OLABS: SCHOOL LABS ONLINE

M Sasikumar
CDAC Mumbai
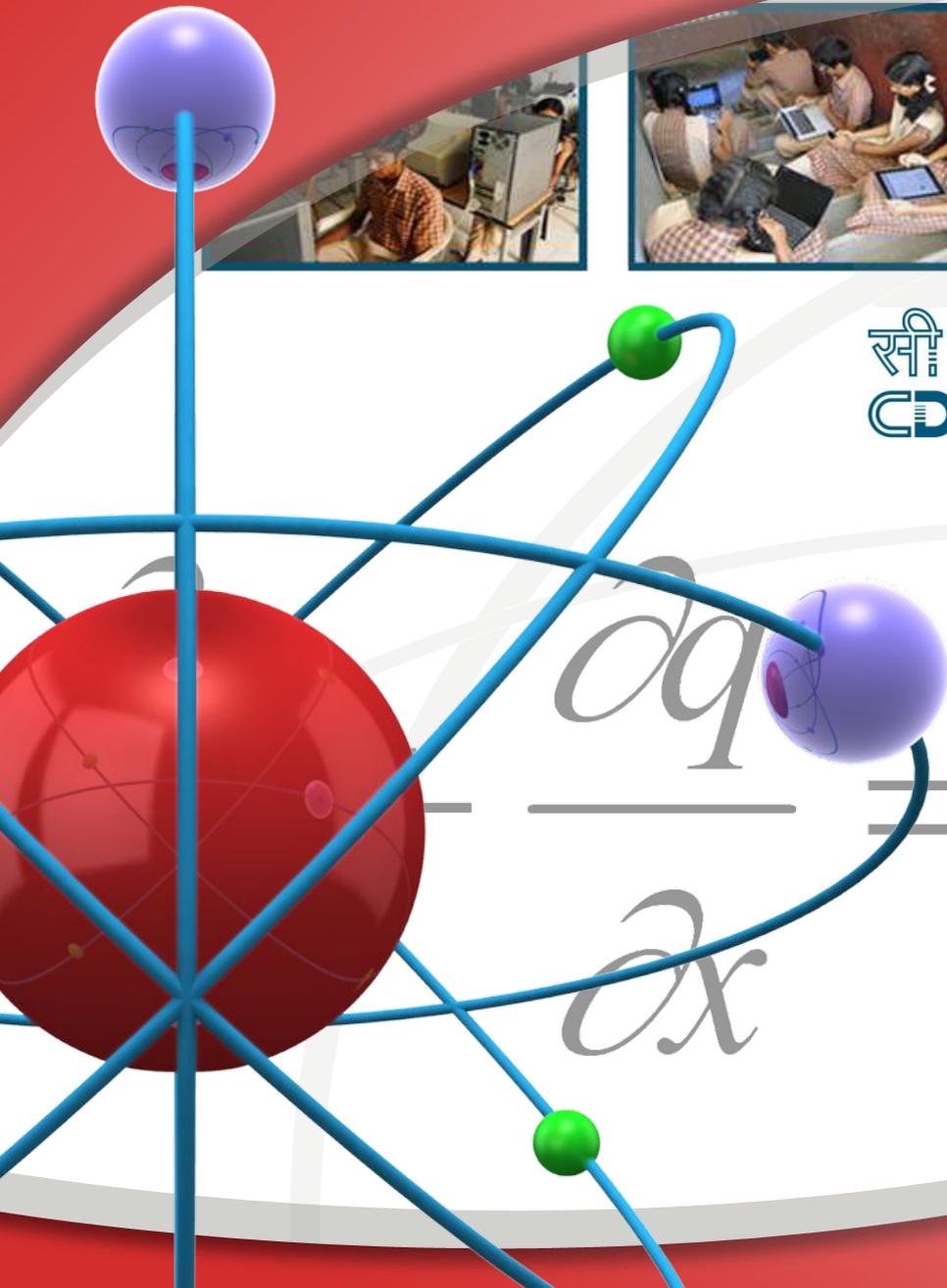
About OLabs

Project Title

Online Labs (OLabs) for school experiments

Participating Organizations

C-DAC Mumbai & Amrita Vishwa Vidyapeetham

Target Audience

CBSE schools, students & teachers

Subjects

Physics, Chemistry, Biology, Mathematics &

Classes Covered

Class IX, X, XI, XII

Duration of Project

2010 onwards

OLabs – Background

– *Laboratory a key component of science subjects.*

  – *Activities for other subjects*

– *School education in India faces many challenges*

  – lack of infrastructure including labs.

  – shortage of trained teachers.

