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Teacher Training Module:

Science

Learning Cycle Twelve

Electricity

Sindh Technical Assistance – Development through Enhanced Education Programme (STA-DEEP)

School Education & Literacy Department (SE&LD)

Government of Sindh.

Introduction and Rationale of the Training

Dear Teachers!

Welcome to the School Education & Literacy Department (SE&LD) Government of Sindh's Teachers Continuous Professional Development (CPD) Program. This school Cluster-based Teachers' Continuous Professional Development (CPD) program has been developed and is being implemented under the revised School Clustering Policy of 2021 and CPD Model of 2022.

This Content-Based Learning Cycles (CBLCs) series, consisting of cycles 11 to 20, has been developed to further enhance your knowledge and skills in content-based classroom teaching practices. The initial 10 Learning Cycles (LCs) focused on improving pedagogical skills to create interactive, participative, and enjoyable classrooms for students. Building upon these skills, CBLCs 11 to 20 will provide learning opportunities in Mathematics, Science, English, Urdu, and Sindhi for students in grades 1-8 will equip you with modern teaching strategies and subject knowledge to effectively manage classroom situations.

CPD Program vision

The CPD program aims to improve the quality of teaching practices in schools all over Sindh so that students become active and collaborative learners, problem solvers, and critical thinkers who approach tasks creatively and confidently. These CBLCs would help students clearly understand the subject knowledge and connect learned knowledge and acquired skills to the world around them. To make this possible, teachers must be better prepared for the classroom teaching requirements of pedagogy and the subjects' content. Moreover, this program provides specialised training to teachers at the school level through School Cluster-based CPD to make an impact and substantially increase students' learning outcomes.

CPD Program Teaching Philosophy

The CPD training sessions, including this one, adhere to a participatory teaching philosophy. This approach encourages participants to actively engage in collaborative learning while fostering self-reflection and peer reflection, ultimately creating a community of practice. The main goal is to enhance teaching practices and promote an understanding of the subject content theory and the strategies that enable students to confidently and effectively apply the learned knowledge in their daily lives.

Supporting You

The training module is designed to support you in your classroom teaching instruction practices. It will introduce you to the subject content and some approaches for use in the classroom. This will make your teaching more manageable and help you grow as a skilled teacher.

Online CPD portal for teachers

An online CPD portal has been developed for teachers to ask questions to experts, exchange ideas, and share personal learning experiences and difficulties in rolling out the CBLCs. The online CPD portal would help teachers connect with other teachers from all the districts and subject experts to share and learn as a community of teachers. Online portal: https://stadeep-cpd.com/

Note: CBLCs have been developed in alignment with the School Education & Literacy Department (SE&LD), Government of Sindh notified curriculum and textbooks of English subject from grades 1-8 under STEADA and PITE supervision. English textbooks of Grade 1-8 have been used in this LC as a reference.

CBLCs: 1-20: Please refer to the last page of this LC to see the complete list of topics for 1-20 LCs.

Acknowledgement

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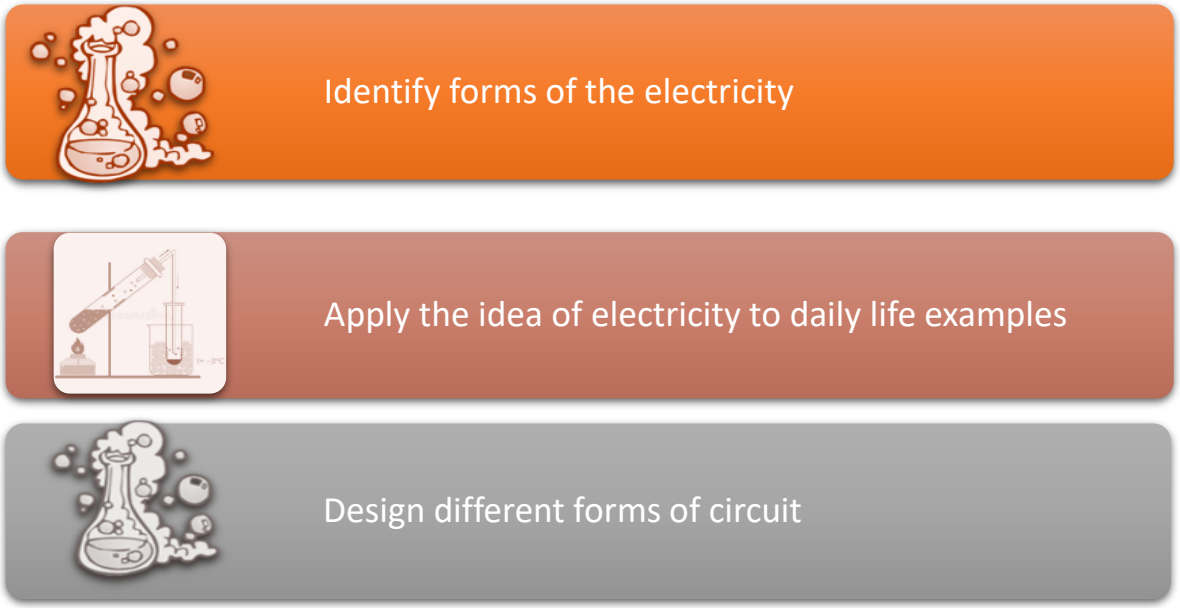
We would like to express sincere gratitude to the following contributors:

