Rajasthan at the end of AY 2017-18

In line with these surveys, an endline survey is being planned at the end of AY 2018-19 in all the four CLIx states

Domain-Specific Thematic Case Studies: Outcomes, Impact, Curricular Design

Along with implementation, the field teams in each of the four intervention states are exploring key thematic areas that capture their field specificities and lessons from the intervention. These include questions on teacher motivation, technological challenges, student ownership and autonomy, models of implementation, and best practices in schools. Domain specific research on pedagogies of English, Mathematics and Science are also being conducted concurrently, studying learning outcomes, impact and curricular design to effect sustained knowledge retention and application.

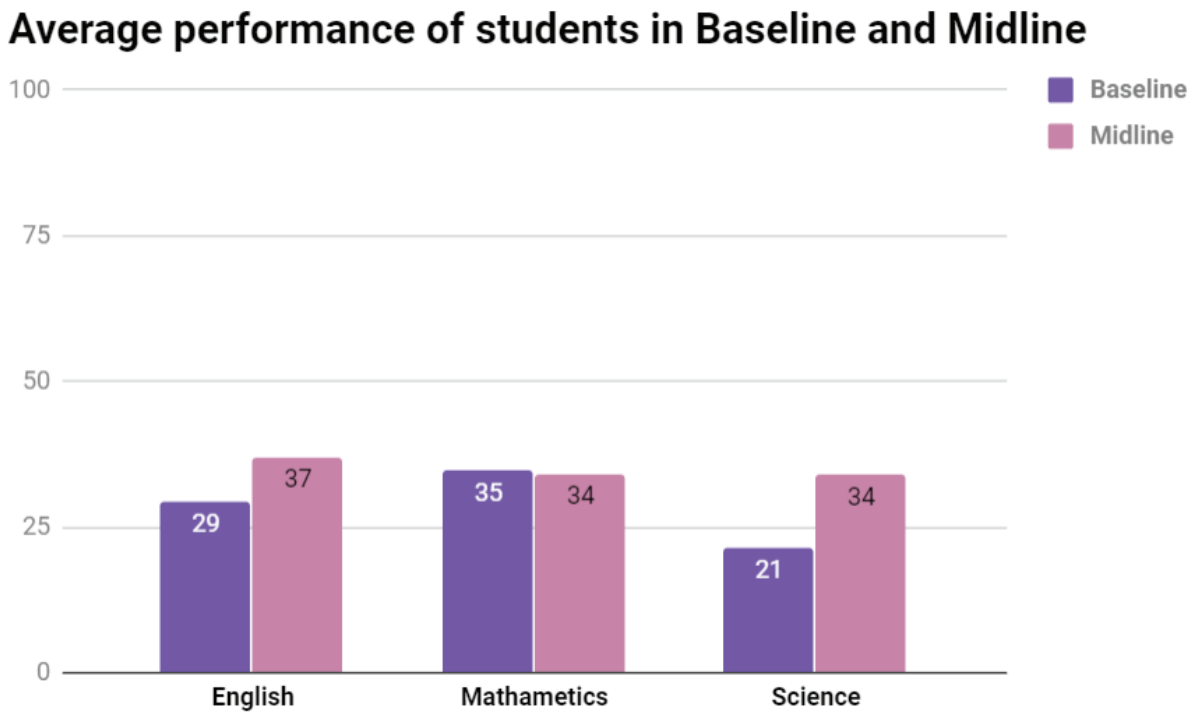
Interim Findings

Based on the recent midline survey in 2018, the following are some interim findings :

For Students:

- Students in CLIx schools display significantly better basic skills, application based and intermediate computer skills.
- Students of CLIx schools in Mizoram are better in terms of academic aspiration as compared to the control schools
- Within state analysis reveals that CLIx students performed better than the non-CLIx students across various domain specific skills
- Within the specific context of the CLIx treatment schools, boys were found to be better than girls in digital skills and learning achievement.
- Within the CLIx schools, basic digital skill emerged to have a significant positive correlation with skill-specific scores across domains

