PERSEN 2:DEVELOPING POTENTIAL LESSONS & ACTIVITIES

ILO4: Differentiate various critical thinking and problem-solving frameworks.

- **Critical Thinking, Problem-Solving Strategies,**

Critical Thinking

- Critical thinking is a disciplined, self-directed cognitive process that challenges individuals to rigorously examine and evaluate information through high standards of language and the constant verification of truth to ensure that arguments are supported by accurate evidence rather than vague assumptions. By cultivating a habit of asking relevant questions and investigating the source of claims, a critical thinker ensures that their understanding is both deep and self-corrective, ultimately leading to more reliable and well-reasoned conclusions.

Characteristics of a Critical Thinker:

Critical Thinkers	Uncritical Thinkers
Are honest with themselves, acknowledging what they do not know, recognizing their limitations, and being watchful of their own errors.	Pretend they know more than they do, ignore their limitations, and assume their views are error–free.
Base judgments on evidence rather than personal preferences, deferring judgment whenever evidence is insufficient. They revise judgments when new evidences reveal error.	Base judgments on first impression and gut reactions. They are unconcerned about the amount of quality of evidence and cling to earlier views steadfastly.
Are interested in other people's ideas, willing to read and listen attentively even when they tend to disagree with the other person.	Are preoccupied with self and their own opinions, and so are unwilling to pay attention to others' views. At the sign of disagreement, they tend to think, "how can I refute this?"
Practice restraint, controlling feelings rather than being controlled by them, and thinking before acting.	Tend to follow their feelings and act impulsively.
Think independently and are not afraid to disagree with group opinion.	Tend to engage in "group thinking," uncritically following beliefs and values of the crowd.

Problem Solving:

- Problem-solving is a goal-directed process used when a person faces a situation where they do not immediately know how to complete a task. It involves systematic observation, critical thinking, and the recognition of non-routine states for which regular solutions are not readily available.
- A "Problem": A specific state that occurs when a living creature has a goal but does not know how to reach it. If a goal can be reached through simple, routine action, it is a "task," not a problem.

The Two Pillars of Problem-Solving

Rahman's framework identifies two major skills required to solve any problem effectively:

- **A. Observation Skill**
- This is the starting point of the process. It involves more than just seeing; it is the act of collecting data, understanding, and interpreting information using all the senses.
- **B. Critical Thinking Skill**
- This is the cognitive engine of problem-solving. It is the ability to conceptualize, apply logical reasoning, and synthesize information.
    - **Sub-Skills:**
        - **Conceptualizing Skill:** Involves understanding a topic or problem, allowing learners to identify and comprehend the issues they will study.
        - **Logical Reasoning:** The process of gathering and interpreting information to formulate arguments, which consist of statements used to justify conclusions.
        - **Application Skill:** Involves using knowledge to resolve problems in new or familiar situations by implementing appropriate strategies and procedures.
        - **Analytical Thinking:** Enables students to collect, articulate, visualize, and solve complex problems, involving analysis of arguments, evaluation of evidence, and decision-making by breaking down tasks.
        - **Decision-Making Skill:** The ability to make choices and solve problems by evaluating evidence and selecting the best course of action, while justifying solutions based on reasoned arguments.
        - **Synthesizing Skill:** The ability to combine parts into a whole in new ways, requiring open thinking, integration of knowledge from different sources, and generation of innovative approaches to tasks.

The Four Key Features of Cognitive Problem-Solving

1. **Cognitive:** It occurs internally within the student's mind (intellectual processing).
2. **Process-Oriented:** It involves applying actions to an "intellectual representation" to create a new one (e.g., changing how you think about a puzzle).
3. **Directed:** It is always intended to accomplish a specific objective or goal.
4. **Personal:** It is influenced by an individual's previous knowledge. Teacher's Note: A "problem" for a novice may not be a problem for an expert who already knows the routine solution.

Supporting Cognitive Skills (Higher-Order Thinking)

- **Metacognition:** Thinking about your own thinking. In the lesson, this means asking students, "How did I decide on this strategy?" or "Why is my current plan not working?".
- **Visualization**: Creating a mental image of the problem or the potential outcome.
- **Abstraction**: Identifying the general principles behind a specific problem.
- **Generalization**: Taking a solution found for one problem and applying it to a broader context or a different situation.

ILO5: Apply creative thinking and innovation to real-world challenges.

- Creative Thinking & Innovation

While knowledge is a foundation, the 21st century demands the ability to handle non-routine situations. This is where creative thinking meets innovation.

Creative Thinking: The cognitive process of generating original, diverse, and elaborate ideas. It involves "breaking the mold" of routine thought.

Innovation: The practical application of those creative ideas to solve a problem or create value.Innovation is the directed application of creativity. It is "problem-solving with a result." According to PISA (2012) standards, problem-solving is directed because the solver's efforts are always intended to reach a specific, tangible goal.

Formula: Innovation= Creativity + Implementation

- Creativity is the mental spark; Innovation is the result in the real world.

The Systematic Framework for Innovation

To move from a creative thought to a real-world innovation, students should follow the four stages of problem-solving (OECD, 2015; Rahman, 2019):

- **Recognition**: Observing the environment to identify the "problem state" or a gap in current solutions.
- **Design**: Planning a creative strategy. This requires Abstraction—identifying the general principles behind the specific problem (Rahman, 2019).
- **Execution**: Implementing the plan into a physical or social reality.
- **Assessment**: Monitoring and evaluating the result through Metacognition (thinking about your own thinking) to see if the innovation actually works (Marzano & Kendall, 2006).
- Innovation fails without the "self-corrective" nature of critical thinking. As a self-directed and self-disciplined process, it ensures that creative ideas are:
    - *Logically Sound:* Does the solution actually address the root cause?
    - *Verified*: Are the claims of the innovation supported by evidence and "rigorous standards of excellence"?
    - *Clear:* Using language analysis to ensure the problem and solution are understood by stakeholders (Rahman, 2019).