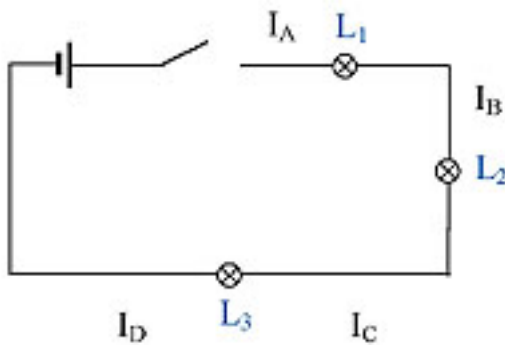


Teaching, Learning and Assessment Cycle - A Case in Science Education (Secondary 1 - 3)

Topic: Electricity - Series circuits

Students are involved in a predict-observe-explain task during a science lesson. They are presented with a circuit with three light bulbs and a cell connected in series. Students are asked to predict the magnitude of current at different parts of the circuit when the switch is closed. They are then given four ammeters to measure the current at the different points simultaneously. Students then proceed onto making sense of their observations.

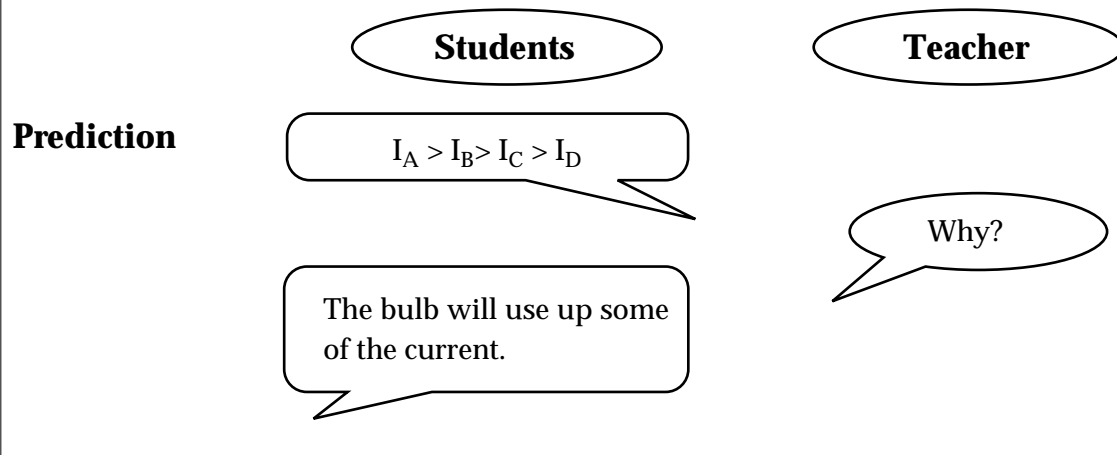


L_1, L_2, L_3 : Light bulbs

I_A, I_B, I_C and I_D : Currents at respective points

- The above predict-observe-explain task is presented to groups of students in a science laboratory.
- Students are first invited to discuss amongst themselves and come up with their own predictions of the magnitude of the current at the different points before the switch is closed.

To evoke thoughtful, active reflection, the teacher must be open-minded and a neutral and intelligent listener:



Students

Teacher

Challenge

I remember that the last time we did this experiment the bulbs were of equal brightness.

What is the implication of the prediction to the brightness of the different bulbs?

Bringing together the points discussed

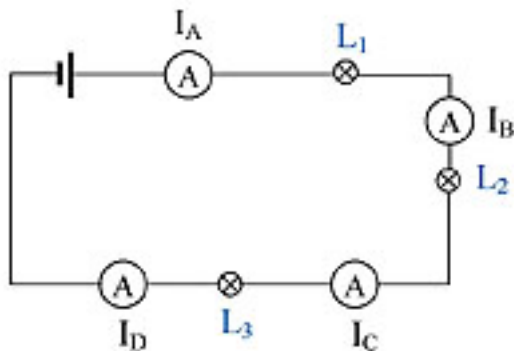
The current is being shared between the bulbs

$$I_A = I_B = I_C = I_D$$

$$I_A > I_B = I_C = I_D$$

If the bulbs are of the same brightness, what does that tell us about the magnitude of the currents at the different points?

Experimentation



L_1, L_2, L_3 : Light bulbs

I_A, I_B, I_C and I_D : Currents at respective points

Based on the experimental result, students are then asked to come up with a model to explain what is happening in the circuit.

- The groups are invited to present their model and how the phenomenon observed can be explained using their model. It is important that the presenters speak on behalf of the groups. The groups challenge the proposals of other groups and defend their own proposal. Students are allowed to modify their models and put their final proposals on the board. They then vote on the options presented. It is important that the dialogue should evoke thoughtful, active reflection in which all students are encouraged to take part.



Student presentation

- The students' performances in explanation and discourse are evaluated publicly. Scores are awarded to the different groups. The teacher guides the students to see why some groups are awarded higher scores than others, helping them to reflect on their models and re-evaluate their explanations.



Student discussion

- The group scores gained during lessons contribute to the final grades of individual students. The scores also give an indication of the quality of collaborative learning in the groups.

- The quality of teacher-student interaction during the prediction, explanation and scoring process is the major factor contributing to the success of raising standards (student achievements) and helping students to take active responsibility for their own learning.

