Exploring Virtual Labs for Mathematics

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Background

Laboratory a key component

School education in India faces many challenges

- Lack of infrastructure including labs.
- *Students come out with little practical knowledge of the concepts they learn.*

Why Virtual Labs ?

Problems with Physical Labs

- Limited Infrastructure
- No/minimal lab session
- Limited lab access
- Safety constraints and fragile equipment's.

Inadequate ‘higher order thinking skills’

Assessment of experiments difficult

Approach – Virtual Labs

Not meant to replace physical labs!

But augment and amplify them.

Virtual labs address deficiencies of physical labs.

Infinite repetitions at no cost.

It provides the ease and convenience of conducting experiments over the internet.

Aimed to bridge the constraints of geographical distances and time.

Technology can expand the boundaries of a physical Lab

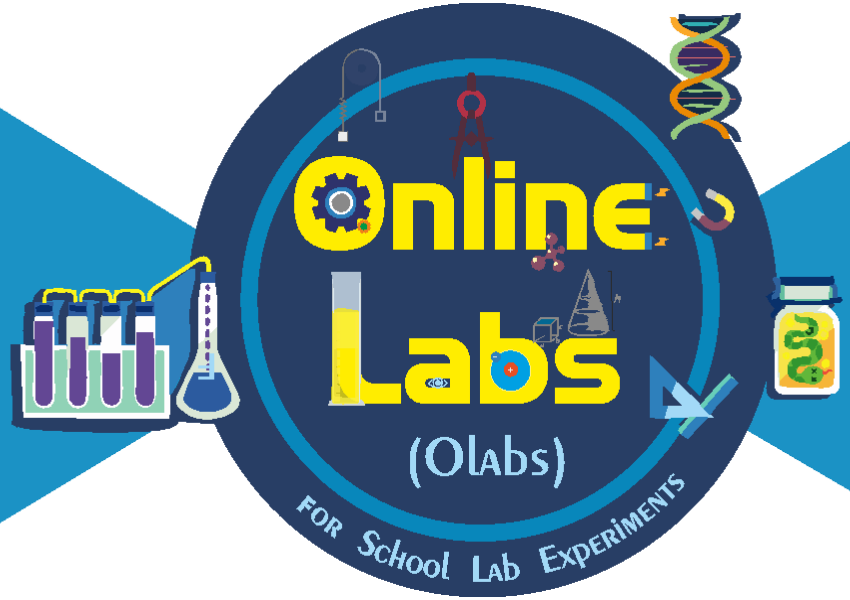
प्रगत संगणन विकास केंद्र
सी डैक CDAC
॥ ज्ञानादेव तु कैवल्यम् ॥
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

