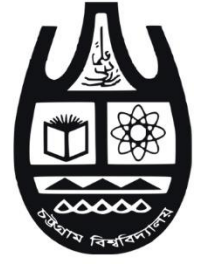




AMRITA
VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY



Report on
Online Workshop on Virtual Labs
23-25 August 2021

Organized by

**Institutional Quality Assurance Cell
(IQAC)**

University of Chittagong, Bangladesh

in collaboration with

**Commonwealth Educational Media
Centre for Asia, New Delhi**

Report
Submitted by

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

Introduction

Virtual Labs is an initiative of the Ministry of Human Resource and Development, Govt. of India under the National Mission on Education through Information and Communications Technology (NME-ICT). This initiative provides an opportunity for all students to use virtual labs free of cost. The aim is to provide high quality remote laboratory access in Science and Engineering disciplines for students and teachers of the country; and is applicable to undergraduate and post-graduate students including Physical Sciences, Biological Sciences, Chemical Sciences, Computer Science and Electronics and Mechanical Engineering. Virtual Labs are being developed by consortia of 12 institutes which include Amrita Vishwa Vidyapeetham, IIT Delhi, IIT Bombay, IIT Kanpur, IIT Kharagpur, IIT Madras, IIT Roorkee, IIT Guwahati, IIIT Hyderabad, Dayalbagh Educational Institute, NIT Surathkal, and College of Engineering, Pune.

Main website: <https://www.vlab.co.in/>

University website: <http://vlab.amrita.edu/>

Virtual Labs are new immersive e-learning environments that provide a media-rich, interactive user interface that teachers can use to supplement their curriculum. These labs are located on an open webpage that can be accessed by anyone through a web browser, on any Internet-connected computer in the world. A variety of laboratory experiments can be conducted virtually using animation, simulation, or remotely triggered hardware. Laboratory experiments are modeled very close to real-life experiments and when used as a learning tool by students it allows them to learn the material more efficiently and can make doing the practical experiments easier.

Laboratory experiments are an integral component of science and engineering education. However, access to lab equipment is often limited due to geographical distances and resource constraints. Virtual or online labs provide an alternative to physical hands-on labs where such labs are not present or augment existing access to experiments. Further, virtual labs, as innovative interactive multimedia platforms for online and blended learning, can enhance the teaching and learning experience and outcomes. There is, therefore, an urgent need for effective deployment, use, and integration of virtual labs into curricula. Recognizing this need, the Commonwealth Educational Media Centre for Asia (CEMCA), in partnership with the University of Chittagong, Bangladesh, facilitated a capacity building programme for teachers in the use of virtual labs.

Aim

This program aimed to create awareness about virtual labs for internet-based experimentation and to enable teachers and teacher educators to use virtual labs and to integrate them effectively in teaching practice.

Objectives

Participants would be able to:

- Demonstrate awareness about virtual labs
- Use virtual labs for performing experiments
- Integrate virtual labs into teaching and learning practice

Invitation

CEMCA, New Delhi invited Amrita Virtual labs to conduct a three-day online workshop on 23rd, 24th and 25th August 2021 for teachers of the University of Chittagong, Bangladesh.

Participants

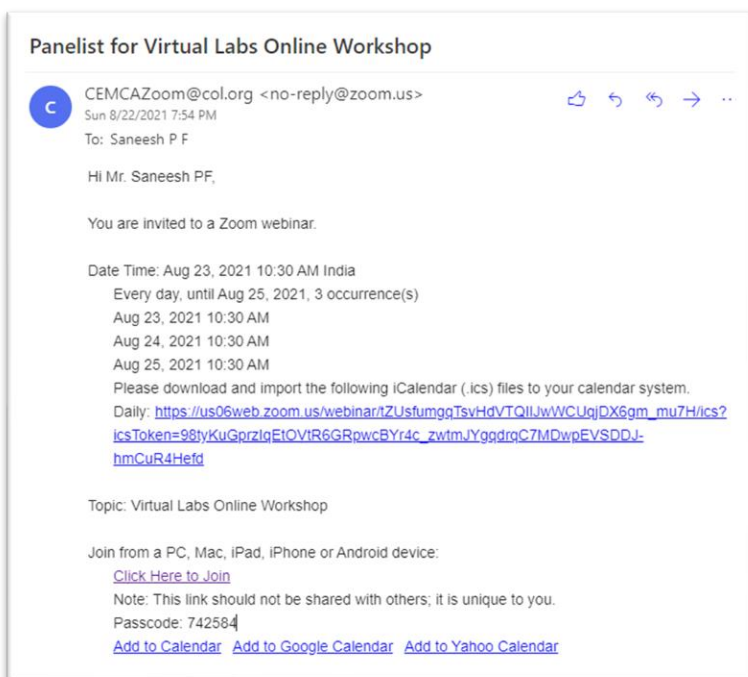
98 participants from various disciplines attended the online workshop. List of participants is placed in the Appendix.

Dates: The workshop was for three days – August 23rd to 25th 2021 from 10:30AM to 12:00PM (IST)

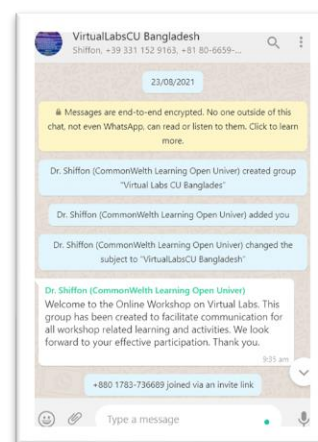
Venue: The workshop was conducted online through the virtual platform Zoom.

Methodology

The capacity building workshop was conducted online through Zoom platform. The methodology used was live demonstration of Virtual Lab experiments from the websites vlab.amrita.edu and vlab.co.in followed by hands-on practice by participants using the assignment questions provided by the resource person. The organizing team shared a WhatsApp group to interact asynchronously, share information, answer queries, and submit feedback.



Zoom link sent to the participants and experts



WhatsApp group screen shot

Workshop Schedule

Day 1: 23 August 2021		
Time	Activity	Session details
11:00AM – 11:20AM(BST)	Address by: Professor Mohammad Abul Hossain, Director of IQAC Prof. Madhu Parhar, Director, CEMCA, India Prof. Nasim Hasan, Dean, Faculty of Science, University of Chittagong Prof. Mostafa Azad Kamal, Treasurer, Bangladesh Open University Prof. Benu Kumar Dey, Honourable Pro-Vice-Chancellor, University of Chittagong	Inaugural session
11:20AM – 11:50AM(BST)	Technical sessions by Mr. Saneesh P F, Project Manager, VALUE Virtual Labs, Amrita Vishwa Vidyapeetham, India Introduction to Virtual Labs (Presentation and video)	Participants gain an overall understanding of virtual labs; the concept and overview; virtual lab related activities
11:50AM – 12:20PM(BST)	Demonstration of virtual lab experiments from Physics, Chemistry, Biology, and Computer Science. Hands-on activity	Participants learn how to perform experiments through virtual labs
12:20PM – 12:30PM(BST)	Q&A session Practice assignments	Queries shared and answered Practice assignments explained

Day 2: 24 August 2021		
Time	Activity	Session Details
11:00AM – 11:10AM(BST)	Opening session	Recapitulation of overview of virtual labs
11:10AM - 11:20AM(BST)	Impact of virtual labs	Significant research findings on virtual labs presented
11:20AM – 12:15PM(BST)	Virtual Lab experiment demonstration and hands-on activity	Participants learn how to perform experiments through virtual labs
12:15PM – 12:30PM (BST)	Q&A session Practice assignments	Queries and observations shared

