



CEMCA



# Capacity Building Workshop on Virtual Labs

9<sup>th</sup> and 10<sup>th</sup> November 2020

## Report

### *Organised by*

Commonwealth Educational Media Centre for Asia, New Delhi

and

School of Computer Science & IT, Uttarakhand Open University

Dr. Shiffon Chatterjee  
CEMCA, New Delhi

## **Background**

Virtual Labs is an initiative of the Ministry of Human Resource Development (MHRD) under the National Mission on Education through ICT (NMEICT). This initiative provides remote access to labs in various science and engineering disciplines at the undergraduate, post graduate level and research scholar levels.

One of the challenges in science and engineering education in our country is that access to costly lab equipment is constrained by lack of resources and geographical distances. Virtual Labs can provide an alternative to traditional hands-on labs where labs are not present or augment existing access to labs and experiments. Thus, Virtual Labs can extend the use of scarce or costly equipment.

Another challenge is how to improve the quality of the teaching and learning experience. Virtual Labs can play an important role in this regard as they allow students to engage with interactive simulators to perform experiments remotely. The aim is to provide a complete Learning Management System where the teaching and learning experience is enriched through simulations, additional web resources, video lectures, animated demonstrations, and tools for self evaluation. Through sharing of knowledge, data, tools, and many other resources, Virtual Labs provide an environment to enhance the teaching and learning of many subjects in science and engineering.

There is, therefore, an urgent need for effective deployment, use, and integration of Virtual Labs into curricula. Further, during this time of educational disruption, it is critical that students continue to learn through laboratory experiments online through virtual labs. Recognizing this need, CEMCA, in collaboration with School of Computer Science & IT, Uttarakhand Open University, organized a two-day workshop on Virtual Labs. The focus of this workshop was on creating awareness about Virtual Labs for internet-based remote experimentation and enabling faculty to use Virtual Labs and to integrate them effectively in teaching practice.

## **Workshop objectives**

The workshop was organized with the objective that participants will be able to:

- Demonstrate awareness about Virtual Labs
- Use Virtual Labs for performing experiments
- Integrate Virtual Labs into teaching and learning practices

## **Date**

The workshop was held on 9<sup>th</sup> and 10<sup>th</sup> November 2020.

## **Participants**

The workshop was attended by 62 participants from Uttarakhand Open University and associated degree colleges. Participants included academic consultants, senior faculty, lab assistants, post graduate students and research scholars.

## **Workshop modality**

The workshop sessions were conducted from 11.00 am to 1.00 pm through Zoom videoconferencing technology. In addition to the synchronous online sessions, participants were encouraged to explore virtual labs and share queries in the asynchronous mode through WhatsApp.

## **Resource person**

Mr. Saneesh P F, Project Manager, VALUE Virtual Labs, Amrita Vishwa Vidyapeetham, Kollam

## **Proceedings**

### **Day 1: 9<sup>th</sup> November 2020**

The inaugural session commenced with the opening address by Prof. Madhu Parhar, Director, CEMCA and Advisor for the workshop. She presented the need for virtual labs in the context of open universities. She pointed out the role of virtual labs envisaged in the National Education Policy 2020. Prof. O.P.S. Negi, Hon'ble Vice Chancellor, Uttarakhand Open University, and Chief Patron, in his Presidential Address, emphasised the importance of experimentation in science education, and posited that open educational resources, including virtual labs can play an important role in taking educators and students towards quality teaching and learning.

Prof. Durgesh Pant, Director, School of Computer Science & IT, UOU and workshop Convenor, highlighted the need for diverse range of technologies such as virtual labs to enrich science education. Dr. Krishnashree Achutan, Principal Investigator, VALUE Virtual Labs, Amrita Vishwa Vidyapeetham, in her keynote address, outlined the evolution of the project at the national level and how virtual labs promote holistic and experiential learning. Dr. Jeetendra Pande, Faculty of Computer science & IT, UOU, and Organising Secretary, delivered the vote of thanks. During the session, speakers and resource person were introduced by Dr. Shiffon Chatterjee, Senior Programme Officer, CEMCA and Organising Secretary.

The technical session was conducted by Mr. Saneesh P F, Project Manager, VALUE Virtual Labs, Amrita Vishwa Vidyapeetham. He provided an overview of virtual labs through his presentation and videos. He demonstrated a variety of experiments from Physics, Chemistry, Biology, and Computer Science. These included Blood grouping experiment (Biotechnology), Spectrophotometer (Chemistry), Determination of viscosity of organic solvents (Chemistry), Parallel LCR circuit (Physics), Tangent Galvanometer (Physics), and Problem solving labs (Computer science).

A WhatsApp group was created by the organisers to enable asynchronous interaction, sharing of assignments, queries, and feedback submission. At the end of the first day's live session, the resource person shared a set of assignments in the group to enable participants to explore and practice doing experiments on virtual labs.