  – *students come out with little practical knowledge of the concepts they learn.*

Why OLabs?

- **Problems with Physical Labs**
  - Limited Infrastructure
  - No/minimal lab session
  - Limited lab access
  - Safety constraints and fragile equipments.
- **Others**
  - Inadequate 'higher order thinking skills'
  - Assessment of experiments difficult
  - Lack of quality teachers

# Online Labs (OLabs) for school lab experiments

- 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

- Events occurring in large or small time windows can be simulated –
  - Demonstrating lifecycle of Mosquito.
- Invisible objects can be 'made visible'
  - Sensing magnetic field intensity.
- Things impossible to perform in real labs
  - behaviour of simple pendulum in atmosphere of Jupiter, etc.
- Offers tremendous scope for open-paced learning, to account for varying learner profiles
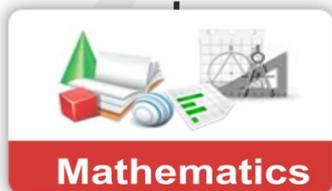
Olabs: What we have now

Experiment/Lab Details

Physics 54

Chemistry 46

Biology 36

Mathematics 25
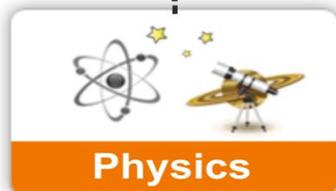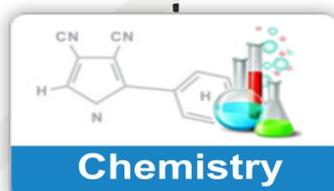
English 12

Classes:
- IX
- X
- XI
- XII

Total Experiments : 173

- हिंदी
- English
- മലയാളം
- मराठी

OLabs Website: http://www.olabs.edu.in/

Salient Features

interactive simulations with real world behaviour.

Students can Explore, Conduct and Repeat at their own pace.

Includes features such as recording observations, plotting graphs, calculations, etc which enhance the overall learning experience.

Experiments/activities aligned to CBSE curriculum.

Available for free web-based access on http://www.olabs.edu.in/

Offline version (Live DVD & Windows installer) are available on request.

Contents of a Lab

Each experiment as sections covering following:

- **Theory –** conceptual background of the experiment, concepts, related laws, proofs, principles, etc.

- **Procedure** - detailed steps for conducting the experiment in the online & actual lab environment.

- **Animation** - for teacher's demonstration of the experiment in the class or in the laboratory.

- **Simulation** - a simulated laboratory environment with necessary apparatus to conduct the experiment online.

- **Viva Voce –** Questions on related lab for self-assessment

Bell Jar Experiment

Theory   Procedure   Animation   Simulator   Viva Voce   Resources

Snippets from Review Report by NCERT

Chemistry:

1. All 46 resources in different section are completely acceptable to be included as e-content on different portal operated by NCERT.

2. We are also looking forward to for sim of 9th (3 experiments) and 12th experiment), which is relevant and created to support experiential learn students.

Mathematics

Among 25 resources in different section are acceptable to be included as e-content on different portal operated by NCERT.

2. We are also seeking such material for senior _____ mathematics.

_____ is to increase the number of _____s) in each section so that _____ problems for practice.

English:

1. The content developed can be supported with more examples

2. Some more activities in simulations can be incorporated for practice by students.

3. All the e-content is satisfactory to be included in various portals maintained by NCERT

Biology:

1. **Among 36 contents in different section , all resources are completely acceptable to be included as e-content on different portal operated by NCERT.**

2. It is suggested that important vocabulary should be included wherever it is applicable. Also, new terms should be incorporated and mentioned in separate section from each experiment.

1. Among 42 contents in different section , 41 resources are completely acceptable to be included as e-content on different portal operated by NCERT.
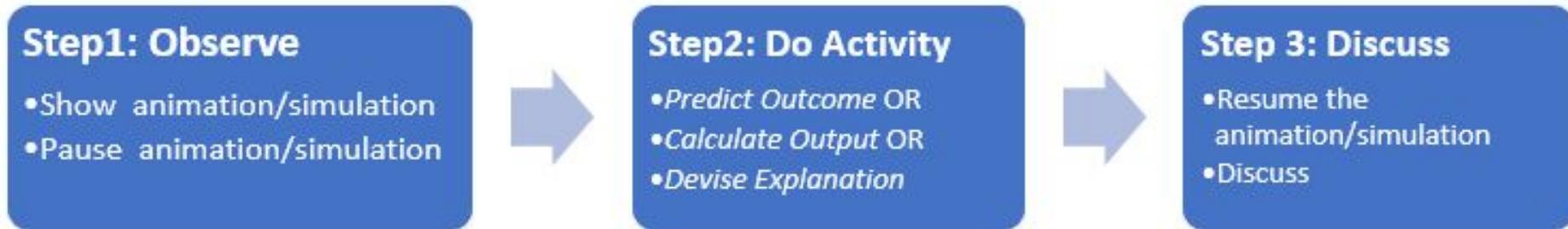
2. One you tube link written as cross-check (either for link or video) is showing error . If provided alternative or correct (playable link) then it can also be included as e-content. If this video is not available for mass then it can be excluded.

