Virtual Laboratory Experiment Design Guidelines (VLEDG) Set VIII- Design authentic assessment for virtual laboratory experiment

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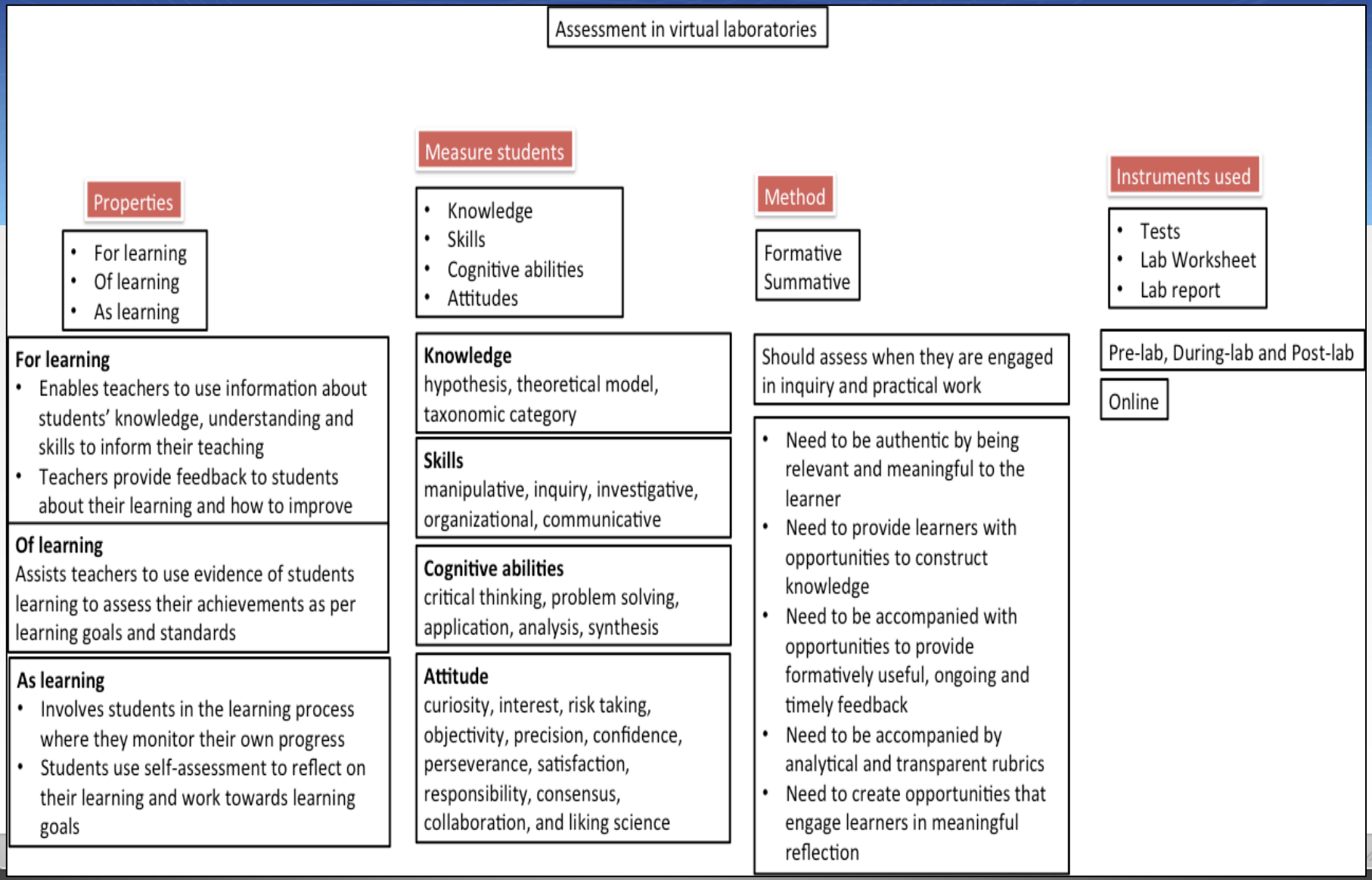
Problems with current assessment methods

- In current lab work assessment we assess is the product of learning and not the way in which it occurs.
- Not authentic
- Assessment questions target students theoretical knowledge and not practical knowledge or skills