Graph 1: Average performance of students in Baseline and Midline



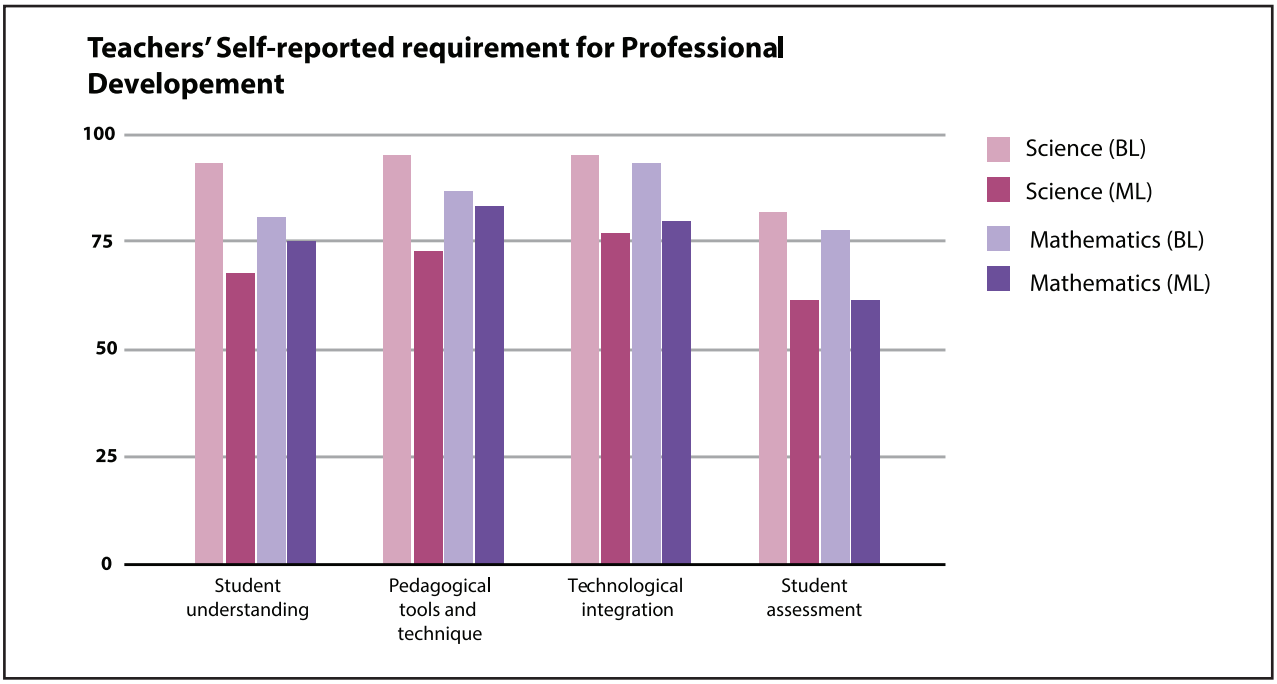
On an average, students scored 29, 35 and 21 percent in English, Mathematics and Science respectively during the baseline study. In the Midline survey, the average scores were 38, 34 and 35 percent in that order. However, some of the items registered similar scores between the 2 surveys. The details of the survey items and analysis of findings can be found in the respectives state research briefs and reports.

For Teachers:

- Teachers from treatment schools are better equipped with digital skills, as against those from control schools.

- Unlike control schools, English, Mathematics and Science teachers from treatment schools are self-reported to be better prepared in the content

Graph 2: Teachers' self-reported requirement for professional development



Mathematics and science teachers were surveyed on their perceived need for professional development training or workshops on 4 items - viz. student understanding, pedagogic technique, integration of technology in domain teaching and student assessment. Results show that, as compared to the baseline, the perceived need for professional development among science and maths teachers has come down during the midline survey. The reason for this decrease could be that these areas of professional development are being addressed through TPD either by CLIx or any others

Please refer to publications for further findings and discussions on teachers, students and school level surveys emerging from Baseline, Midline 1 and Midline 2 studies.

Conducting FGDs with students

Coming together for curriculum design, research and implementation to achieve quality at scale

09

CLIx PARTNERS

Realising CLIx's vision to provide valuable and powerful connected learning opportunities to youths in marginalised communities has been possible because of strategic collaborations and partnerships at multiple levels. Collaborations and an ecosystem of partnerships advance the idea of connectedness with new learning spaces, learning methods, learners, educationists and researchers, as well as curricular ideas and technologies.