Day 3: 25 August 2021		
Time	Activity	Session Details
11:00AM – 11:10AM(BST)	Opening session	Recapitulation of overview of virtual labs
11:10AM – 11:20AM(BST)	Virtual labs learning management system	Describe about learning management system (LMS) module from virtual lab platform.
11:20AM – 12:15PM(BST)	Demonstration of multiple online laboratories and simulations	Participants learn how to perform experiments through virtual labs
12:15PM – 12:25PM(BST)	Q&A Session	Queries and observations shared
12:25PM – 12:30PM(BST)	Closing session	

Day 1 - Inauguration: August 23rd 2021

The inauguration was graced by the presence of Prof. Benu Kumar Dey, Honorable Pro-Vice-Chancellor, University of Chittagong, Prof. Dr. Nasim Hasan, Dean, Faculty of Science, University of Chittagong, Professor Dr. Mohammad Abul Hossain, Director, IQAC, University of Chittagong, Prof. Dr. Mostafa Azad Kamal, Treasurer, Bangladesh Open University, Prof. Madhu Parhar, Director, CEMCA, India, Dr. Shiffon Chatterjee, Senior Programme Officer, CEMCA, India. Dr. Ganguli served as moderator of the inaugural session and invited all the guests. Dr. Hossain, director IQAC delivered the welcome address to the audience. Dr. Hossain mentioned that this programme is altogether different from the other programmes IQAC has arranged over the past one and half year. According to Dr. Hossain, this workshop is expected to contribute to an area of specialized knowledge in the University of Chittagong and would act as a precursor to many more collaborative programmes of this kind between CEMCA and IQAC University of Chittagong.

During the inaugural function Dr. Mostafa Azad Kamal highlighted that “this is the first time we are going to conduct a workshop relating to lab works”. Prof. Madhu Parhar spoke of how “in many countries including India, laboratories are not fully functional and there are large number of students performing experiments in one given time; so each student does not get a change to do experiments”. Prof. Madhu stated that virtual labs can provide a solution to this situation. Dr. Mohammed Nasim Hasan, Dean, Faculty of Science, Chittagong University said “during COVID 19 pandemic, Chittagong university organized online classes from 2019 onwards but could not organize practical classes that require physical presence in class for laboratory demonstration”. Dr. Hasan emphasised how virtual labs, as simulated learning environments would allow students to complete laboratory experiments online and explore theory without going into physical lab.

At the end of the inaugural session Prof. Benu Kumar Dey, Pro Vice-Chancellor, University of Chittagong, addressed the audience. Prof. Dey stated that despite technological limitations universities in Bangladesh, including Chittagong University, were able to begin remote classes successfully during the pandemic situation. However, virtual labs could not be started effectively. He expressed the view that after attending the 3-day workshop on virtual labs, colleagues would feel confident to teach virtual labs to students in online settings. Prof. Dey expressed his gratitude to CEMCA for organizing the workshop in collaboration with IQAC of Chittagong University. At the end of the inaugural session Dr. Mohammed Omar delivered the vote of thanks to all the dignitaries and participants.

Inaugural Function



Dr. Mohammad Abul Hossain, Director, IQAC, University of Chittagong



Dr. Mostafa Azad Kamal, Treasurer, Bangladesh Open University



Prof. Madhu Parhar, Director, CEMCA, India



Dr. Mohammed Nasim Hasan, Dean, Faculty of Science, University of Chittagong

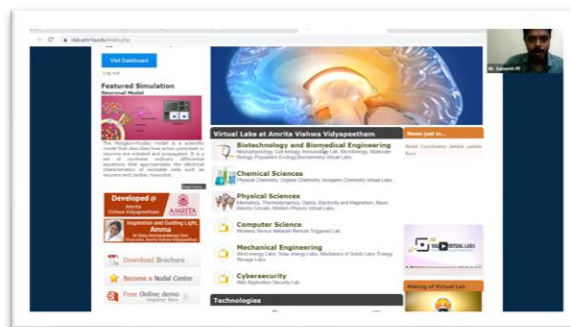


Prof. Benu Kumar Dey, Honourable Pro-Vice Chancellor, University of Chittagong

Dr. Shiffon Chatterjee, Senior Programme Officer, CEMCA, introduced the resource person Mr. Saneesh P F. Various experiments in Physics, Chemistry, Biology, and Computer Science were demonstrated by the resource person who also discussed how to transform teaching using virtual labs/ Mr. Saneesh shared research findings regarding how virtual labs are effective for students and faculty members.

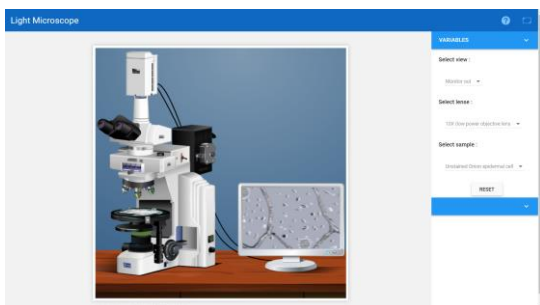
Session details from 11:00AM to 12:00PM (IST)

Introduction to the virtual laboratory: Mr. Saneesh presented an overview of the virtual lab project and he demonstrated experiments from vlab.amrita.edu and vlab.co.in. In between the sessions, he asked several questions to the audience through polls. The audience submitted their answers through polls so that the presenter could have a good interaction with the audience.



Mr. Saneesh P F demonstrating virtual lab experiments

Virtual Lab Experiment Demonstration

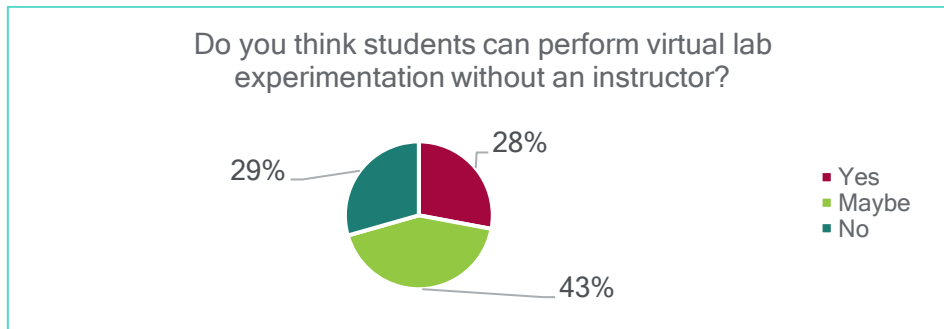
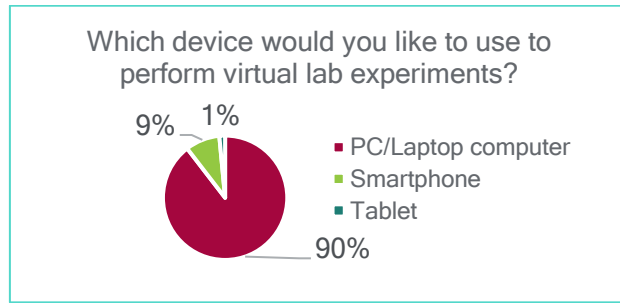
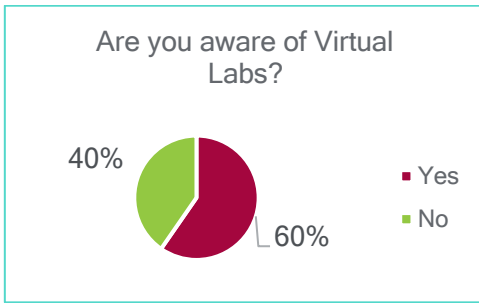


Light Microscope - Biotechnology



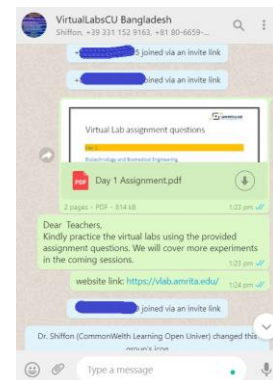
Gram Stain Technique - Biotechnology

Poll question responses



Virtual lab practice assignment questions

There were several questions given to the participants for practicing the laboratory experiments in order to get familiarized with the online virtual lab interface. Assignment questions were shared both through a WhatsApp group and email.