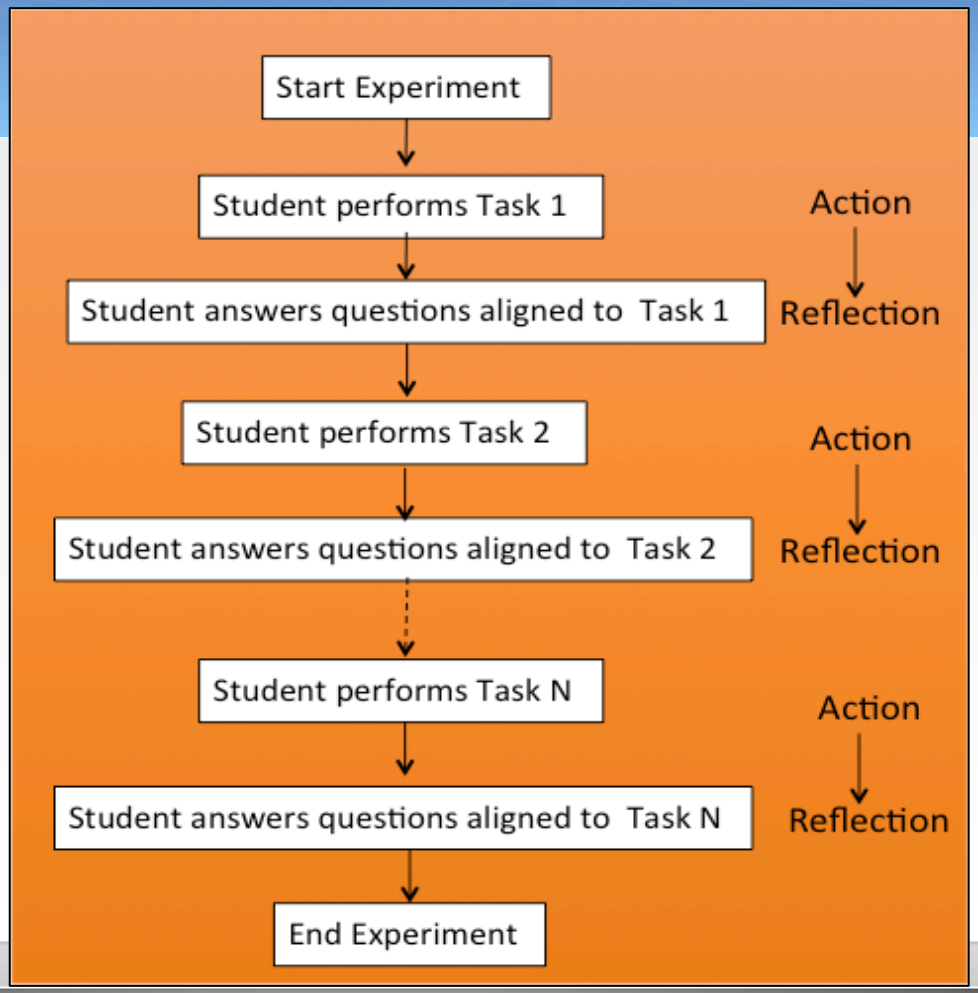
The laboratory assessment

- Should assess the students' knowledge and laboratory skills
- Should be aligned to learning objectives
- Should assess when they are engaged in inquiry and practical work
- Should be based on a set of protocols for analyzing student laboratory activities and not just the final outcome
- Should be such that the students' learning is assessed effectively

Virtual laboratory Assessment framework



Proposed assessment strategy



Assessment questions

Should be aligned to the learning objectives.

Assessment for Principles

- Learning objective: Student should be able to identify the linear and non-linear regions in the V-I Characteristics plot of PN Junction Diode
- Tasks: Construct the given circuit. Measure the current flowing through the diode at various values of applied DC voltage. Note down the readings for ten values. Plot the graph of current vs. voltage to obtain the V- I Characteristics of the PN junction diode. Calculate the static and dynamic resistance of the diode from the formulae given in the linear and non-linear region of the characteristics.
- Assessment question: Is the slope of the V-I plots equal everywhere on the graph? What does the slope of the plot indicate?

Assessment of laboratory skills

Manipulative skills – The students are said to have developed these skills if they are able to carry out the following tasks - Observations, Measurements, Manipulations, Recording results, Calculations, Explaining experimental techniques, Explaining about various decisions and Working according to the design.

- Ask questions that test whether the students are able to perform these tasks correctly.

Assessment of laboratory skills

- **Investigative skills** - The students are said to have developed these skills if they are able to carry out the following tasks - Transforms results into standard form (tables), Determine relationships (could include graphs), Discuss accuracy of data, Formulate generalizations, Discuss limitations/ assumptions of experiment, Explain relationships and Formulate new questions/problems.
  - Ask questions that test whether the students are able to perform these tasks correctly.

Assessment of laboratory skills

- **Inquiry Skills** - The students are said to have developed these skills if they are able to carry out the following tasks - Formulate question or problem to be investigated, Formulate hypothesis, Determining replications, Identifying treatments, Defining dependent variable, Defining independent variable, Design experiment, Design observation and measurement procedures, Predict results, Predict applications based on results, Formulate follow up hypotheses and Apply experimental technique to new problem.
  - Ask questions that test whether the students are able to perform these tasks correctly.

Instruments used

You can use various instruments for carrying out the assessment in the virtual laboratory. They are

- Lab report – Handwritten
- Lab report – Online
- Tests
- Presentations
- Whatever instruments are used the assessment questions asked in each of the instrument should be aligned to the learning objectives.

Use rubric for assessment of cognitive ability

Scientific ability	Missing(0)	Inadequate(1)	Needs some improvement(2)	Adequate(3)
Is able to evaluate results by means of an independent method.	No attempt is made to evaluate the consistency of the result using an independent method.	A second independent method is used to evaluate the results. However there is little or no discussion about the differences in the results due to the two methods	A second independent method is used to evaluate the results. The results of the two methods are compared. However there is little or no discussion about the reasons for the differences when the results are different.	A second independent method is used to evaluate the results. The results of the two methods are compared. There is discussion about the reasons for the differences when the results are different.

What next?

- Start your virtual lab assessment for the experiment design
- Set IX – Select and understand the virtual laboratory features.