



Virtual Laboratory Experiment Design Guidelines (VLEDG) Set V- Design an effective virtual laboratory experiment with Problem Based 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 Ill Structured Problem?

- The problem situation are not well specified
- The problem descriptions are not clear or well defined
- The information needed to solve them is not contained in the problem statement.

These are also referred to as Real World problems or Open-ended problems.



Characteristics of Ill Structured Problem

- One or more of the problem elements are unknown or not known with any degree of confidence.
- Have vaguely defined or unclear goals and unstated constraints.
- Possess multiple solutions, solution paths, or no solutions at all.
- Possess multiple criteria for evaluating solutions.
- Possess less manipulable parameters
- Require learners to express personal opinions or beliefs about the problem
- Require learners to make judgments about the problem and defend them.



Instructional design steps for the ill-structured problem solving

- Step 1: Articulate Problem Context
- Step 2: Introduce Problem Constraints
- Step 3: Locate, Select, and Develop Cases for Learners
- Step 4: Support Knowledge Base Construction
- Step 5: Support Argument Construction
- Step 6: Assess Problem Solutions



Instructional design steps for Problem-Based Instructional Strategy

- Phase 1: Problem Definition Phase
- Phase 2: Research Phase
- Phase 3: Proposed Solution Phase
- Phase 4: Implementation Phase
- Phase 5: Desired results



Instructional design steps for Problem-Based Instructional Strategy

- Phase 1: Problem Definition Phase

Create the problem. Ideally, this will be a real-world situation that resembles something students may encounter in their future careers or lives. Cases are often the basis of PBL activities. Assign tasks and assessment questions so that the students will examine and define the problem. Explore what they already know about underlying issues related to it.



Instructional design steps for Problem-Based Instructional Strategy

- Phase 2: Research Phase

Establish ground rules at the beginning to prepare students to work effectively in groups. Assign tasks and assessment questions so that the students will determine what they need to learn and where they can acquire the information and tools necessary to solve the problem.



Instructional design steps for Problem-Based Instructional Strategy

- Phase 3: Proposed Solution Phase

Assign tasks and assessment questions so that the students will evaluate possible ways to solve the problem.



Instructional design steps for Problem-Based Instructional Strategy

- Phase 4: Implementation Phase

Establish how you will evaluate and assess the assignment. Consider making the assessments students make of their own work and that of their peers part of the assignment grade. Assign tasks and assessment questions so that the students will solve the problem.



Instructional design steps for Problem-Based Instructional Strategy

- Phase 5: Desired results

Assign tasks and assessment questions so that the students will report on their findings.



What next?

- Start your virtual lab experiment design with Problem Based Instructional Strategy
- Set VIII – Design authentic assessment for virtual laboratory experiment.