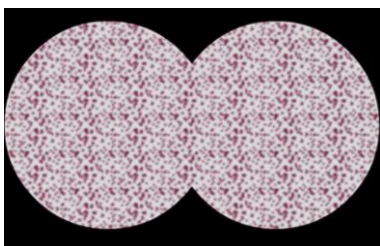


Day 1 Assignment questions

Biotechnology and Biomedical Engineering

Problem 1: Identify the sample

Hint: Gram Stain Technique



Problem 2:

How much voltage is applied across the electrode of electrophoretic chamber?

Hint: Agarose Gel Electrophoresis

Chemical science

Problem 1: Identify the unknown concentration of the ‘Rose Bengal’

Hint: Spectrophotometry

Problem 2: Which of the following is a weak base?

Hint: Acid Base Titration

1. KOH
2. HF
3. NaOH
4. K_2CO_3

Physical science

Problem 1: For a circular coil of 30 turns and diameter 10cm, find the magnetic field at the centre of the coil, if 1A current flows through it. Also obtain the fields at different points on the axial line and verify the Gaussian distribution of magnetic field.

Link: <https://vlab.amrita.edu/index.php?sub=1&brch=192&sim=972&cnt=1>

Computer science

Problem 1: How many swaps are needed to sort the numbers 27, 61, 82, 64, 27, 62 in non-decreasing order using Bubble Sort?

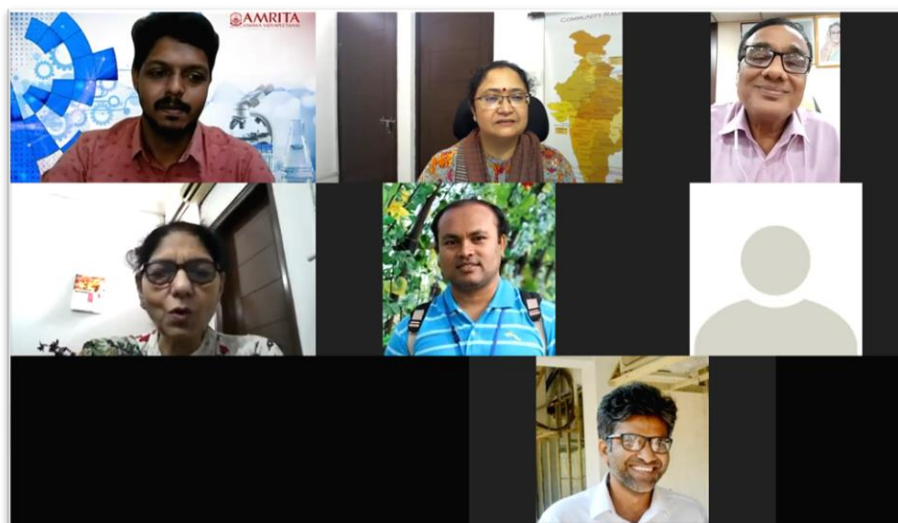
Link: <https://ds1-iiith.vlabs.ac.in/exp/bubble-sort/exp.html#Basic%20Concept>

Closing remarks

During the closing session, Prof. Madhu Parhar encouraged participants to explore all the possible experiments and learn more. Dr. Shiffon Chatterjee thanked the resource person, panelists, and participants for Day 1 of the workshop.

Day 2 – August 24th 2021

Mr. Saneesh demonstrated various experiments from chemical science, physical science, computer science and biology. During the session resource person provided several tasks to the participants so that hands-on experience of virtual laboratories could be obtained. All the participants very actively engaged with the hands-on session and interacted with the resource person.

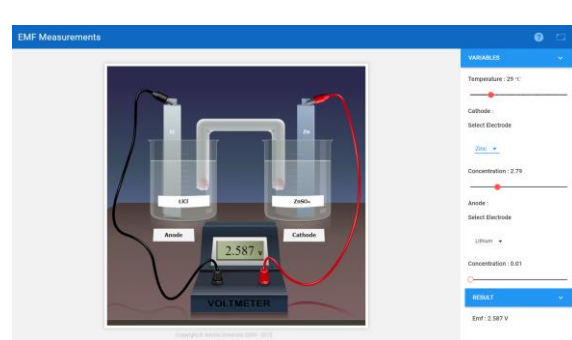


Prof. Madhu Parhar addressing the participants during the second day of the workshop

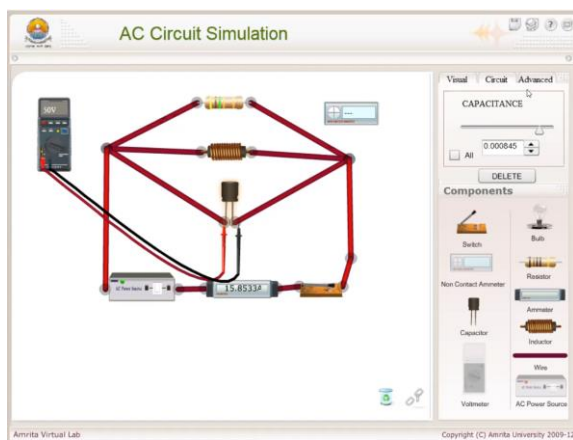
Virtual lab experiment demonstration



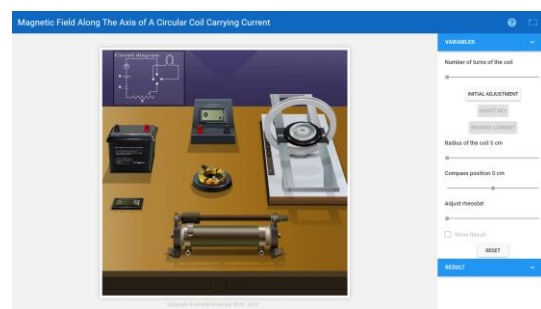
Chemistry: Spectrophotometry



Chemistry: EMF Measurement



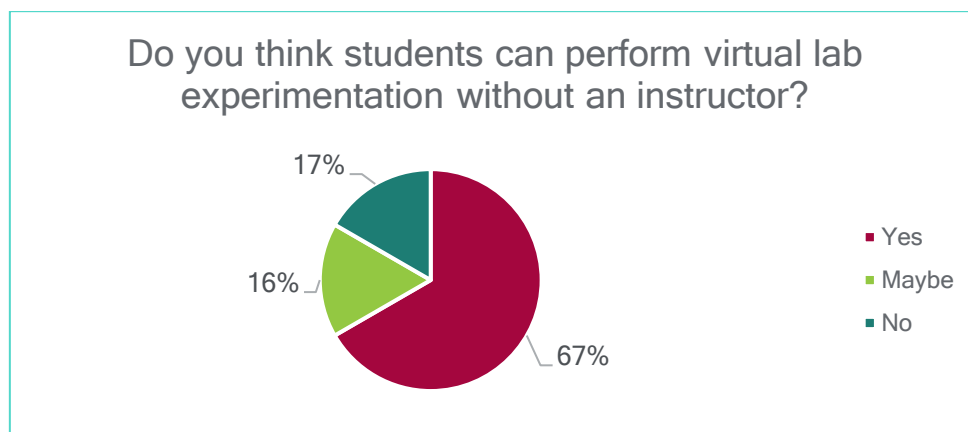
Physics: Electric circuit simulation



Magnetic Field Along The Axis of A Circular Coil Carrying Current – Physics

Computer science: Bubble sorting simulation

Poll question responses



Hands-on task result

As part of the workshop, there were several tasks assigned to the participants to practice the virtual labs and submit the answers. Around 10 minutes were provided to complete the task and submit the answer through polls. Participants who could not submit the correct answer were encouraged to repeat the experimentation at their own pace as part of the assignment after the online session.