## Day 2: 10th November 2020

Prof. Madhu Parhar, in her opening remarks, encouraged participants to navigate virtual labs and practice how to use virtual labs for experiments. The technical session began with a recapitulation of the overall approach of virtual labs. Following this, Dr. Zeena S Pillai, Associate Professor, Department of Chemistry, Amrita Vishwa Vidyapeetham and Dr. Sreelatha K S, Assistant Professor, Govt. Polytechnic College, Kerala shared their experiences as virtual lab users and developers. They discussed how virtual labs have helped them to engage students effectively in learning through experimentation.

Saneesh P F then demonstrated how to navigate the virtual lab learning management system and how to conduct online assessment using the system. Research insights on the impact of virtual labs were shared, followed by a discussion on how to transform teaching methods and build in active learning strategies using virtual labs. The resource person then demonstrated several experiments from Physics, Chemistry, Biology, and Computer Science. The focus was on providing a good representation of experiments to create awareness and to motivate participants to learn to use virtual labs effectively, and to see how to develop further content and experiments.

During the concluding session, Prof. Madhu Parhar, Director CEMCA and Prof. Durgesh Pant, Director, School of Computer Science and IT, Uttarakhand Open University, spoke of the need to take such initiatives ahead so that open universities can benefit from virtual labs. The need was highlighted for discipline specific training; utilization of existing experiments; and development of new experiments.

## Programme schedule

Day 1: 9 <sup>th</sup> November 2020			
Time	Session topic	Resource person	Outcome
11:00AM – 11:45AM	Inaugural session	Prof. Madhu Parhar Prof. Durgesh Pant Prof. O. P. S Negi Dr. Krishnashree Achuthan Dr. Jeetendra Pande Dr. Shiffon Chatterjee	Speakers and resource person introduced, inaugural address; presidential address; and keynote address delivered, vote of thanks offered
11:45AM – 12:30PM	Introduction to Virtual Labs (presentation and videos)	Mr. Saneesh P F	Participants gained an overall understanding of virtual labs; the concept and overview; virtual lab related activities
12:30PM – 1:00PM	Demonstration of Virtual Lab experiments	Mr. Saneesh P F	Experiments from Physics, Chemistry, Biology, and Computer Science and Information Technology were demonstrated; Participants learnt how to perform experiments through virtual labs
1:00PM – 1:05PM	Q&A session	Mr. Saneesh P F	Queries shared and answered

Day 2: 10th November 2020			
11AM – 11:15AM	Overview of virtual labs: recapitulation	Mr. Saneesh P F	Participants gained an overall understanding of virtual labs
11:15AM - 11:20AM	Virtual Lab user experience	Dr. Zeena S Pillai	Insights shared by faculty members using virtual labs
11:20AM – 11:25AM	Virtual Lab user experience	Dr. Sreelatha K S	
11:25AM – 11:45AM	Innovative Teaching	Mr. Saneesh P F	Strategies discussed on how to transform teaching using virtual labs
11:45AM – 12:00PM	Impact of virtual labs	Mr. Saneesh P F	Research findings on virtual labs shared
12:00PM – 12:20PM	Virtual Lab Learning Management System (LMS Module)	Mr. Saneesh P F	LMS module demonstrated
12:20PM – 12:50PM	Demonstration of virtual lab experiments	Mr. Saneesh P F	Participants learnt how to perform virtual lab experiments
12:50PM – 1:00PM	Q&A Session	Mr. Saneesh P F	Queries shared and answered
1:00PM – 1:10PM	Closing and way forward	Prof. Madhu Parhar Prof. Durgesh Pant Dr. Jeetendra Pande Dr. Shiffon Chatterjee	Highlighted need for discipline specific training; utilization of existing experiments; and development of new experiments

### Photo gallery





A screenshot of a presentation slide from a Zoom meeting. The slide is titled "Magnetic Field Along The Axis of A Circular Coil Carrying Current" and is part of a presentation from "VALUE @ Amrita". The slide content includes:

**Experiment Title**

**Theory Discussion**

**Experiment tabs**

**Supporting Video**

**Aim:**  
To study the variation of magnetic field with distance along the axis of a circular coil carrying current.

**Apparatus:**  
Circular coil, rheostat box, sensitive galvanometer, ammeter, voltmeter, battery, etc. The position of the combination is to allow the current to be reversed with the coil while keeping it in the same distance to the rest of the setup.

**Theory:**

A current carrying coil generates a magnetic field. According to Biot-Savart law, the magnetic field at a point due to an element of a circular carrying current is:

1. Directly proportional to the length of the current.
2. Directly proportional to the sine of the angle  $\theta$  between the element and the line joining the element to the point.
3. Inversely proportional to the square of the distance. (between the element and the point).

The slide also features a "Supporting Video" icon and a small video thumbnail of a man speaking. The slide number "24" is visible at the bottom left, and the "AMRITA" logo is at the bottom right.



## List of participants

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