Mr. Sayed Rasool Bux Shah	Executive Director, Sindh Teachers Education Development Authority (STEDA), Karachi
Ms. Nusrat Fatima Kalhoro	Director-General Provincial Institute of Teacher Education (PITE), Shaheed Benazirabad
Mr. Inayat Ullah Shaikh	Additional Director, Directorate of Teacher Training Institutions Sindh, Hyderabad
Dr. Altaf Hussain Samo	Director Executive Development Center at Sukkur IBA University, Sukkur
Dr. Takbir Ali	Associate Professor and Director Outreach at Aga Khan University, Karachi
Mr. Abdul Majeed Bhurt	Director, Directorate of Curriculum, Assessment and Research (DCAR), Jamshoro
Mr. Shahabuddin Mallah	Director and English Subject Specialist, Provincial Institute of Teacher Education (PITE), Shaheed Benazirabad
Mr. Sayed Rasool Bux Shah	Executive Director, Sindh Teachers Education Development Authority (STEDA), Karachi
Mr. Zaheer Abbas Chang	Director Provincial Institute of Teacher Education (PITE), Shaheed Benazirabad
Mr. Imtiaz Ali Kumbhar	Module Developer, Associate Professor, TTIs Hyderabad
Dr. Tasneem Anwar	Module Developer, Aga Khan University (IED), Karachi
Ms. Jamila Khanum	Module Developer, Aga Khan University (IED), Karachi
Ms. Pirah Saba	Module Developer, Sukkur IBA University
Mr. Hassan Ali	Module Designer, Sukkur IBA University
Mr. Syed Kamran Shah	Project Coordinator, Sukkur IBA University, Sukkur

Ms. Rabia Batool	Project Manager, Sukkur IBA University, Sukkur
Ms. Abeer Maqbool	Education Manager, UNICEF
Mr. Asif Abrar	Education Specialist, UNICEF
Dr. Pervaiz Pirzado	Education Officer, UNICEF
Mr. Aftab Ahmed Nizamani	National Teachers Professional Development Consultant, UNICEF

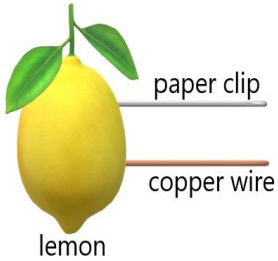
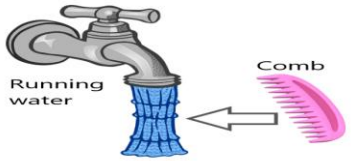
Learning Objectives: By the end of the session, the teachers will be able to:



Session Plan

Instructional strategies/activities

Time	Objective/purpose of the activity	Activities/learning experiences	Materials/resources
10 mins	**Welcome** 1. The facilitator will greet participants and help them share their key learning from the last cycle.	Introduce the rules of the workshop. Ask the teachers to introduce themselves (describing themselves by associating with electrical appliances). For example, Refrigerator, washing machine, fan etc. Teachers will be asked to share one key learning from the previous learning cycle.	Sticky Note, Multimedia, Chart paper.
15 mins	**Warm-up**  The facilitator will use pictures to engage participants in the concept of 'Electricity'.	The facilitator will display some pictures (see below) on the screen/board.  The facilitator will ask some probing questions e.g. 1. What did you see in this picture? Identify the appliances. How do these help in our daily life?	Pictures, Multimedia