Hands-on task	Percentage of correct responses
Magnetic field around the circular coil, Number of turns: 20, Radius of the coil: 7cm, Compass box position: 14 cm, Current: 1A. Identify the deflection shown in the compass box.	62%
Identify the voltage of the cell if the cathode electrode as Gold (Concentration: 4M) and anode electrode as Copper (concentration: 1.19M) at 10 degree Celsius temperature	71%

Day 2 Assignment questions

Day 2 assignment questions were shared via WhatsApp group as well as email for practicing virtual lab experiments.

Chemical science

Problem 1: What is the absolute viscosity of Nitrobenzene?

Hint: Determination of Viscosity of Organic Solvents

Physical science

Problem 2: What should be the minimum applied potential for complete stoppage of photocurrent in an experiment if the target material is zinc, area of the plate 0.2cm^2 , intensity of light 15w/m^2 and wavelength of light 120nm ?

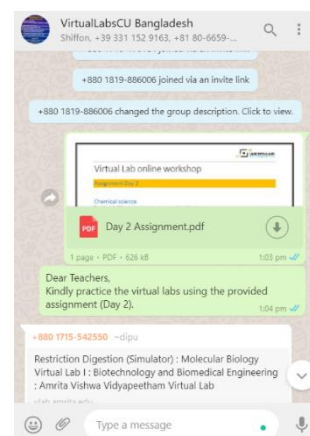
Link:

<https://vlab.amrita.edu/index.php?sub=1&brch=195&sim=840&cnt=4>

Computer science

Problem 3: Which tag is used for largest heading?

Link: <https://html-iitd.vlabs.ac.in/basics-of-html/exp/introduction-to-html/simulation.html>



Day 3- August 25th 2021 10:30AM – 12:00PM (IST)

Mr. Saneesh presented the impact of virtual labs using several research articles. He explained learning activities that teachers can implement in the classroom to transform the teaching process.



Mr. Saneesh delivering talk on impact of virtual labs.

Significant impact of virtual labs- Research studies

Amrita Virtual Lab team has conducted various research works to identify the impact of virtual labs among students and institutions. Mr. Saneesh shared some of the research findings with the participants. He presented the following research articles:

- Kolil, V. K., Muthupalani, S., & Achuthan, K. (2020). Virtual experimental platforms in chemistry laboratory education and its impact on experimental self-efficacy. *International Journal of Educational Technology in Higher Education*, 17(1), 1-22.
- Achuthan, K., Kolil, V. K., & Diwakar, S. (2018). Using virtual laboratories in chemistry classrooms as interactive tools towards modifying alternate conceptions in molecular symmetry. *Education and Information Technologies*, 23(6), 2499-2515.
- Achuthan, Krishnashree, Sayoojyam Brahmanandan, and Lakshmi S. Bose. "Cognitive Load Management in Multimedia Enhanced Interactive Virtual Laboratories." *Advances in Intelligent Informatics*. Springer, Cham, 2015. 143-155.

Virtual lab experiment demonstration

Determination of TS, TC

DETERMINATION OF TS, TDS AND TSS IN WATER

STEP 3 Place the filter paper in the membrane filter and pour 50ml of sample from top of filter slowly.

Connect the filter to vacuum pump

© 2018 - 2021 SOLVE - The Virtual Lab © NITK Surathkal, Department of Water Resources & Ocean Engineering

Environmental Engineering Lab: Determination of TS, TDS and TSS

Boiling Point of an Organic Compound

Select the unknown compound (select)

Water

The temperature at which continuous stream of air bubbles appears, (t₁)

The temperature at which bubbles completely disappears, (t₂)

Boiling point, (t_b = (t₁ + t₂)/2 =

Select the actual compound (select)

Show chart

Reset

Developed by Amrita University Under research grant from Department Of Electronics & Information Technology

Chemistry: Boiling point of Organic solvent

Studies on Turbidity, pH and Microbial Presence in Water

Select the experiment:

pH of Water Sample

Top water, Waste water, Pond water, Backwater, Sea water, Pure water

Tap water, pH Paper, Universal Indicator

Developed by Amrita University Under research grant from Department Of Electronics & Information Technology

Biology: Studies on Turbidity, pH and Microbial Presence in Water

Volume of a sphere

Instructions

1. Click on "next" to proceed

2. Use the system in the next step to reach solution page

Tools

Generate sphere

Generate cylinders

Workbench

A sphere of diameter 2r has been drawn

Two cylinders of height 2r have been drawn

Developed by Amrita University Under research grant from Department Of Electronics & Information Technology

Mathematics: Volume of a sphere

Other OER Virtual labs

ANALOG DEVICES

Search

COMPANY, MYBLOG, PRODUCTS, APPLICATIONS, DESIGN CENTER, EDUCATION, SUPPORT

Deep Center > Social Design Tools & Components > LTSpice

Search

LTSpice

LTSpice® is a high performance SPICE simulation software, schematic capture and waveform viewer with enhancements and modules for easing the simulation of analog circuits. Included in the download of LTSpice are macromodels for a majority of Analog Devices switching regulators, amplifiers, as well as a library of devices for general circuit simulation.

Contact Technical Support for assistance

Benefits of using LTSpice

Our enhancements to SPICE have made simulating switching regulators extremely fast compared to normal SPICE simulators, allowing the user to view waveforms for most switching regulators in just a few minutes. This video provides an overview of the advantages of using LTSpice in an analog circuit design and how easy it is to get started.

LTSpice- Electric Circuit Simulator

myphysicslab.com

Physics Simulations

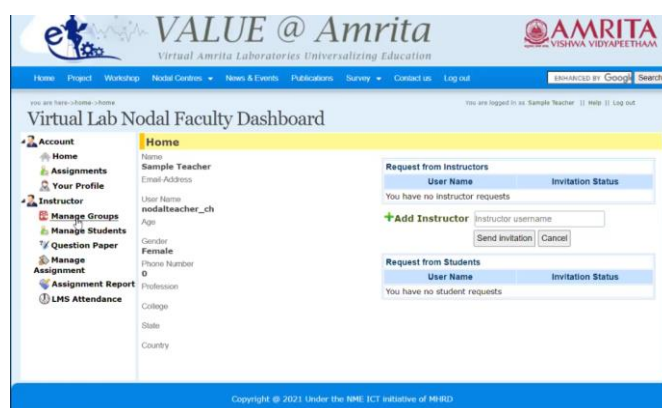
Click on one of the physics simulations below... you'll see them animating in real time, and be able to interact with them by dragging objects or changing parameters like gravity.