सत्यमेव जयते

Ministry of Electronics and Information Technology
Government of India

AMRITA VISHWA VIDYAPEETHAM

Class IX
Class X
Class XI
Class XII



No of Labs available
173

www.olabs.edu.in

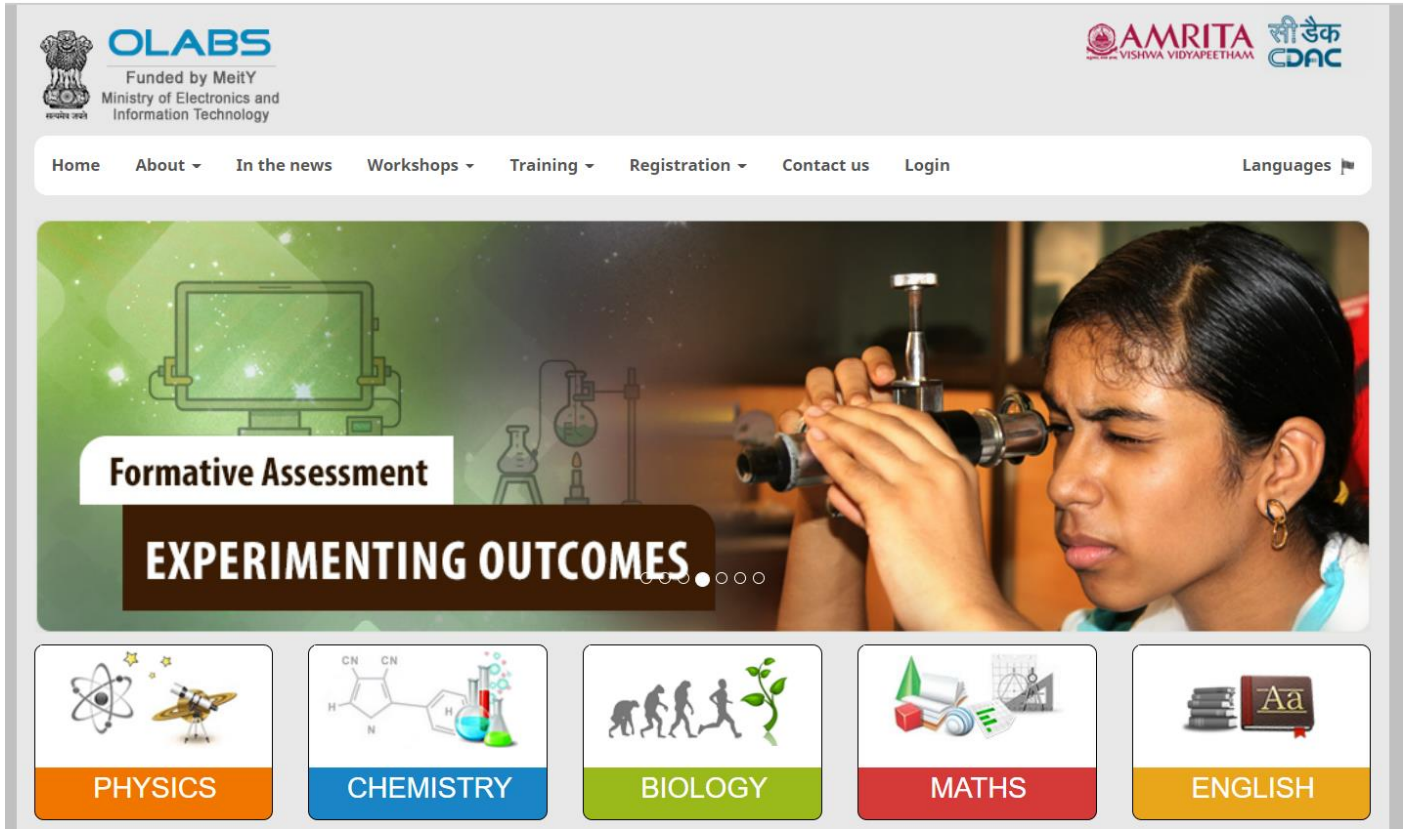
Digital India
Power To Empower

आज़ादी का अमृत महोत्सव

आत्मनिर्भर भारत

OLabs Homepage

www.olabs.edu.in



Journey So far……

Olabs.edu.in

--- Now available under Diksha

01

The OLabs project, supported by Meity, has produced over 170 virtual labs covering Science, Maths and English for school students.

02

Freely accessible on the web (olabs.edu.in).

03

A 10-plus year long journey till date.

04

Coming: A suite of about 700 more in the next couple of years.