25 mins	**Input**  The facilitator will engage teachers to explore and demonstrate their understanding of electricity. Then facilitator will provide his/her input with discussion	The facilitator will distribute the teachers into two groups to explore and demonstrate electricity. **Group-1-** Investigate how to generate electricity using simple materials. 1. Straighten the paper clip and ask a teacher to cut the copper wire to match the length of the paper clip. 2. Stick the paper clip and the piece of copper wire into a lemon. Refer to the setup given below. 3. Make sure that the ends of the paper clip and the wire are smooth to avoid injury. 4. Hold the ends of the wire close together, but not touching, and carefully place the ends on your tongue. (You should taste something and feel a tingling sensation) 5. Record your observations.  Group-2- Investigate how to produce static electricity and demonstrate it as a form of energy 1. Briskly rub a comb against a woolen garment for five minutes. In the unavailability of a woolen garment, just rub the comb on your hair instead. 2. Then, bring the comb near a small, smooth stream of running water. Refer to the setup given below. 	Lemon, Paper clip, copper wire, running water from tap, comb

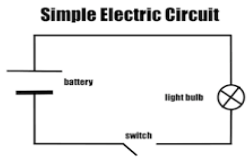
		3. Record your observations. Facilitator will use the follow-Up questions to engage teachers in further discussion. Group-1-Follow up Question 1. Did you taste anything when you placed the wires on your tongue? If yes, describe the taste. 2. What was the reason behind the tingling sensation and taste? 3. Is the citrus a conductor of electricity? 4. Identify the form of electricity that is shown in this experiment. Group-2- Follow up Questions 1. What part of the experiment uses friction to generate electricity? 2. What happened to the stream of water when the comb was placed near it? 3. Is the water charged? or is it the comb? 4. Identify the form of electricity that is shown in this experiment. (Reference: https://study.com/academy/lesson/what-is-electricity-lesson-for-kids.html)	
 40 mins	**Practice**	The facilitator will assign groups with specific tasks to discuss, design, and demonstrate (for reference see handout 12.1) • **Group 1:**	**Handout 12.1** Board,

	 Through this practice, the teachers will learn more about electricity.	Design a Simple Circuit and demonstrate its working by explaining its components. • **Group 2:** Design a Parallel Circuit and demonstrate its working by explaining its components. • **Group 3:** Design a Series Circuit and demonstrate its working by explaining its components.	Battery cell, wires, small bulb, small battery
10 mins	**Conclusion**  Facilitator will conclude by posing questions.	The facilitator will conclude this learning cycle by posing the following questions: • How does electricity travel? • What type of circuit will you use in streetlights? • What would happen to a device if part of the circuit were missing or broken? • If you have problems with electrical circuits in your home, you might call an electrician. What kind of information do you think an electrician needs to know to fix your electric circuits?	
20 mins	**Assessment**  Facilitator will assess the learning through a worksheet.	The facilitator will provide worksheet (handout 12.2) to teachers and ask them to individually respond.	Handout 12.2

Handout# 12.1

Reference Material

Simple Circuit

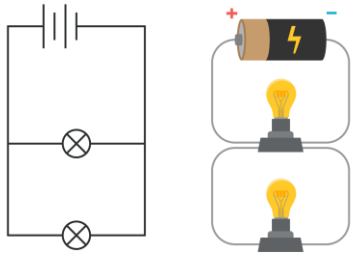


Description:
A simple electrical circuit consists of a power source, such as a battery, connected by conductive wires to a load, such as a light bulb, which utilizes the electric current.

Components:

- Power Source: Provides the electrical energy needed to drive the current through the circuit (e.g., a battery or a power supply).
- Conductors: Wires that connect the components and provide a path for the current to flow.
- Load: A device that consumes electrical energy and converts it into other forms of energy, such as light, heat, or motion (e.g., a light bulb, resistor, or motor).
- Switch A device that can open or close the circuit, allowing control over the flow of current.

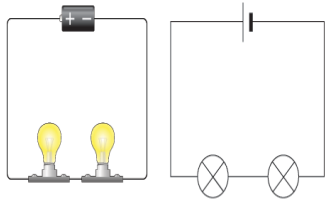
Parallel Circuit



Description:
A parallel circuit is an electrical circuit where the components are connected across common points or junctions, providing multiple paths for the current to flow.

