Virtual Laboratory Experiment Design Guidelines (VLEDG) Set V- Design an effective virtual laboratory experiment with Well-Structured Problem Solving Instructional strategy

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What is a Problem?

The basic components of a problem include

Givens - the initial state

Goal - a desired end state

Operations - means to get from the initial state to the end state

What is a Well-structured Problem?

These are problems that require the application of a finite number of concepts, rules, and principles being studied to a constrained problem situation.

Givens - the initial state – Well defined

Goal - a desired end state - Known

Operations - means to get from the initial state to the end state - constrained set of logical operators.

Characteristics of Well-structured Problem

- These problems present all elements of the problem and are presented to learners as well-defined problems with a probable solution.
- The parameters of problem are specified in the problem statement.
- They engage the application of a limited number of rules and principles that are organized in a predictive and prescriptive arrangement with well-defined, constrained parameters.
- They involve concepts and rules that appear regular and well-structured in a domain of knowledge that also appears well-structured and predictable.
- They possess correct, convergent answers; possess knowable, comprehensible solutions where the relationship between decision choices and all problem states is known.
- They have a preferred and prescribed solution process.

Steps in learning design for Well-structured Problem Solving

Step 1: Review Prerequisite Component Concepts, Rules, and Principles

Step 2: Present Conceptual or Causal Model of Problem Domain

Step 3: Model Problem Solving

Step 4: Present Practice Problems

Step 5: Support the Search for Solutions

Step 6: Reflect on Problem State and Problem Solution

Steps in learning design for Well-structured Problem Solving

Step 1: Review Prerequisite Component Concepts, Rules, and Principles

For example for solving a problem on Voltage Divider Biasing circuit of BJT give the details of this bias.

Steps in learning design for Well-structured Problem Solving

Step 2: Present Conceptual or Causal Model of Problem Domain

Specify the circuit diagram and all the formulae giving the relationships between the various parameters of the circuit.

Steps in learning design for Well-structured Problem Solving

Step 3: Model Problem Solving

Give the detailed steps to solve a particular problem.

Steps in learning design for Well-structured Problem Solving

Step 4: Present Practice Problems

Give multiple similar problems so that students can practice the problem solving.

Steps in learning design for Well-structured Problem Solving

Step 5: Support the Search for Solutions

If there are other alternate ways of solving the problem provide the details of the same. Provide references for solving the problems.

Steps in learning design for Well-structured Problem Solving

Step 6: Reflect on Problem State and Problem Solution

Make the students analyse the solution and how they reached the desired goal from the given initial state. Make the students reflect on the results obtained. Ask questions such that they will think about how they arrived at the goal by following the solution steps.

What next?

- Start your virtual lab experiment design with Well Structured Problem Solving Instructional Strategy
- Set VII – Design experiment with Problem Based Instructional Strategy