Effective usage of 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 OLabs

- Recommended time: 5-15 min

Step1: Observe
- Show animation/simulation
- Pause animation/simulation

Step2: Do Activity
- *Predict Outcome* OR
- *Calculate Output* OR
- *Devise Explanation*

Step 3: Discuss
- Resume the animation/simulation
- Discuss

- *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 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 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.

Important Links

- **OLabs website** – www.olabs.edu.in

- **OLabs FB page** - https://www.facebook.com/onlinelabs/

- **OLabs Email** – support@olabs.co.in / etu@cdac.in

- **Download Offline version** http://www.olabs.edu.in/?pg=topMenu&id=289

- **Are you using OLabs? Let us know** http://www.olabs.edu.in/?pg=topMenu&id=288

ENDORSEMENTS, AWARDS

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/DIR(ART&I)/2013

Dated: 16th February, 2013
Circular No. Acad-15/2013

All the Heads of Institution
Affiliated to CBSE

Subject: Roll out of Online Labs in CBSE affiliated schools across the country

Dear Principal,

Online Labs for School Experiments (OLabs) is a novel e-Learning project developed by CDAC, Mumbai and Amrita University, Kerala and based on the concept of virtual learning environment.

CBSE recommends OLabs to all the schools affiliated to the Board. For Kendriya Vidyalayas the roll out may be via ERNET, which provides network connectivity to all the Kendriya Vidyalayas. This is also to inform that OLabs is a facility which is available free of cost at www.olabs.co.in to all the schools affiliated to the Board.

Regards,

Vineet Joshi
(Chairman)

CBSE Circular & Endorsement – Feb 2013

CBSE Circular 2016

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.

CBSE Circular 2020

केन्द्रीय माध्यमिक शिक्षा बोर्ड
(मानव संसाधन विकास मंत्रालय, भारत सरकार के अधीन एक स्वायत्त संगठन)
CENTRAL BOARD OF SECONDARY EDUCATION
(An Autonomous Organisation under the Ministry of Human Resource Development, Govt. of India)

CBSE/ Dir (Acad)/2020

September 2, 2020
Circular No.: Acad- 65/2020

All the Heads of Institutions affiliated to CBSE

Subject: Conduct of the practical work during the lockdown

CBSE has advised schools to follow the Alternative Calendar developed by NCERT to continue education during the lockdown through alternative modes to achieve learning outcomes. Schools have reportedly started using these calendars and other prescribed pedagogical techniques such as experiential and joyful learning, integration of Arts and Sports and project based learning etc. It is also learnt that in addition to alternative calendar and guidelines given on the conduct of online classes (Pragyata), most of the schools have started using online virtual platforms for providing an experience of practical lab activities to the extent possible during this period.

In addition to measures being taken by schools regarding conduct of practical work, it is informed that a platform titled **OLabs** has been developed jointly by the Ministry of Electronics and Telecommunications, Government of India, CDAC, and Amrita University to facilitate a virtual experience of **CBSE syllabus aligned experiments for classes 9 to 12**. The **OLabs** are hosted at www.olabs.edu.in, and the access to it is free for schools on registration. This platform provides class wise experiments with detailed theory and procedure. Students can see animations and use simulation to have an experience as close to real experiments as possible. Students can also assess themselves and provide feedback.

Schools may also keep developing their own resources and explore other appropriate online platforms available in the public domain and use them only after establishing their effectiveness in attaining the desired learning outcomes.

Dr. Joseph Emmanuel
Director (Academics)

KVS & NVS circulars/emails

केन्द्रीय विद्यालय संगठन (मुख्या०)
शहीदजीत सिंह मार्ग, १८ संस्थागत क्षेत्र,
नई दिल्ली – ११० ०१६
KENDRIYA VIDYALAYA SANGATHAN (Hqrs.)
18, INSTITUTIONAL AREA, SJS MARG
NEW DELHI - 110 016
Ph. 26858570 Fax – 26514179

E-mail/Speed Post

F. 110350–50/2016 / KVS (HQ) Acad/   Dated: –06–2016.

The Dy. Commissioner / Director
Kendriya Vidyalaya Sangathan
All Regional Offices & All ZIETs.