Salient Features

Aligned to CBSE curriculum

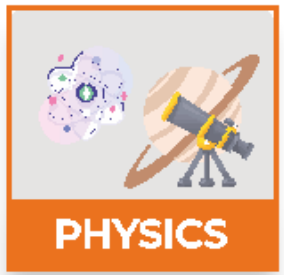
Interactive 2D/3D simulations

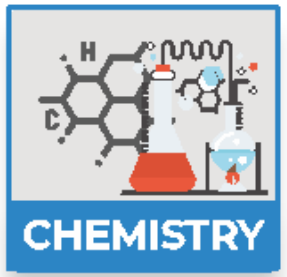
Simulations model real life environment

Authentic content

Intuitive feedback and guidance

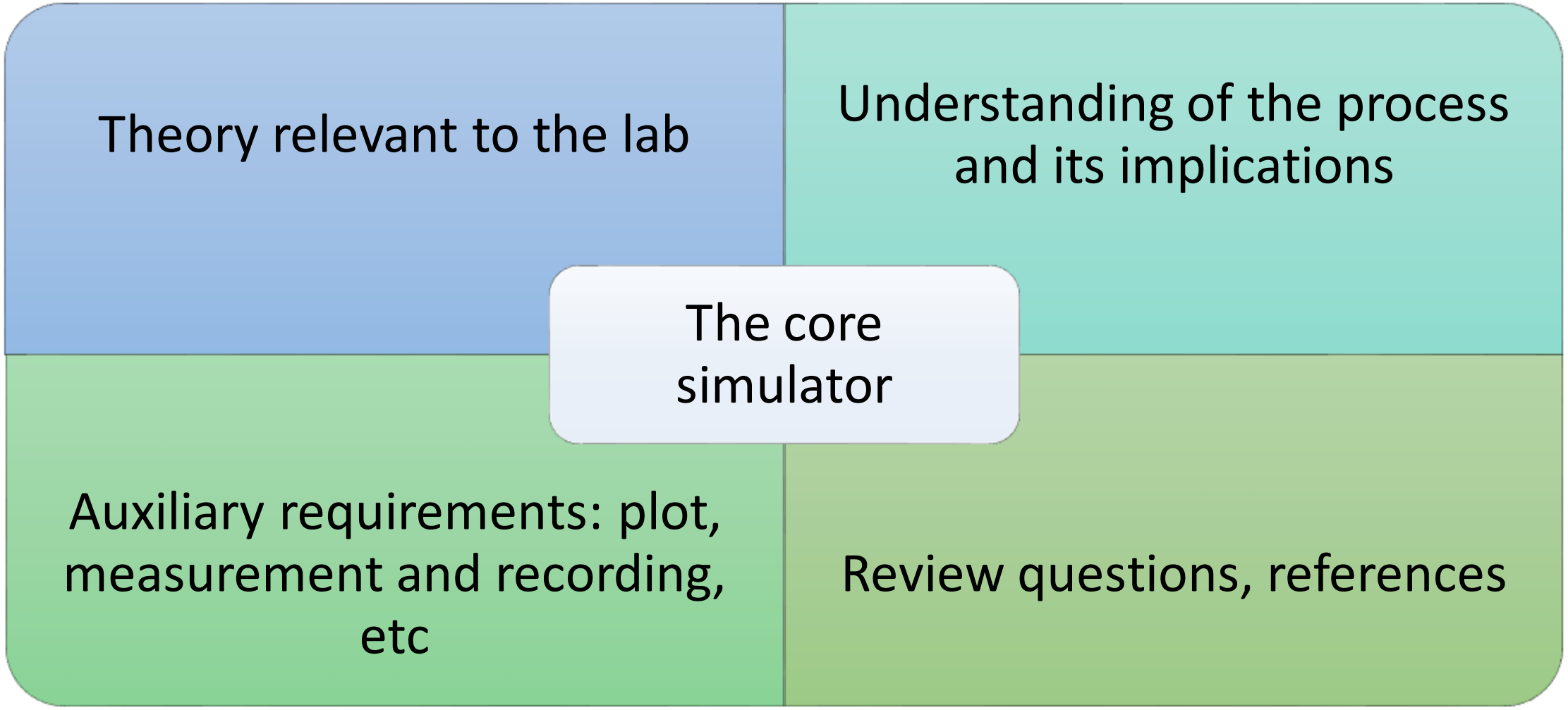
Labs available in subjects





Labs available in languages

Eco-system


Theory relevant to the lab
Understanding of the process and its implications
The core simulator
Auxiliary requirements: plot, measurement and recording, etc
Review questions, references

Effective usage of Virtual Labs (OLabs) in your school – suggestions for teachers

Minimally, use it for demonstration in class

To prepare students for the physical lab

To reflect on the activities performed in the lab

Can get more by ensuring students are actively involved in the activity.

Active learning strategies can be interleaved with usual lecture

As Homework – Give inquiry-based activities

Encourage self-evaluation using “Viva-Voce” section of each lab.

Proposed Active Learning Strategy for Virtual Labs (OLabs)

- Recommended time: 5-15 min
- *Predict Outcome* - Ask students to make prediction: "What will happen if …"
- *Calculate Output* - Ask students to calculate next step or output.
- *Devise explanation* - Ask students to devise reason for process
- **Choose activity based on pedagogical purpose and learning objective of the Lab**

Using Virtual Labs (OLabs) : Scenario

- **Teachers (In the classroom/Lab)**
  - Explain labs before performing the practical/lab session
  - Explain a procedure
  - Demonstrate a phenomenon
  - Set expectation about a lab
  - Can frame review questions with the lab as the backdrop (after Lab Session)

Creative teachers and students can come up with many more innovative uses!

Usage Virtual Labs (OLabs)

Students

- Familiarize with the Lab before physical lab session
- Try variations available in the lab
- Do revision
- Use Lab to reinforce the concepts, answer question they may have, etc.