Single Spring, Double Spring, Pendulum, Pendulum with Direction Field, Chaotic Pendulum, Two Chaotic Pendulums, Invariable Pendulum, Double Pendulum, Mobile, Double Pendulum, Vibrating Pendulum, Inert, Colliding Blocks, Cart + Pendulum, Dipping Stick, Rigid Body Forces, Rigid Body Collisions, Rigid Body Contact Forces, Roller Coaster, Roller Coaster with Spring, Roller Coaster with two Balls, Roller Coaster with Friction, Billiards, Hanging Chain, Newton's Cradle, Do Nothing, Grinder, Pendulum Clock, Car Suspension, Double Pendulum with Physics Engine, Cart + Pendulum with Physics Engine, Mars Moon, G

Myphysics.com

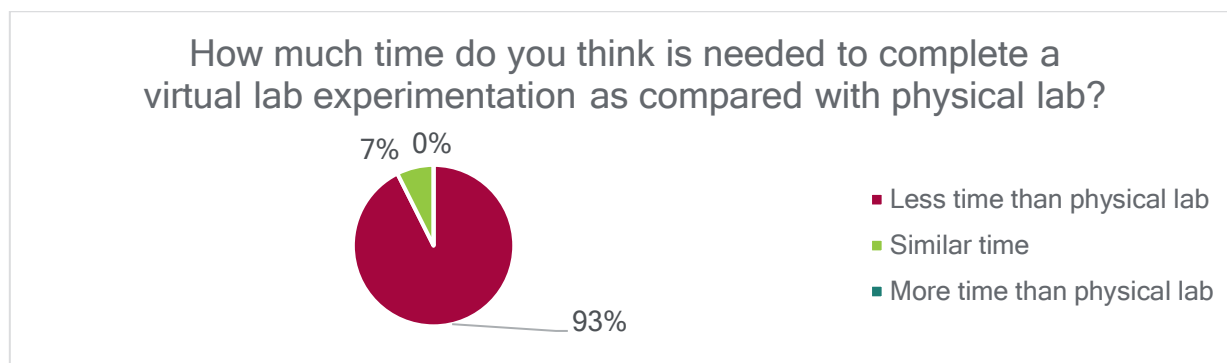
Learning Management System (LMS) Module

An additional tool in the form of a learning management system is available to conduct online assessment within the virtual lab platform. Using this platform, faculty members can create groups, manage students, create online question papers, and manage online assignments. Mr. Saneesh explained the features of the LMS module to the participants after the demonstration of the experiments.



Virtual Lab Learning Management System

Poll question response

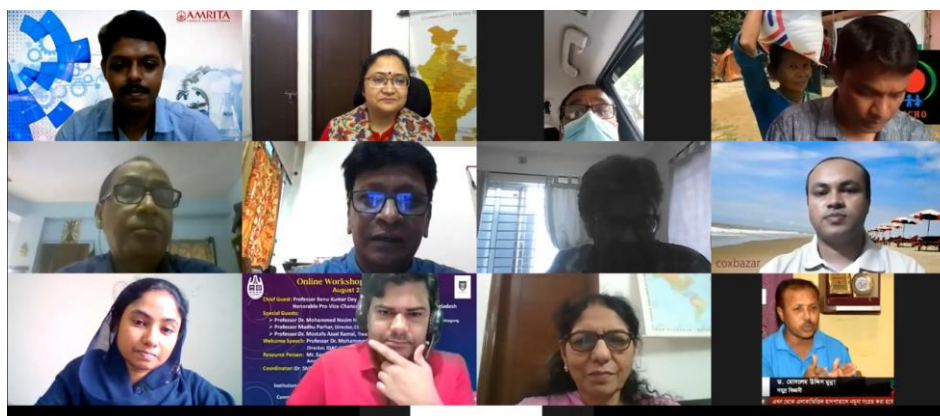


Hands-on task	Percentage of correct responses
What is the pH value of lake water?	70%
Identify the organic compound-13 by using its boiling point in the experiment – Boiling point of an organic compound	100%

Valedictory session from 11:55AM – 12:15PM (IST)

The concluding and the valedictory session was graced by the presence of Prof. Benu Kumar Dey, Honourable Pro-Vice-Chancellor, University of Chittagong, Prof. Dr. Mohammed Nasim Hasan, Dean, Faculty of Science, University of Chittagong, Professor Dr. Mohammad Abul Hossain, Director, IQAC, University of Chittagong, Prof. Dr. Mostafa Azad Kamal, Treasurer, Bangladesh

Open University, Prof. Madhu Parhar, Director, CEMCA, and Dr. Shiffon Chatterjee, Senior Programme Officer, CEMCA. Dr. Sumon Ganguli served as moderator for the closing session. Participants expressed their views at the end of the session focusing on how this workshop helped them to learn about virtual laboratories. Prof. Dey concluded the session by expressing sincere thanks to CEMCA and IQAC for this workshop which helped faculty members to teach laboratory sessions virtually.



Valedictory session

Feedback of the workshop

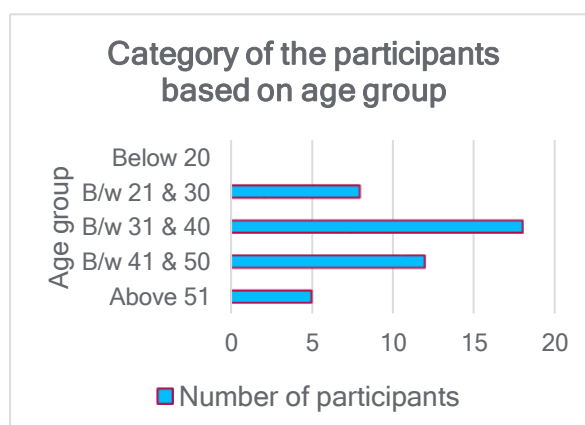
Participants were requested to fill up the feedback form at the end of the workshop. Feedback is used to adjust and improve current and future actions and behaviors.

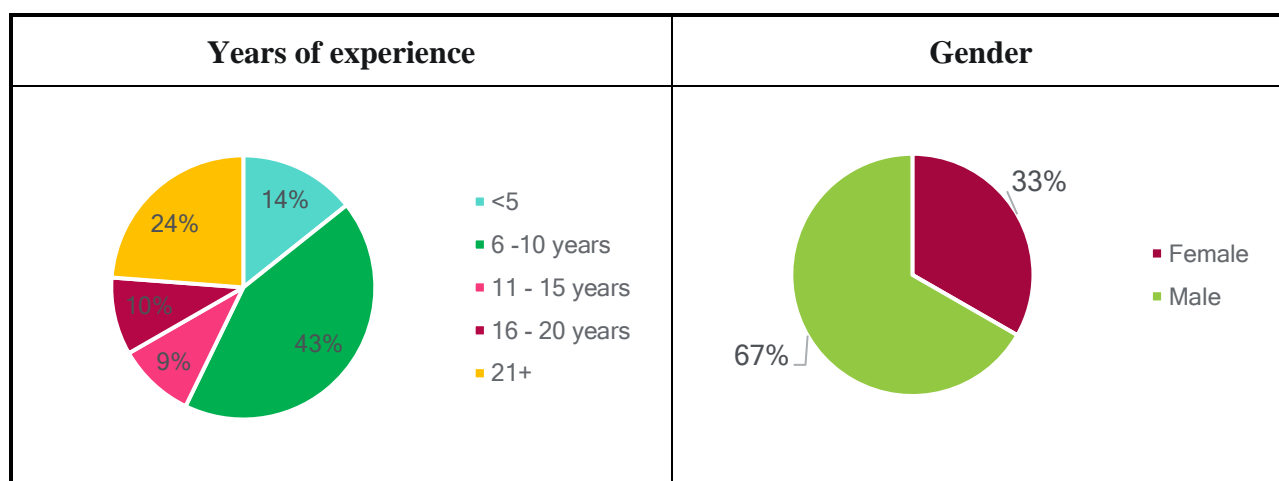
Virtual Laboratory Workshop Feedback

Dear Participant,

We want to thank you for participating in the Virtual Labs workshop. We would like to request for a few minutes of your time to take this detailed survey to allow us to use this information to enhance the experience of using virtual labs.

21 responses were received after the workshop. Majority of the participants were in the age group 30 to 50 years.