Creating an open ecosystem to foster collaboration for innovation and sustainability was envisioned, in 2014, as a core aspect of the project. This involved five key communities:

- Domain/resource group partners
- Implementation partners
- Communities of learners comprising teachers from school systems as well as those who may sign up independently to participate in the learning community
- Members of the educational community (including student teachers, teacher educators, curriculum developers and researchers)
- Governmental agencies and foundations who are seeking ways to enhance services for marginalized communities.

This ecosystem has grown in the last four years by

- Developing strong inter-institutional partnerships that work collaboratively and contribute to open education resources

- Creating opportunities for a range of stakeholders to collaborate;

- Establishing a strong and credible reputation for quality, responsiveness and relevance, both to the field and to the primary beneficiaries/audience of this initiative, namely high school students and teachers

- Availability of a technology platform configured for this initiative by MIT, with inputs from IIT Bombay

The values driving these collaborations and defining the ecosystem have been a **commitment to openness, inclusion and social justice, responsibility, accountability and sustainability, responsiveness** to developments on the field and constant **innovation** with new possibilities.

Testimonials

G. Nagarjuna (Professor), HBCSE, TIFR, Mumbai, and Chairperson, Free Software Foundation of India-

On the salient features of the partnership with CLIx:

"This partnership gave our gnowledge lab a splendid opportunity to participate in a large scale project. The task of designing and developing a technology that offers a connected learning environment which could work in the resource-constrained government schools in India is very challenging. The course on I2C, that we designed, became a testing ground during the first year of deployment, which contributed to the final design of the CLIx platform."

On the principle of connectedness of learning:

"Our lab uses the design principles inspired from the emerging science of complexity. One aspect of the new laws of nature that applies more to biology and society is the idea of a network. A network is built through connections. Linkages among participants on the one hand and the linkages among the ideas we hold on the other form the essence of a social network. Thus, it is established that learning happens when connections happen. It should be the cement of any educational infrastructure we try to build for achieving quality at scale."

Anil Mammen, (Chief - Learning Design and Social Impact), Tata ClassEdge, Mumbai-

On the principle of connectedness of learning:

"One way to read the history of education is to see it as the opening up of learning - from restricting knowledge to the select few to attempting to make it accessible to all. The more people participate in the creation of learning materials and experiences, in the process of learning, in the construction of meaning and its expression, the more questions are raised. The more questions are raised, the more solutions are sought, thereby extending the boundaries of learning. Connectedness is precisely about this opening up of learning and connecting diverse expertise (from local to global) with varied ground realities, transforming both expertise and realities in the process."

Nagendra Nagpal, Director, CERP, Jaipur-

On the principle of connectedness of learning:

"For me connectedness is associating with various groups/organizations/ individuals for achievement of a larger and common goal. In the process each associating partner brings in diverse experiences and expertise that eventually result in the development of synergy in the output. While connected, each partner grows its own strengths and in one or other way contributes in the growth of other associates."

On the nature of partnership with CLIx:

"CERP is partnering with CLIx to can replicate at large scale. The CLIx programme has given us an opportunity to work with ICT enabled processes at secondary level, which is otherwise an area requiring lot of new input."

Rajya Pariyojna Nideshak, Rajasthan Madhyamik Shiksha Parishad, Jaipur

"माध्यमिक शिक्षा विभाग के अंतर्गत संचालित CLIx योजना विद्याथियों के लिए उपयोगी साबित हो रही और इस योजनसे विद्यार्थी शिक्षा के साथ कंप्यूटर शिक्षा भी प्राप्त कर रहे है."

Our Partners

Seeded by:
The Tata Trusts

Initiative led by:
Tata Institute of Social Sciences, Mumbai
Massachusetts Institute of Technology, Boston

Government Partners:
Government of Rajasthan
Government of Chhattisgarh
Government of Mizoram
Government of Telangana

Development Partners:
Eklavya, Bhopal, Madhya Pradesh
Inter-University Centre for Astronomy and Astrophysics, Pune, Maharashtra
National Institute of Advanced Studies, Bengaluru, Karnataka
Tata ClassEdge, Mumbai, Maharashtra
Tata Institute of Fundamental Research, Mumbai, Maharashtra

Implementation Partners:
Centre for Education, Research and Practice, Jaipur, Rajasthan
State Council of Educational Research and Training, Raipur, Chhattisgarh
State Council of Educational Research and Training, Hyderabad, Telangana
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