Subject: Training of Kendriyia Vidyalaya teachers on Managing
            Resources – regarding.
Ref.:   1. CBSE Circular No. Acad.11/2016 dated 07-04-2016
            2. CDACM (K)/Rollout/MS/75 dated 18-05-2016

Madam / Sir,

    Please refer to the above cited letters (copy enclosed) regarding
teachers on Managing Online Lab Resources.

    In this context, you are requested to communicate the CBSE cir
Principals of all KVs under your jurisdiction encouraging them to depute
benefit from the Olabs training programme.

    You are also requested to contact Dr. M. Sasikumar, Associate Directo
Development of Advanced Computing to schedule workshops to incorporate
in the workshops planned at the regional / ZIET level. Please inform this
out comes / benefits of the workshops alongwith comments, if any, for kind p
competent authority.

                                                          Yo

                                                          (Dr. S
                                                Joint Commiss

Copy to:

1. Dr. M. Sasikumar, Associate Director, Centre For Development of
   Computing, Gulmohar Cross Road No.9, Juhu, Mumbai-400 021.
2. PS to Commissioner, KVS (HQ).
3. PS to Addl.Commissioner (Acad.) KVS (HQ).
4. Guard File.

                                                Joint Commiss

---

F.No.12-11/2016-NVS(Acad)   Dated:- 24/04/2017

To

The Deputy Commissioner
Navodaya Vidyalaya Samiti
All Regional Offices(Except Hyderabad Region)

Sub:- Conduct of Online Lab Teacher training workshop for JNV Teachers under Digital India
Programme-OLABS-reg.

Sir/Madam,

    The Online Labs for School Experiments (O Labs) is a novel e-learning project developed by Amrita
University in collaboration with CDAC Mumbai under a research giant from the Department of Information
Technology, Government of India. It has been developed to supplement the traditional physical labs and
bridge the constraints of time and geographical distances. O Labs is a free resource for all schools in India
and is accessible free of cost on its website. O Labs content has been developed for Class IX and X in
Physics, Biology, Chemistry, Mathematics and English and is aligned with CBSE syllabus.

    For further information regarding fixing venues and dates of the training workshops, you are
requested to please contact Dr. Prema Nedungadi, Director, AmritaCREATE, Amrita University,
Mob.-9995911222, email is: prema@amrita.edu and Co-ordinator, O Labs Team at Email-
amritaolabs@gmail.com and Shri Pantina Chandrashekhar at pantinashekhar87@gmail.com, Contact
No.09940653418.

    After conduct of the said training, a report in this regard may be forwarded to this office. Your
co-operation in this regard is highly solicited.

    This issues with the approval of competent authority.

                                                          Yours faithfully,

                                                          (N.Uma Maheswara Rao)
                                                          Assistant Commissioner (Acad)

Launch of OLabs

OLabs was launched during Good Governance week celebrations on Dec 28, 2015 by Honourable minister of IT Shri Ravi Shankar Prasad

A PEEP INTO OLABS

OLabs Homepage

OLabs - Physics

OLabs - Chemistry

OLabs - Biology

OLabs - Mathematics

OLabs - English

OLabs in Regional Languages

OLabs on Mobile devic

Statistics and Analytics

Olabs: training and online usage
Overall training Figures

Total Teachers Trained	School Trained.
48493	12072

Registered users on Olabs Portal ➡️

Last Updated
08 Mar 2021   6:00

418233 Users

Registered

Statewise training – CBSE schools

State	No. of teachers trained
Andaman and Nicobar Islands	317
Andhra Pradesh	846
Arunachal Pradesh	258
Assam	526
Bihar	619
Chandigarh	226
Chhattisgarh	305
Daman and Diu	3
Delhi	4901
Dadra and Nagar Haveli	35
Goa	35
Gujarat	992
Himachal Pradesh	111
Haryana	691
Jharkhand	369
Jammu and Kashmir	105

State	No. of teachers trained
Karnataka	2932
Kerala	9163
Lakshadweep	127
Maharashtra	2094
Meghalaya	64
Manipur	135
Madhya Pradesh	1551
Mizoram	15
Nagaland	40
Odisha	846
Punjab	727
Puducherry	357
Rajasthan	1121
Sikkim	162
Telangana	739
Tamil Nadu	3852
Tripura	114
Uttar Pradesh	3344
Uttarakhand	545
West Bengal	738
Total	**39005**