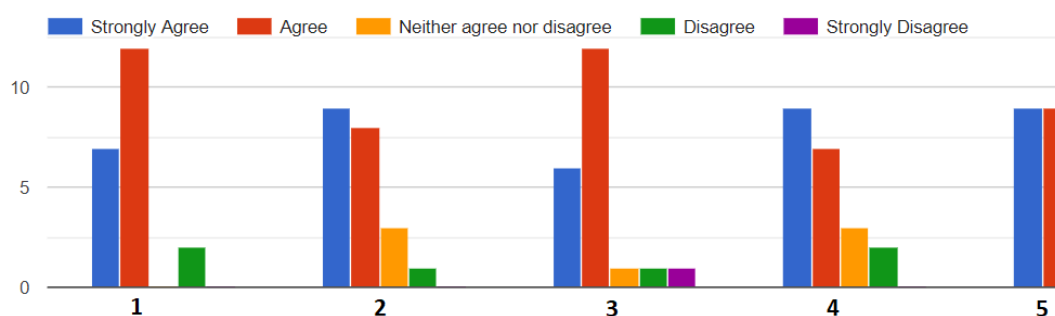


14% of the participants have less than 5 years of experience, Majority of the participants have around 6-10 years (43%) and 24% of the participants have 21+ years of experience. 10% of the participants have 16 – 20 years of experience and 9% of the participants have 11 – 155 years of experience. 33% of the participants are female and 67% of the participants are male candidates.

The common challenges faced by teachers during laboratory teaching were analyzed. 76.2% of the participants responded that there is a shortage of apparatus in the traditional laboratory. 66.7% of the participants faced difficulty in handling groups of students. 42.9% of the participant reported time constraints in the physical lab session. 38% of the participants responded that unmotivated students also pose a challenge in conducting laboratory sessions. 71.4% responses said that the apparatus error makes it difficult to complete the experimentation. 14.3% of the participants faced difficulty in teaching new experiments to the students because teachers must learn the experiment rigorously before conducting the laboratory session.

To understand the effectiveness of virtual labs, a survey was conducted. Based on the teachers' experience, we analyzed the effectiveness using the below questionnaire. Responses are reported in the graph below. Majority of the teachers either strongly agreed or agreed that virtual labs are effective to teach and understand laboratory experiments. Responses for the fourth statement show that few participants neither agree/disagree that virtual lab experiments are easy to understand. This feedback can be taken into consideration for further modification of the online workshops.

1. Students can easily understand the experiment by performing it in virtual lab
2. Performing the experiment in virtual lab increases student's confidence level to perform the same in physical laboratory environment.
3. Performing the experiment in virtual lab will decrease student's anxiety with physical lab experimentation.
4. Experiments in virtual lab are easy to understand.
5. Learning experiments through virtual lab is fun and interesting.

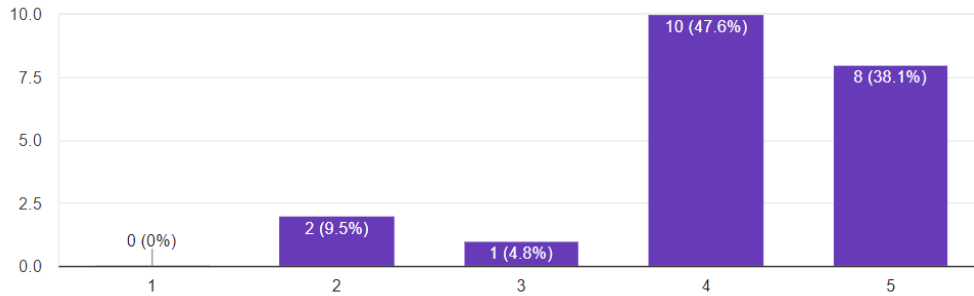


There were several questions asked to the participants to know their opinion about the overall content of the virtual labs and the workshop. Their responses are represented in the following graphs.

How would you rate the quality of the theory descriptions given in the virtual labs.