Mathematics Labs – Salient Features

- 3D representation for select labs
- Facilitates drawing geometric figures on workbench with given dimensions
- Tools provided relevant to lab
  - Show Scale
  - Cut triangle/rectangle
  - Rotate Clockwise
  - Rotate Anticlockwise
  - Drag/Drop
  - Superimpose
- Instructions provided on each step
- Actions taken by student/system in ‘Workbench”, displayed in “Observations”.
- Details inference and conclusion after completion of Lab. Also relevant illustration on workbench.

List of Labs

Class 6 –8 : 90+ labs

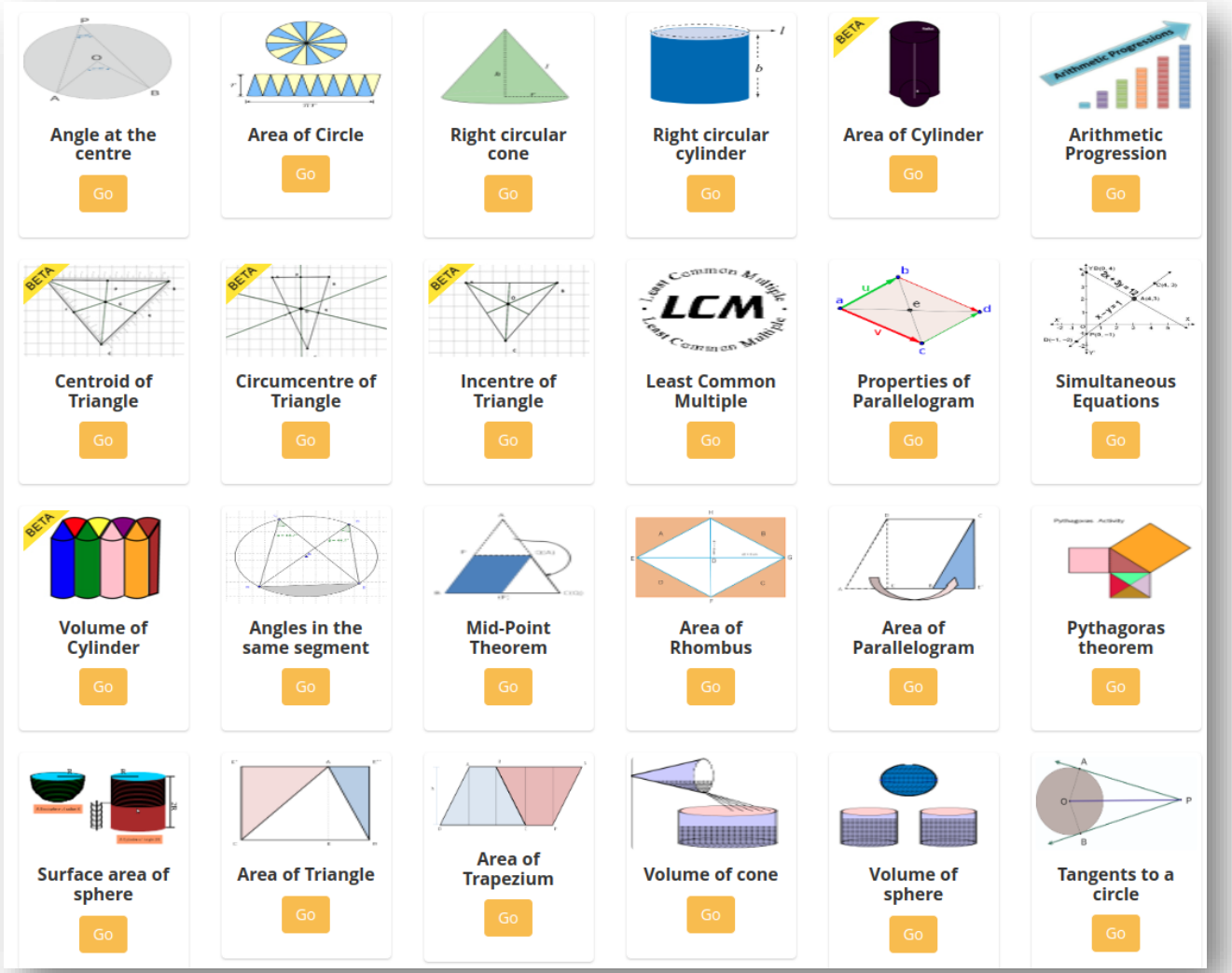
Class IX : 40+ Labs

Class IX : 40+ Labs

Class IX : 30+ Labs

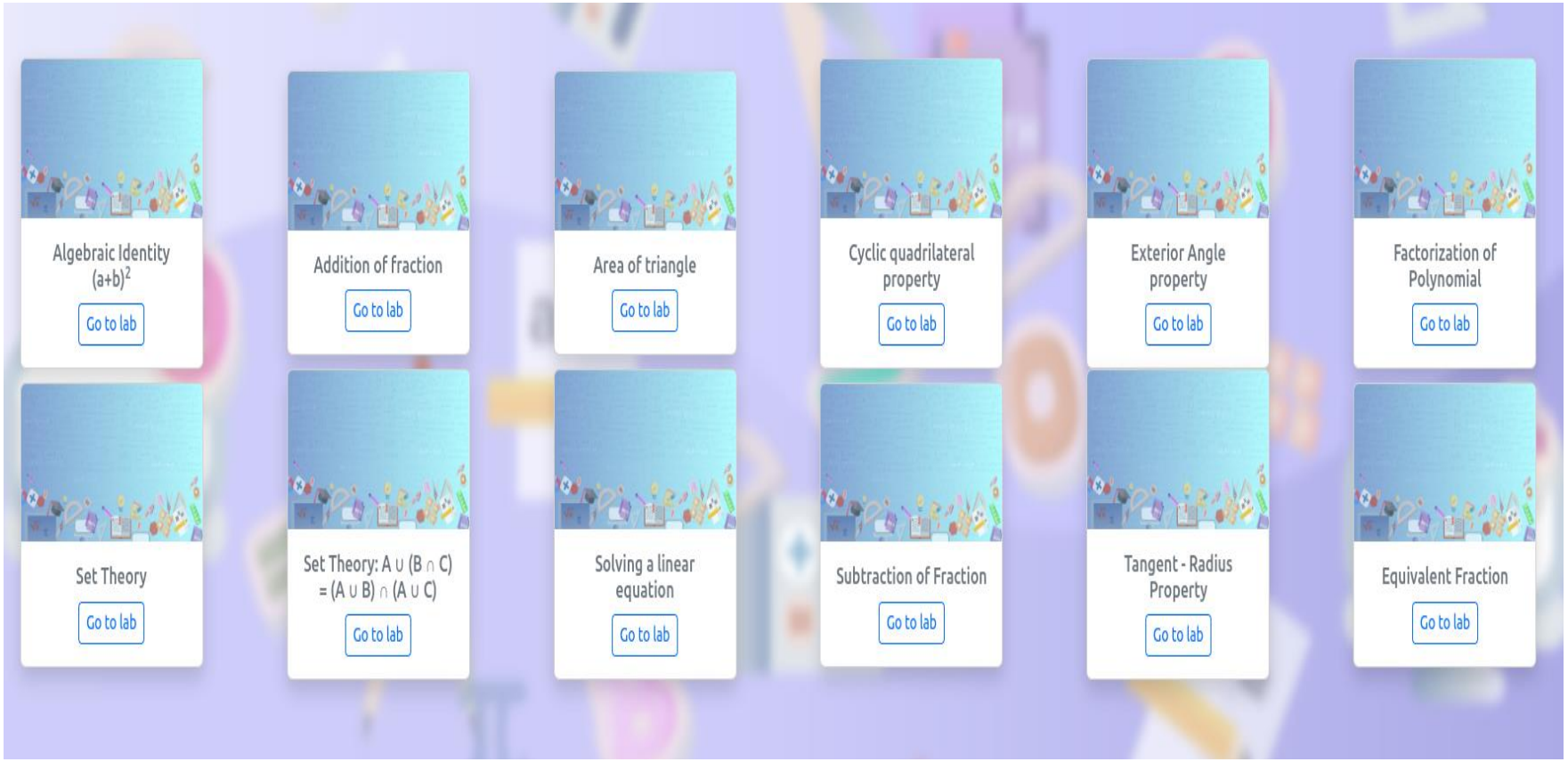
Class IX : 25+ Labs

Screenshots



OLabs Phase II

Screenshots



OLabs NextG

Demonstration of Mathematics Labs

List of Labs for Demo

3D Labs

- Volume of Cylinder