Insights of Training

Zone-wise training status

Zone	Percentage	Value
Union terriories	15.3%	5966
North East Zone	3.4%	
Central Zone	4.8%	1856
South Zone	44.9%	17532
North Zone	14.2%	5523
East Zone	6.6%	2572
West Zone	10.9%	4242
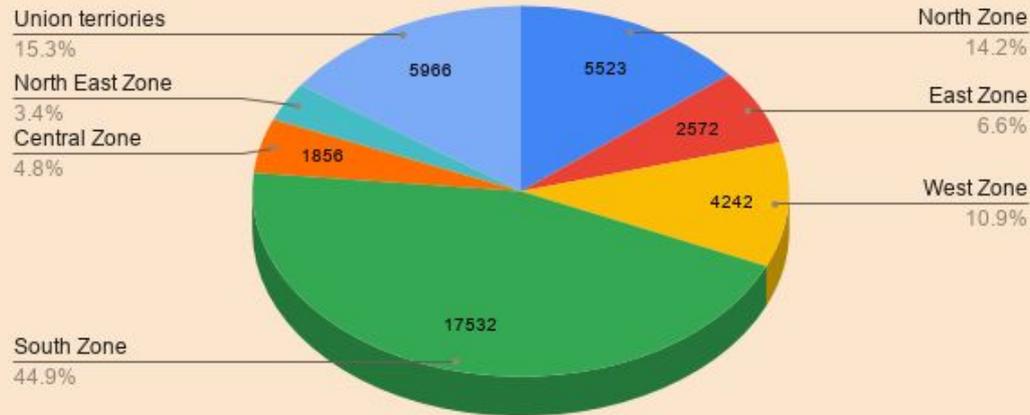
Total number of training conducted in the North East Region is : 52