- In a parallel circuit, the total current supplied by the power source is divided among the parallel branches. Each branch carries a portion of the total current, which depends on the resistance of the branch.
- The voltage across each branch in a parallel circuit is the same and is equal to the voltage of the power source. This is a key characteristic of parallel circuits.

Series Circuit



Description:
A series circuit is an electrical circuit in which components are connected end-to-end, so there is only one path for the current to flow.

- In a series circuit, the current is the same through all components because there is only one path for the current to travel.
- The total voltage supplied by the power source is divided among the components. The sum of the voltages across each component equals the total voltage of the power source.

Handout# 12.2

Read the given situations and respond.

1. What will happen If you remove one bulb from a series circuit with three bulbs?

   _____

2. What will happen to the other bulbs in a series circuit if one bulb burns out?

   _____

3. What will happen to the light given out by each bulb when more bulbs are added to a series circuit?

   _____

4. What will happen to the voltage when batteries are connected in a parallel circuit?

   _____

Draw a circuit diagram of a parallel circuit with two batteries and three light bulbs.

Additional Resources

https://www.acaedu.net/cms/lib3/TX01001550/Centricity/Domain/389/5.6B%20Circuts%20and%20Electricity.pdf

https://www.quora.com/What-does-a-simple-electric-circuit-consist-of

https://byjus.com/physics/circuit-component/

https://www.acaedu.net/cms/lib3/TX01001550/Centricity/Domain/389/5.6B%20Circuts%20and%20Electricity.pdf

https://www.teachengineering.org/lessons/view/cub_electricity_lesson05

For reference:

List of 1-20 LCs topics

Learning Cycles (LCs)	Topics
LC-1	Orientation to Science
LC-2	Food and Health
LC-3	Ecology
LC-4	Matter and its States
LC-5	Mixture and Compound
LC-6	Force and Machines
LC-7	Forms of Energy
LC-8	Heat and Temperature
LC-9	Earth and Space
LC-10	STEM
LC-11	Sound
LC-12	**Electricity**
LC-13	Atomic Structure
LC-14	Microorganisms
LC-15	Pollution
LC-16	Light
LC-17	Chemical Equation
LC-18	Cellular Organisation
LC-19	Human Organ Systems
LC-20	Technology in Everyday Life

For reference:

List of Resource Items for LCs (11-20)

Items	No. of items	LC-11	LC-12	LC-13	LC-14	LC-15	LC-16	LC-17	LC-18	LC-19	LC-20
Sticky notes	3 set	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
A4 Paper	1 set	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pencils	12	✓				✓	✓	✓	✓	✓	✓
Thumb pins	1 box	✓				✓					
Balloons	12	✓									
Wooden blocks	1	✓									
Blind fold ,	2	✓									
Board marker,	5	✓									

Speaker	**1**	✓									
Plastic ruler	**2**	✓									
Metallic ruler	**4**	✓									✓
Rubber band	**1 packet**	✓									
Wooden ruler	**2**	✓									
Human ear structure	**1**	✓									
Aluminum foil sheet	**7 meter**	✓					✓				
Card stock or construction paper	**12**	✓									
Straw	**24**	✓								✓	

Ping pong ball	**5**	✓									
Bell	**2**	✓		✓							
Bucket or Tub	**2**	✓									
Chart	**24**		✓	✓	✓	✓	✓				
Lemon	**6**		✓								
Paper clip	**2**		✓								
Copper wire	**1 fold**		✓								
Comb	**1**		✓								
Battery	**5**		✓								
Small bulb / Led light	**3**		✓								

Marker	**10**			✓	✓	✓					
Chart of atomic structure	**1**			✓							
Agar plates	**2**				✓						
Yeast	**1 small packet**				✓						
Tap	**2**	✓				✓	✓				
Clear plastic	**2 pieces**					✓					
Mirrors	**2**					✓					
Wax paper	**2 pieces**					✓					
Torch / laser	**3**					✓					
Paper bags	**4**									✓	
1 litter bottles	**2**									✓	
Cardboard	**2 box**										✓
Cutter	**3**										✓

Meter tape	**3**										✓

Contact email address:

kamranshah@iba-suk.edu.pk

School Education & Literacy Department (SE&LD)

Government of Sindh