- Cube and Cuboids

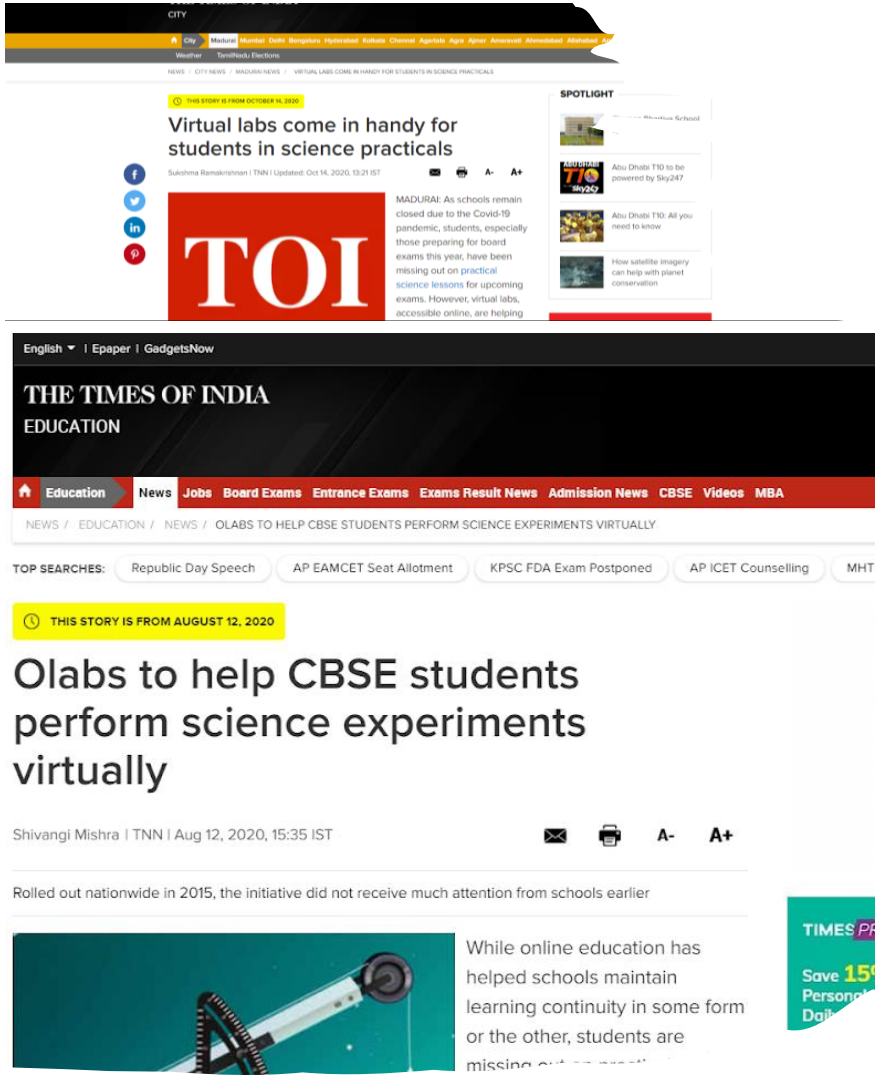
Geometry

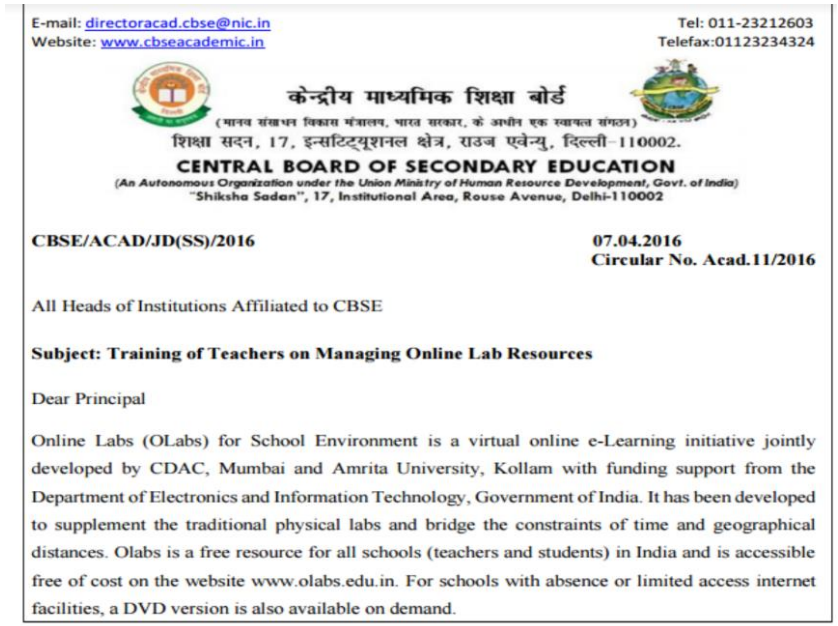
- Cyclic Quadrilateral
- Area of Circle

Algebra

- Algebraic Identity
- Polynomials
- Fractions

OLabs in News





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केन्द्रीय माध्यमिक शिक्षा बोर्ड
(मानव संसाधन विकास मंत्रालय, भारत सरकार, के अधीन एक स्वायत्त संगठन)
शिक्षा सदन, 17, इन्सटिट्यूशनल क्षेत्र, राउज एवेन्यु, दिल्ली-110002.