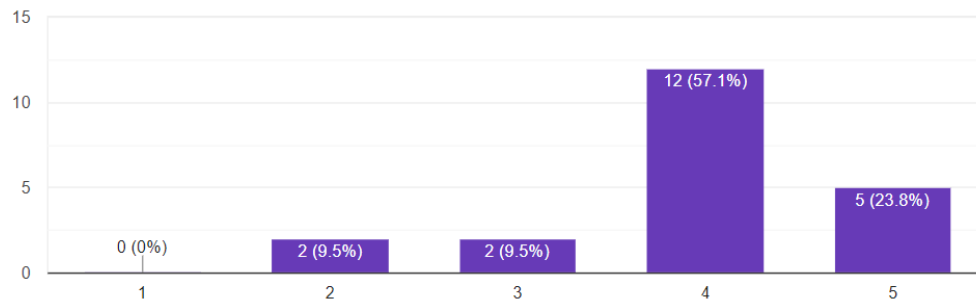


21 responses



How would you rate the quality of the lab procedure given in the virtual labs

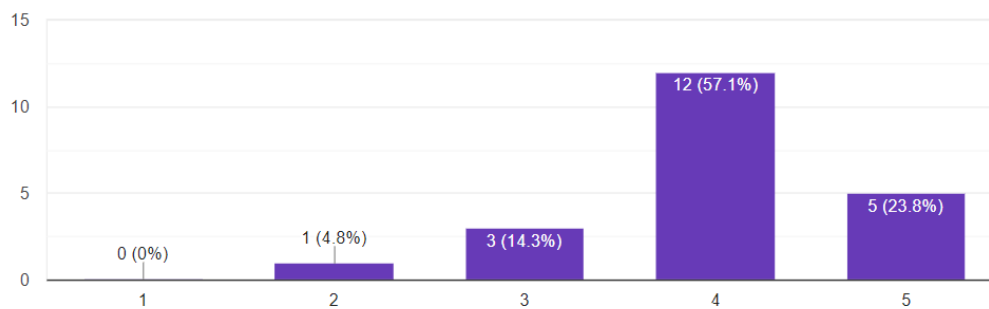
21 responses



How would you rate the quality of the simulator provided in virtual labs

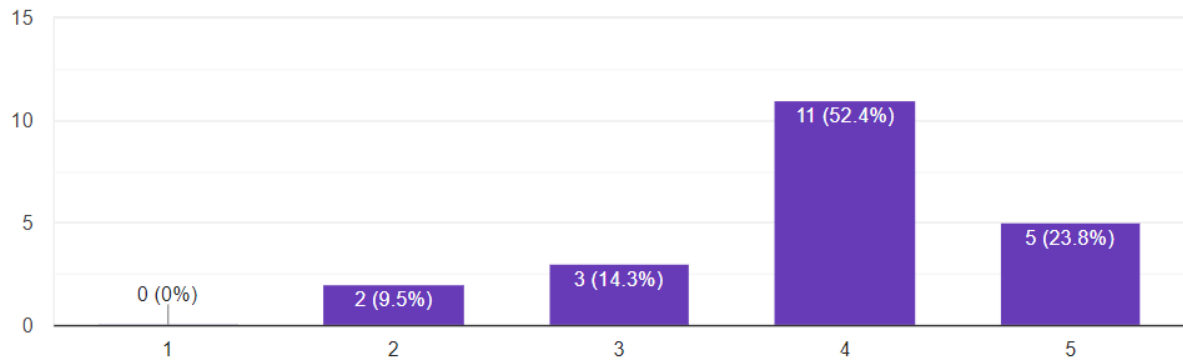


21 responses

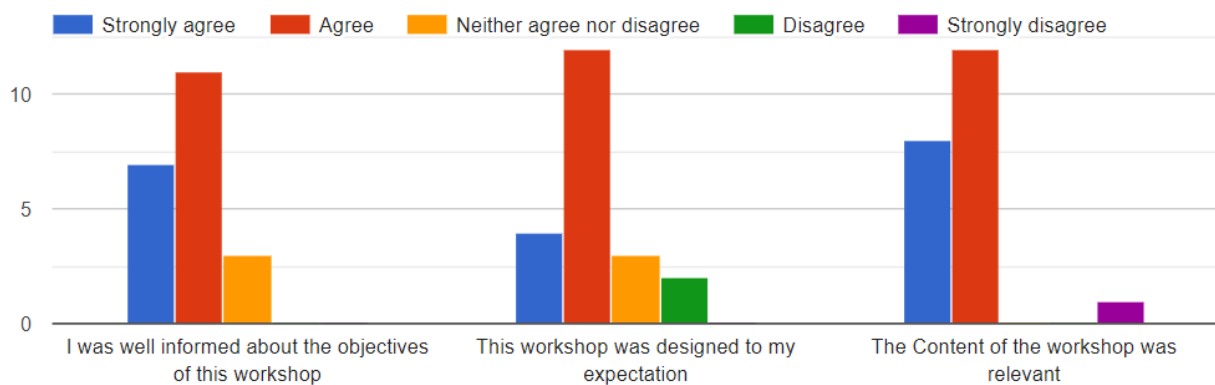


How would you rate the overall quality of the content from virtual labs

21 responses

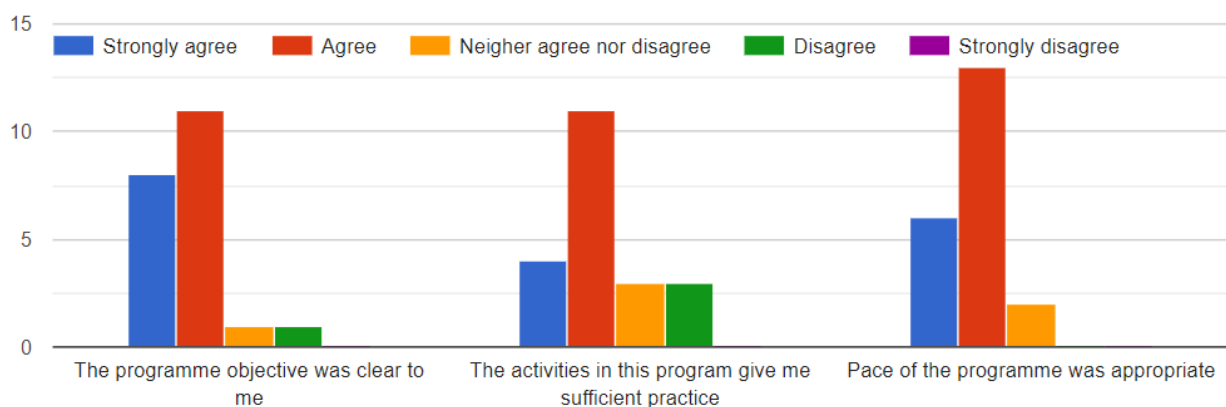


Programme content (Please click your response to the items)



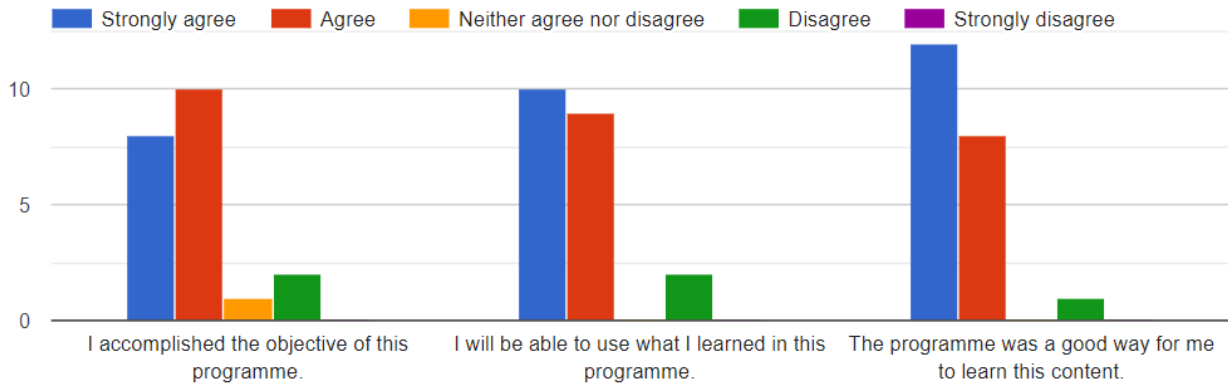
Most of the participants felt that they were informed about the objective and found the content relevant and designed as per their expectations. Three of the faculty members expressed their disagreement which should be explored to strengthen the workshop further.

Program Design (Please click your response to the items)



The chart above shows feedback regarding the programme objectives, practice session, pace of teaching learning activities. Most of participants replied in affirmative as is evident in chart above.

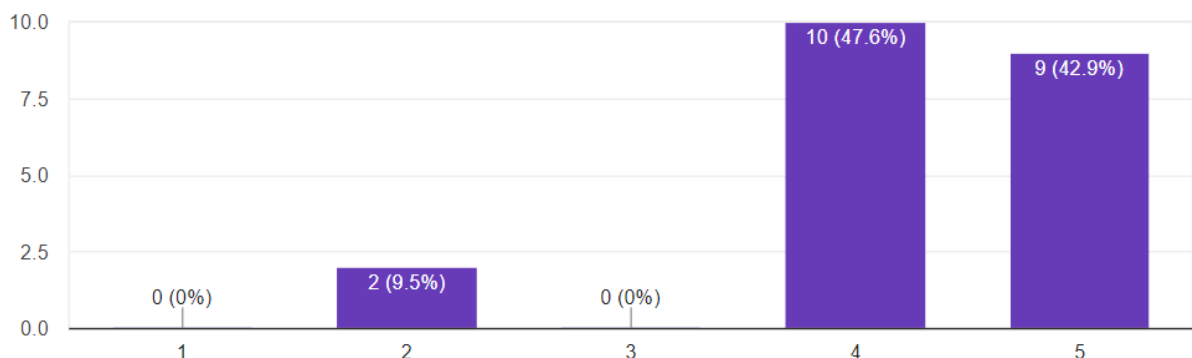
Programme Results:



It is important to know what the participants perceived regarding the attainment of the objectives and how they would use the knowledge gained during the workshop. A look at the graph above shows that most of the participants were satisfied on these points. Two faculty members expressed disagreement. Further investigation reveals that those faculty members are from Oceanography and Ecology disciplines and there are no virtual experiments directly available for these disciplines on the current virtual lab platform. This feedback helps to identify the experiments for the future development of the virtual labs.

Workshop rating

Rating of the workshop represented in the Likert scale 1 -5. 1 represent poor and 5 represents excellent. Below graph represents the overall rating of the workshop.



