

LED Art

Students explore concepts of science, engineering, technology and arts as they create art using LEDs.

Prepare the materials

Necessary materials

LEDs
Colored A4 papers
Tracing paper
Coin cells
Wires
Sign pen colors
Masking Tape
Scissors

Optional materials

Popsicle stick
Food stick
Cardboard
Rubber bands
Construction paper
Pencil colors/crayons

Note: Underlined materials are to be shared among the students

Curiosity

Ask students if they like drawing and coloring. Get them to share their favorite things about it. Then ask them to think how awesome our art would be if we could include lights in them.

Show them a few models of LED art to get them interested and also to help them get ideas.

Activity

Scaffolding

Allow students to get familiar with the components. Hand over a coin cell and a few LEDs of different colors.

Ask questions to help them think about the materials.

- The two legs of the LEDs aren't equal. Why might it be so?
- This coin-like thing is called a coin cell. How do you think it works?

Let them figure out the function of the components through these challenges:

- Glow an LED using the coin cell
- Glow multiple LEDs simultaneously using a single coin cell
- Use wires to glow the LED

You can support students as they build their art. Suggest starting ideas to groups who are struggling.

For example:

- What will your art look like?

- What elements of your art will be enhanced by light from LEDs?
- How many LEDs do you want to use in it? How will you connect them?

You can ask them to refer to the student guide for assistance.

Experimentation

You can provide structures for students to fill or ask questions to stimulate their thinking.

- I wonder what happens if _____
- What do you want to try next?
- How can you add more LEDs to your art without adding more coin cells?

Suggestions for the facilitator

We found these insights and tips to be helpful while facilitating this session.

- Seeing demo models of LED art is important for students to get an idea of what they'll be working on. Student guide has photos of some models but being able to see live models is best.
- Students get many coin cells short circuited despite the initial precautions; especially if it's the first time they are working with electronics
- Because the whole team is working on a single piece of paper, it's difficult for students to divide parallel tasks. Many groups will have idle members now and then. It's best to have no more than 2 people in a group for this activity.
- The LEDs won't glow time and again due to break in connection with the coin cell. This can be frustrating for students if it happens frequently. You can make them think about ways to make the connection more stable.
- Coin cells contain the element Lithium which makes them toxic when swallowed. Some students might try keeping them in mouth. You need to clearly and firmly emphasize them against it before letting them tinker with the components.

Thinking

Reflection

Ask questions to help students reflect on their learning.

- What insights did you get in the process of making your LED art?
- What challenges did you face while making it? How did you overcome them?

You can also provide structures to support their thinking.

- Two things I learnt are _____
- I used to think _____ and I now think _____
- The most interesting part for me was _____ because _____

Think like a ...

Ask thought provoking questions to make students think from the perspective of a professional

Think like a physicist

- Red and yellow LEDs can glow together when connected in parallel to a coin cell. But a blue LED, however, doesn't glow when connected in parallel to a red or yellow LED. Why might it be so?
- LED stands for Light Emitting Diode. What does the name tell you about the working of an LED?

Think like an engineer

- How can you make your art more interactive?
- How can you make sure your art's battery lasts longer?

Think like an artist

- What colors go well together?
- What kind of effects and designs can you add to make your art more fascinating?

Concepts and skills

This lesson can also be used to emphasize on scientific concepts and skills.

Some concepts and skills students explore in this lesson are:

- **Polarity**
The Foo machine converts the rotational motion of the turbine into linear motion of the object being lifted.
- **Energy transformation**
LED converts the electrical energy in coin cell to light energy
- **Conductivity and insulation**
Materials like aluminum wire conduct electricity from coin cells to LEDs. Materials like paper and plastic don't, which is why coin cells can be safely attached to them.

Sample lesson plans

1. A 60 minute class

Learning Objectives

To get students to experience the play based learning approach by making art using LEDs. The emphasis is on getting them to learn the basics of electronics while doing a fun activity.

Classroom context

This sample lesson is designed for grade 5 students. The time available for the class is 60 minutes.

Lesson Flow

Curiosity (5/5 mins)

Divide students in groups of 2 each. Show them the LEDs and ask them if they know what these are. Distribute LEDs to the groups and ask them to share the interesting things they notice in them.

Activity (45/50 mins)**Safety precautions**

Before handing materials, remind students about safe use of sharp, pointed objects such as food sticks and scissors. Caution them against short circuiting and swallowing the coin cells.

Tinkering

Distribute the materials and give them 10 minutes to play with them to figure out how they work. Get them to try the following:

- Identifying the polarity of the LED
- Glowing multiple LEDs with same coin cell, simultaneously

Building

Ask students to go through the student guide before they start making their art. Give them 20 mins for this activity. Ask leading questions to support students who are struggling.

Sharing and feedback

Ask students to share their work with their neighbors and exchange feedback.

Thinking (10/60 mins)

Ask questions to help students reflect on their learning experience.

- What insights did you receive during sharing and feedback?
- Complete the sentences:
 - Two things I learnt are _____
 - Something I now wonder about is _____

2. Two 45 minutes classes**Learning Objectives**

To get students to experience the play based learning approach by making art using LEDs. The emphasis is on getting them to learn the basics of electronics while doing a fun activity.

Classroom context

This sample lesson is designed for grade 8 students. The time available for the class is two 45 minute sessions, not necessarily consecutive.

Lesson Flow**Class I****Curiosity (10/10 mins)**

Talk to students about art and drawings. Get them to talk about the drawings they have made and some of their favorites if any. After students share, inform them that they are going to make some really fun

and lively art in this lesson using LEDs.

Activity (25/35 mins)

Safety precautions

Caution students against short circuiting and placing the coin cells in mouth.

Tinkering

Distribute the materials to the students. Ask them to get a coin cell and an LED from the pack and figure out a way to make the LED glow. Add these challenges one by one as they succeed in the tasks:

- Identifying the polarity of the LED
- Glowing multiple LEDs with same coin cell, simultaneously

Give them 20 minutes for this.

Thinking (10/45 mins)

Ask questions to help students reflect on their learning experience.

- What part of the activity was most enjoyable for you? Why was it so?
- Complete the sentence:
 - Two things I learnt today are _____
 - Something I now wonder about is _____

Class II

Recalling (5/5 mins)

Get students to sit in the same groups from the last class. Ask them to discuss among group members and recall their work from the previous class. You can get a couple of volunteers to share with the class.

Activity (30/35 mins)

Building

Ask students to refer to the student guide before they start building. Give them 20 minutes to build their LED art.

Sharing

Ask students to share their work with neighbors. Encourage them to exchange feedback on each other's work.

Thinking (10/45 mins)

Ask questions to help students reflect on their learning experience.

- What part of the activity was challenging for you? How did you overcome them?
- Complete the sentence:
 - I used to think _____ and I now think _____