CENTRAL BOARD OF SECONDARY EDUCATION
(An Autonomous Organization under the Union Ministry of Human Resource Development, Govt. of India)
"Shiksha Sadan", 17, Institutional Area, Rouse Avenue, Delhi-110002

CBSE/ACAD/JD(SS)/2016

07.04.2016
Circular No. Acad.11/2016

All Heads of Institutions Affiliated to CBSE

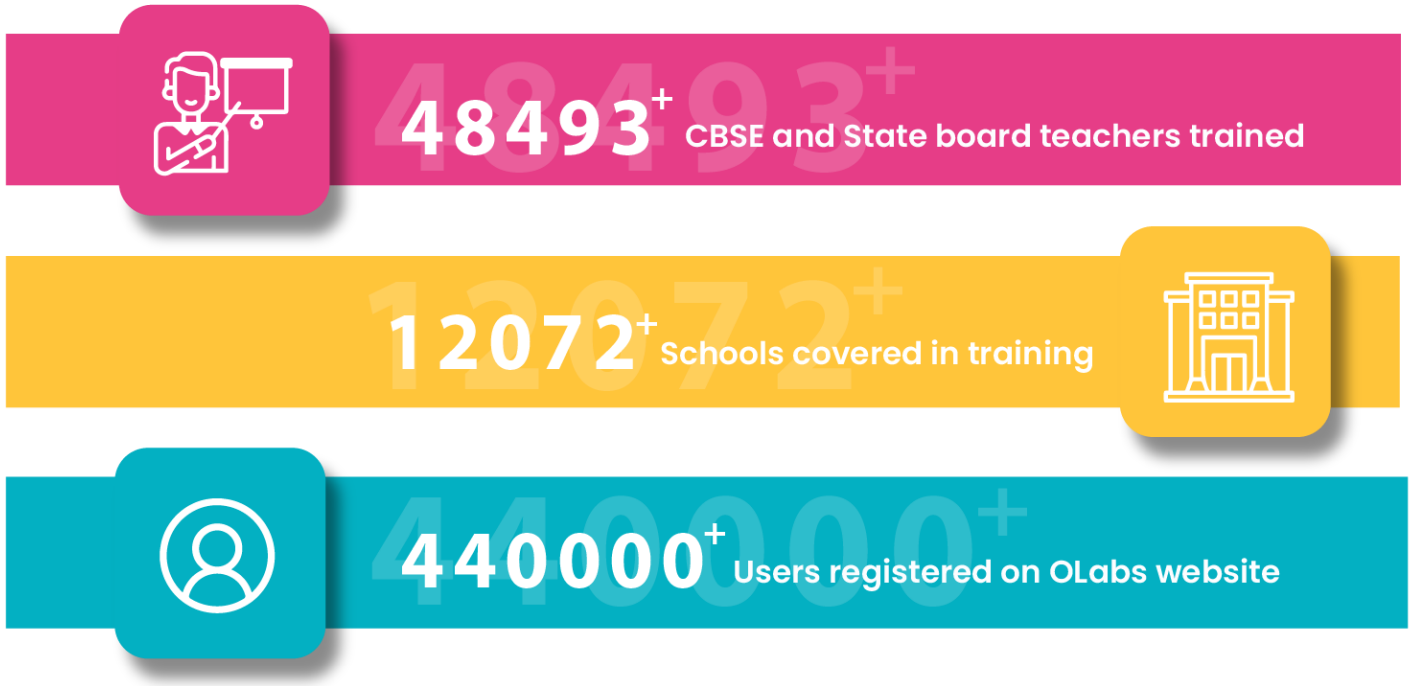
Subject: Training of Teachers on Managing Online Lab Resources