Status of Urban and Rural training in NE regions

	Percentage	Value
Urban	40.0%	512
Rural	60.0%	768
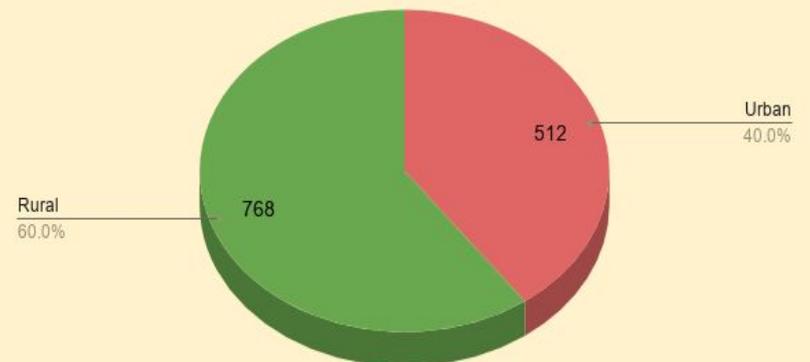
Active users and pages
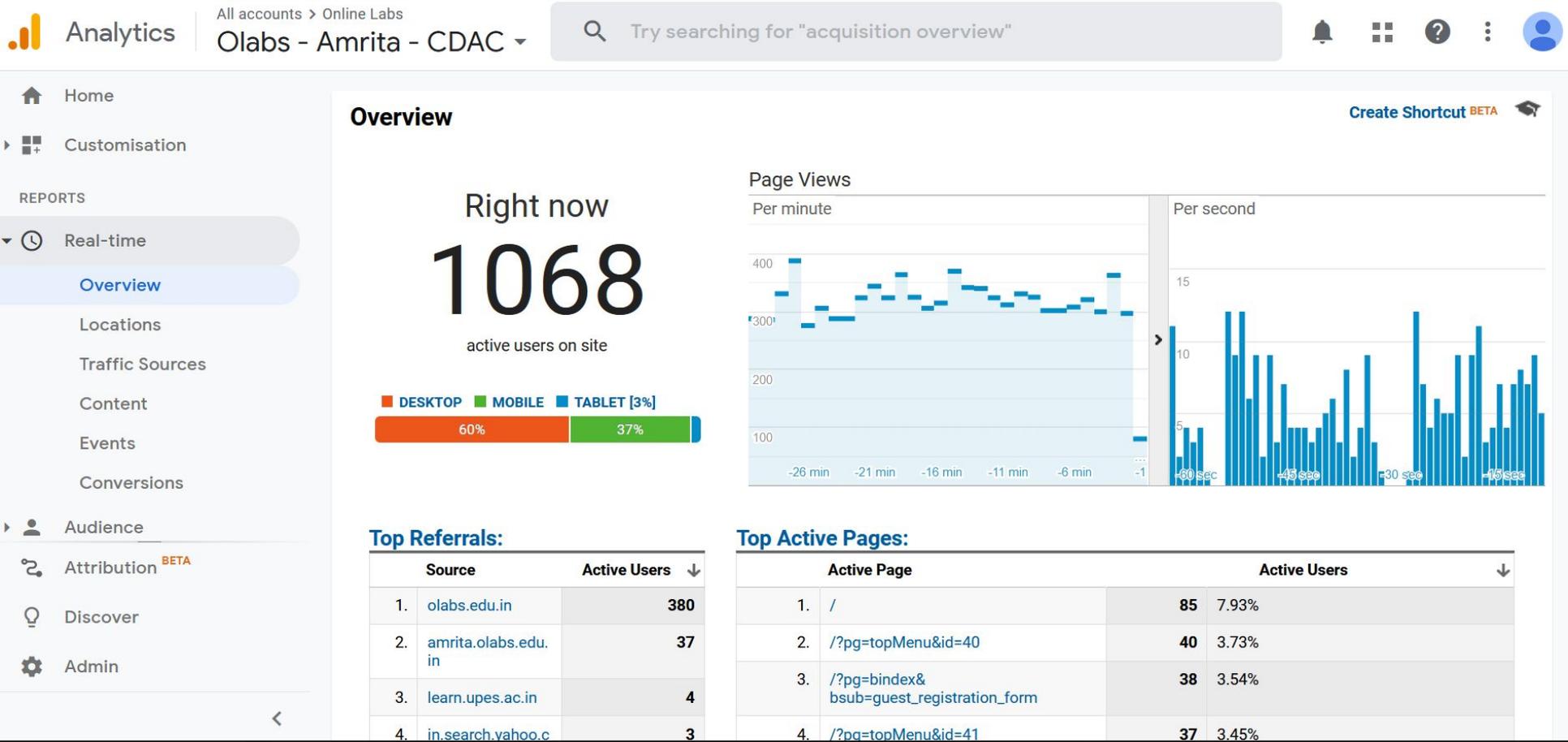
Audience Overview
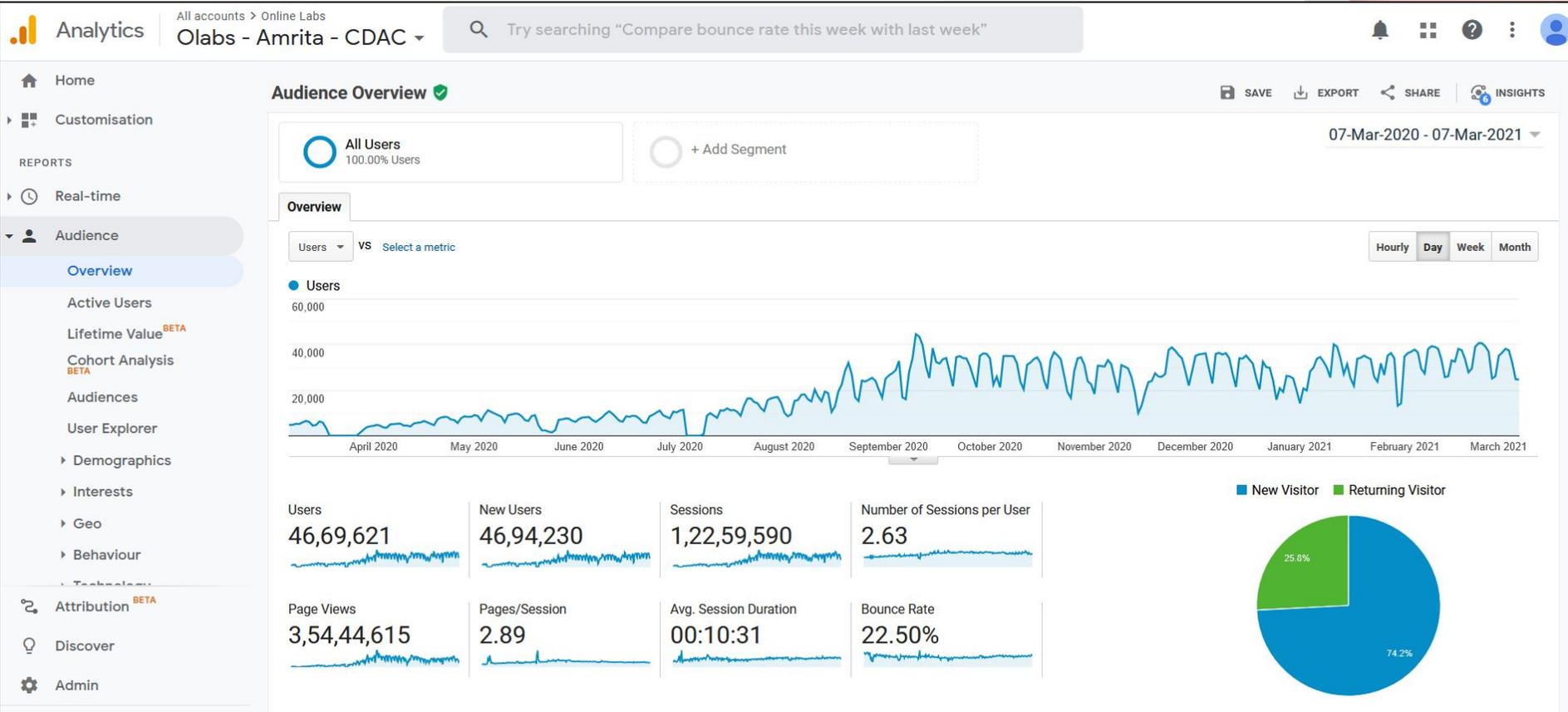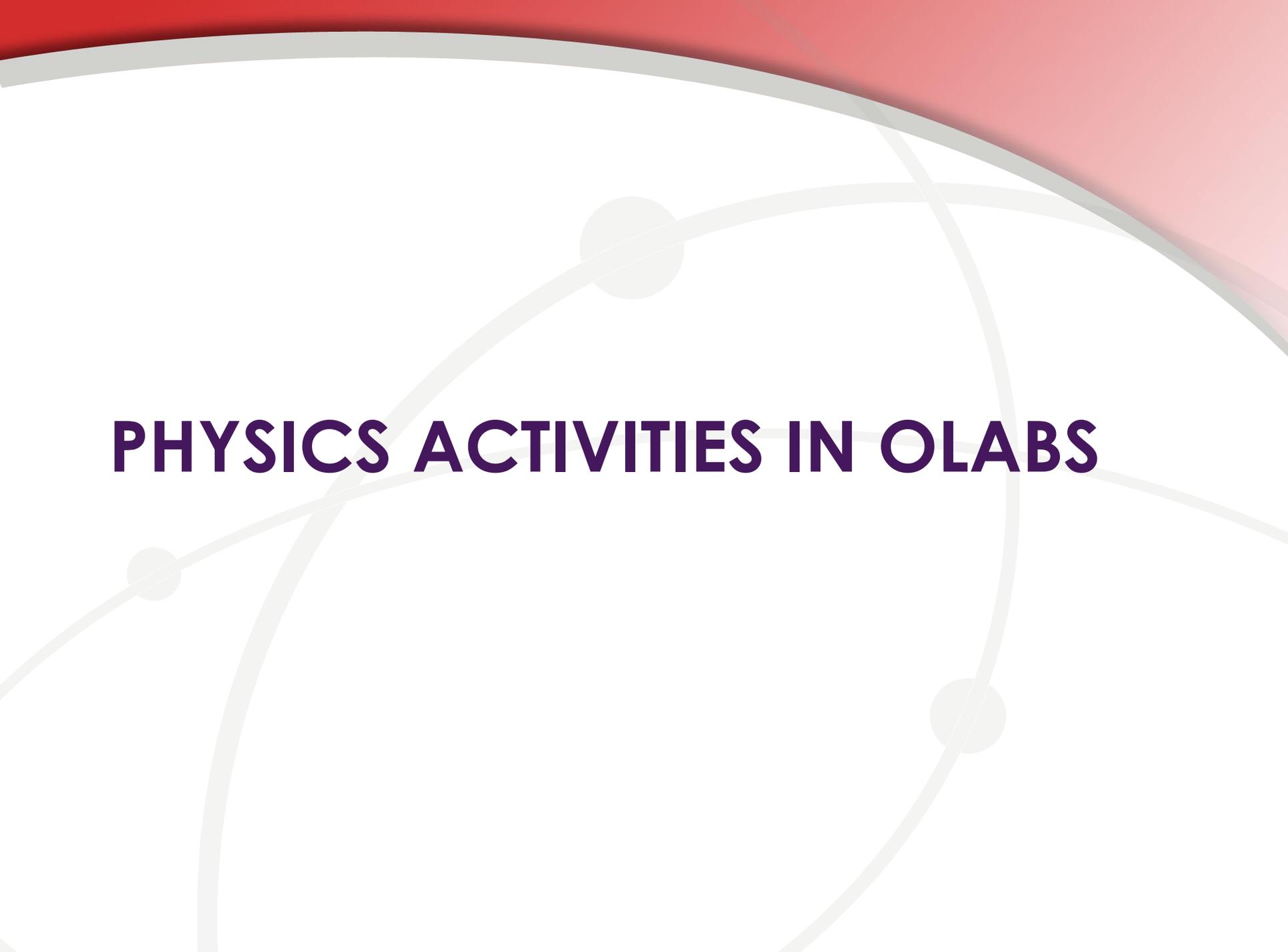
PHYSICS ACTIVITIES IN OLABS