Suggestions from participants

- More time could be allotted for hands-on experimentation during the workshop
- More experiments from multiple topics in different subjects would be very useful
- Different workshops could be designed for training in specific disciplines

Appendix

List of participants

SI No.	Name	Designation	Department	Gender
1	A. K. M.Rezaur Rahman	Professor	Physics	Male
2	AKM Moinul Haque Meaze	Professor	Physics	Male
3	Aminul Chowdhury	Assistant Professor	Applied Chemistry and Chemical Engineering	Male
4	Ayesha Afrin	Associate Professor	Applied Chemistry and Chemical Engineering	Male
5	Aysha Akhtar	Associate Professor	Institute of Marine Sciences	Female
6	Azizul Hakim	Associate Professor	Soil Science	Male
7	Biplob Kumar Dey	Assistant Professor	Psychology	Male
8	Dr. Dil Afroze Begum	Professor	Physics	Female
9	Dr. Md Ismail Hossain	Professor	Chemistry	Male
10	Dr. Md Towhid Hossain	Professor	Microbiology	Male
11	Dr. Nasrin Chowdhury	Professor	Department of Soil Science	Female
12	Dr. Zainul	Professor	Chemistry	Male
13	Dr. A. K. M. Ariful Haque Siddique	Professor	Physics	Male
14	Dr. Abu Nowshed Chy	Assistant Professor	Computer Science and Engineering	Male
15	Dr. Biswajit Nath	Associate Professor	Department of Geography and Environmental Studies	Male
16	Dr. Hasan Khaled Rouf	Professor	Electrical & Electronic Engineering	Male
17	Dr. Iqbal Ahmed	Associate Professor	Computer Science and Engineering	Male
18	Dr. Jarin Akhter	Professor	Institute of Forestry and Environmental Sciences	Female
19	Dr. Kamol Dey	Associate Professor	Applied Chemistry and Chemical Engineering	Male
20	Dr. M. Rafiqul Islam	Professor	Physics	Male
21	Dr. Md. Aktar Hossain	Professor	Institute of Forestry and Environmental Sciences	Male
22	Dr. Md. Moazzem Hossain Miah	Professor	Department of Physics	Male
23	Dr. Md. Shafiqul Islam	Professor	Institute of Marine Sciences	Male
24	Dr. Md. Shah Alam	Associate Professor	Electrical and Electronic Engineering	Male
25	Dr. Mohammad Idrish Miah	Professor	Physics	Male
26	Dr. Mohammad Muslem Uddin	Associate Professor	Oceanography	Male
27	Dr. Mohammad Nurul Azim Sikder	Associate Professor	Institute of Marine Sciences	Male
28	Dr. Mohammed Nasim Hasan	Professor	Physics	Male
29	Dr. S. M Abe Kawsar	Professor	Chemistry	Male
30	Dr. Sohag Miah	Assistant Professor	Forestry and Environmental Sciences	Male
31	Dr. Suman Barua	Associate Professor	Applied Chemistry and Chemical Engineering	Male
32	Dr. Syeda Khurshida Begum	Professor	Chemistry	Female
33	Dr. Tapashi Ghosh Roy	Professor	Chemistry	Female
34	Dr. Wahhida Shumi	Professor	Department of Microbiology	Female
35	Dr. Md. Golam Kibria	Professor	Soil Science	Male
36	Dwaipayam Sikdar	Professor	Biochemistry and Molecular Biology	Male
37	Faiz M. Taimur	Assistant Professor	Institute of Marine Sciences	Male

38	Farhana Rumzum Bhuiyan	Assistant Professor	Botany	Female
39	G. N. Tanjina Hasnat	Assistant Professor	Forestry	Female
40	Jamal Uddin Ahamed	Professor	EEE	Male
41	Jewel Das	Assistant Professor	Institute of Marine Sciences	Male
42	Kanchan Chakma	Associate Professor	Biochemistry and Molecular Biology	Male
43	Kazi Nazrul Islam	Assistant Professor	Institute of Forestry and Environmental Sciences	Male
44	Kazi Shamim Sultana	Professor	Physics	Female
45	Lailun Nahar	Assistant Professor	Psychology	Female
46	Lipon Chandra Das	Assistant Professor	Mathematics	Male
47	M Helal Uddin, PhD	Professor	Applied Chemistry and Chemical Engineering	Male
48	Mazharul Islam	Associate Professor	Soil Science	Male
49	Md Iqbal Sarwar	Associate Professor	Geography and Environmental Studies	Male
50	Md Kamrul Hossain	Assistant Professor	Chemistry	Male
51	Md Rokonuzzaman	Professor	Department of Statistics	Male
52	Md Shahidul Hoque	Assistant Professor	Statistics	Male
53	Md. Abul Kashem	Assistant Professor	Botany	Male
54	Md. Akhter Hossain	Assistant Professor	Institute of Forestry and Environmental Sciences	Male
55	Md. Ashraful Hoque	Assistant Professor	Applied Chemistry and Chemical Engineering	Male
56	Md. Enamul Hoque	Assistant Professor	Department of Oceanography	Male
57	Md. Giash Uddin Sajid	Lecturer	Pharmacy	Male
58	Md. Mostafa Monwar	Associate Professor	Institute of Marine Sciences	Male
59	Minhajur Rahman	Assistant Professor	Botany	Male
60	Mohammad Ali Haider	Associate Professor	Geography and Environmental Studies	Male
61	Mohammad Ashraful Islam	Assistant Professor	Physics	Male
62	Mohammad Forkan	Associate Professor	Mathematics	Male
63	Mohammad Nasir Uddin	Professor	Chemistry	Male
64	Mohammad Nasirul Hoque	Lecturer	Physics	Male
65	Mohammad Omar Faruque	Associate Professor	Botany	Male
66	Mohammad Razuanul Hoque	Associate Professor	Biochemistry and Molecular Biology	Male
67	Mohammad Salim Zahangir	Professor	Statistics	Male
68	Mohammad Saydul Islam Sarkar	Assistant Professor	Department of Oceanography	Male
69	Mohammad Shahjahan	Assistant Professor	Department of Physics	Male
70	Mohammed Moniruzzaman Bhuiyan	Associate Professor	Statistics	Male
71	Mohammed Sala Uddin	Associate Professor	Botany	Male
72	Mostafa Azad Kamal	Dean	School of Business, Bangladesh Open University	Male
73	Mowri Dhali	Assistant professor	Biochemistry and Molecular Biology	Female
74	Muhammad Anwarul Azim	Professor	Computer Science	Male
75	Muhammad Mosaraf Hossain	Associate Professor	Biochemistry and Molecular Biology	Male
76	Naznin Nahar Sultana	Associate Professor	Dept. of Geography and Environmental Studies	Female
77	Nur Mohammad Eman	Assistant Professor	Physics	Male
78	Oli Ahmed	Assistant Professor	Psychology	Male
79	Quazi Muhammad Rashed Nizam	Associate Professor	Physics	Male
80	Rajib Acharjee	Assistant Professor	Department of Zoology	Male

81	Rezaul Karim	Associate Professor	Computer Science & Engineering	Male
82	S M Mijan Uddin	Professor	Institute of Forestry and Environmental Sciences	Male
83	Sadeka Sultana Rubai	Lecturer	Physics	Female
84	Sajal Roy	Assistant Professor	Soil Science	Male
85	Santanu Purohit	Assistant Professor	Physics	Male
86	Saumitra Kumar Kuri	Assistant Professor	Electrical and Electronic Engineering	Male
87	Shahida Akhter	Professor	Physics	Female
88	Shamsun Alam	Assistant Professor	Physics	Female
89	Shyamal Karmakar	Associate Professor	Environmental Sciences (Program)	Male
90	Shyamal Ranjan Chakraborty	Professor	Physics	Male
91	Sohana Akter Mina	Assistant Professor	Genetic Engineering and Biotechnology	Female
92	Sumon Ganguli	Associate Professor	Applied Chemistry and Chemical Engineering	Male
93	Sumyia Zahan	Lecturer	Pharmacy	Female
94	syeda karimunnesa	Assistant professor	Physics	Female
95	Taj Sultana	Associate Professor	Geography & Environmental Studies	Female
96	Tapash Kumar Bhowmik	Assistant Professor	Botany	Male
97	Tasneem Chowdhury	Assistant Professor	Microbiology	Female
98	Tauhidul Haque	Lecturer	Electrical and Electronic Engineering	Male