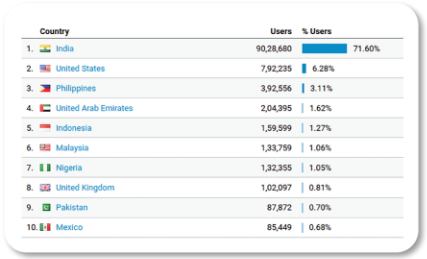
Dear Principal

Online Labs (OLabs) for School Environment is a virtual online e-Learning initiative jointly developed by CDAC, Mumbai and Amrita University, Kollam with funding support from the Department of Electronics and Information Technology, Government of India. It has been developed to supplement the traditional physical labs and bridge the constraints of time and geographical distances. Olabs is a free resource for all schools (teachers and students) in India and is accessible free of cost on the website www.olabs.edu.in. For schools with absence or limited access internet facilities, a DVD version is also available on demand.

Endorsements

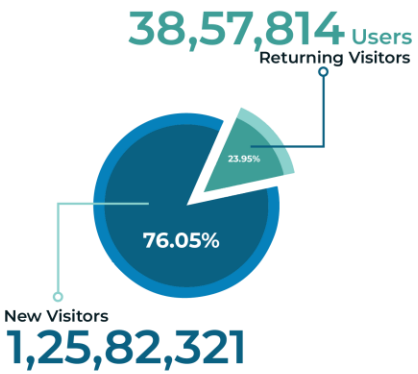
Trainings

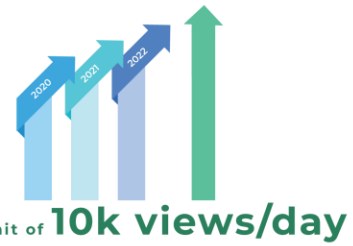

48493+
CBSE and State board teachers trained
12072+
Schools covered in training
440000+
Users registered on OLabs website



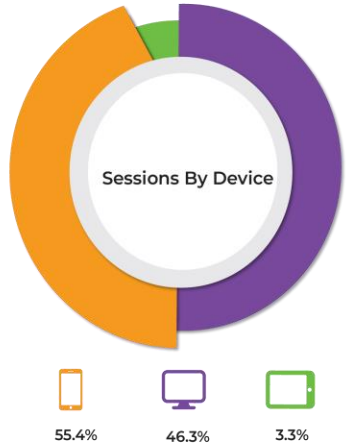
	Country	Users	% Users
1.	India	90,28,680	71.60%
2.	United States	7,92,235	6.28%
3.	Philippines	3,92,556	3.11%
4.	United Arab Emirates	2,04,395	1.62%
5.	Indonesia	1,59,599	1.27%
6.	Malaysia	1,33,759	1.06%
7.	Nigeria	1,32,355	1.05%
8.	United Kingdom	1,02,097	0.81%
9.	Pakistan	87,872	0.70%
10.	Mexico	85,449	0.68%

Used By **20+ Countries**





Average hit of **10k views/day**



OLabs Usage

Availability of OLabs

Website *www.olabs.edu.in*

Offline Windows installer

Android App

OLabs App

Download the Olabs app from

mSeva Store

OR

https://apps.mgov.gov.in/details?appid=1627

Link to Video :

Olabs Ahead!

Yes, we are now on to add another 500+ labs to the pool.

Classes 6-12, and more subjects including languages, social science, etc.

120+ Math labs to be added for classes 6-12

Many improvements in light of the challenges mentioned earlier.

Learner tracking and analytics

Guidance in the lab

AR/VR capability

Richer simulation – variety within limits.

Help us help you….

1

Share the information to all fellow teachers…

2

Share your feedback on whatever you have explored in this regard.

3

Let us know if there are some concepts/topics on which you would like such a lab to be available.

Thank You

- ***For any information, please write to us at:***
- **Educational Technology Unit,**
- **C-DAC Mumbai**
- **support[at]olabs[dot]co[dot]in**