Physics Labs – Class IX

Class 9

Bell Jar Experiment

Force Required to Move a Wooden Block on a Horizontal Table
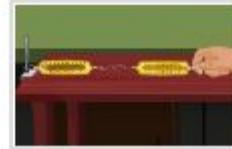
Newton's Third law of Motion
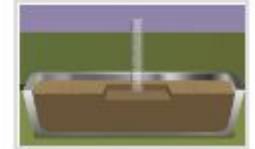
Pressure Exerted by a Solid Iron Cuboid on Sand
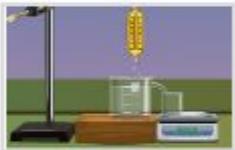
Verification of Archimedes Principle

Laws of Reflection of Sound

Determination of Density of Solid

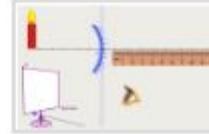**Newtons Second Law**

Velocity of a Pulse Propagated Through a Slinky

Physics Labs – Class X

Class 10
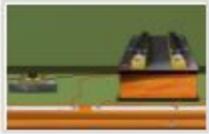
Equivalent Resistance of Resistors (Series)
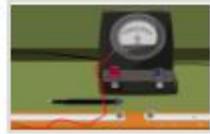
Equivalent Resistance of Resistors (Parallel)

To find focal length of a Concave Mirror
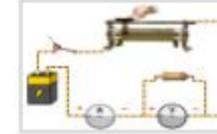
Verification of Ohm's Law

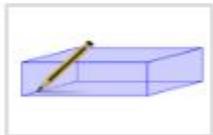To study the field lines formed around a bar magnet

Verification of Hooke's Law
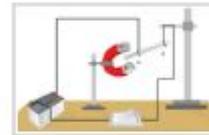
Force on a Current Carrying Conductor in a Magnetic Field
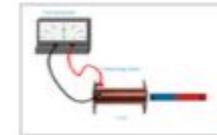
Electromagnetic Induction

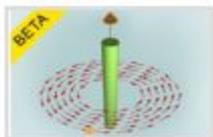To study refraction of light in rectangular glass slab

To study reflection in concave mirror

Ohm's law and resistance

The magnetic field lines around current carrying solenoid

Magnetic field lines around current carrying conductor
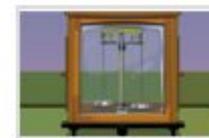
Physics Labs – Class XI

Class 11

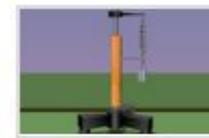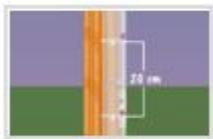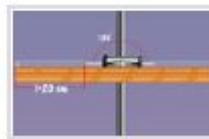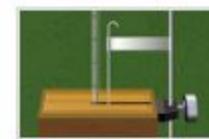|			
Screw Gauge	Vernier Calipers	Simple Pendulum	Beam Balance
Parallelogram Law of Vectors	Spherometer	Friction	Helical Spring
Viscosity of a liquid - Stoke's method	Inclined Plane	Boyle's Law	Surface Tension
Young's Modulus	Resonance Column	Sonometer	Newton's Law of Cooling

Physics Labs – Class XII

Class 12

Ohm's law and resistance

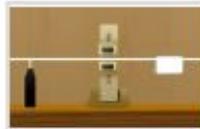Potentiometer-Internal Resistance of a Cell
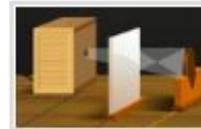
Potentiometer-Comparison of emf

Figure of Merit of a Galvanometer

Conversion of Galvanometer to Ammeter

AC Sonometer

Concave Mirror-Focal Length by u-v Method
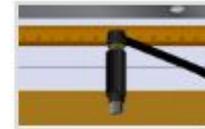
Convex Mirror-Focal Length

Concave Lens-Focal Length

Spectrometer-Prism

Refractive Index of Liquid

Metre bridge-Resistance of a wire

MetreBridge-Law of Combination of resistors

Diode Characteristics

Zener Diode

Transistor Characteristics

Conclusion

- We are happy to bring this platform you to add value to the school education, in significant ways.

- We are working on to bring you better and more labs.

- Do share your feedback and suggestions; we certainly appreciate that.

- We do hope you will consider adopting it for your students and inform the students accordingly.

Thank you for your time

etu@cdac.in
vidyakashetu@gmail.com