smarter science · éduca sciences

INITIATE & PLAN

- Identifying a problem or need through curious observation
- Defining testable questions, researching and considering possible answers and solutions
- Revisiting observations and predictions to improve testable question

Observing
Using the 5 senses to find out about objects and events: their characteristics, properties, differences, similarities, and changes. Observation can be made directly with the senses or indirectly through the use of simple or complex instruments.

Questioning
A strategy to make meaning or wonder about uncertainties.

Searching
Gathering information from a variety of sources, developing self-reliance in acquiring library and Internet skills.

Interviewing
Asking and corresponding to gain primary information.

Inferring
Using logic to draw conclusions from the results of investigating/problem-solving.

Predicting
Predictions are not random guesses but speculations of what may occur in the future based on prior knowledge, observations, and reasoning.

Hypothesizing
Making educated guesses or predictions based on evidence that must be tested through experimentation to establish credibility. Hypotheses guide investigations from which further predictions can be made. Hypotheses generally follow an "If....., then...., because...." statement format.

Modeling
Constructing physical/concrete or abstract representations of ideas, objects or events to clarify explanations or demonstrate relationships. Models are used to reinforce concepts, demonstrate learning, and/or illustrate phenomena which cannot be directly observed.

Selecting
Choosing an action from various alternatives based on justifiable reasons.

ENGAGE

PERFORM & RECORD

- Developing and safely carrying out an investigation
- Observing, collecting, and recording results

Using Instruments
Knowing the instrument's parts, how it works, how to adjust it, its proper use for a given task, its limitations; knowing how to store it and transport it safely.

Calibrating
Checking, adjusting, or determining by comparison with a standard (e.g., calibrating a thermometer, balance, timer or other instrument).

Measuring
Assigning numbers to observations, e.g., metric units, time, student-generated units, using appropriate measuring devices and techniques.

Recording
Noting, documenting, tabulating, charting; working systematically, working regularly.

Planning
Working systematically, regularly organizing for future, seeing possible results.

Designing
The overall plan or strategy by which hypotheses / research questions and technological problems are answered (with or without innovation).

Gathering Data
Collecting evidence through measurements, facts, figures, pieces of information, statistics (either historical or derived by calculation), experimentation, surveys, etc.

Demonstrating
Setting up apparatus, making it work, describing parts and functions, illustrating scientific principles.

Constructing
Putting together component parts; to build or erect.

Inventing
Designing something useful, for the first time, through the use of the imagination, ingenious thinking and/or experimentation.

Experimenting
Carrying out a designed investigation to test a hypothesis or answer a question.

EXPLORE

ANALYZE & INTERPRET

- Reviewing results carefully by examining data and identifying patterns
- Deciding what the results mean
- Evaluating and refining solutions

Comparing
Looking for similarities.

Contrasting
Looking for differences.

Classifying
Putting things into groups and subgroups, identifying categories, deciding between alternatives.

Outlining
Employing major headings and subheadings; using sequential, logical organization.

Graphing
Visually representing data.

Reviewing
Picking out important items, memorizing, associating.

Analyzing
Seeing implications and relationships, discerning causes and effects, locating new problems.

Evaluating
Recognizing good and poor features; judging and assessing.

EXPLAIN

COMMUNICATE

- Explaining procedures and results through writing, speaking, visual or electronic means
- Reflecting on the process and checking with peers

Discussing
Engaging in oral, written, or any other appropriate form of communication with others.

Explaining
Clearly describing, clarifying main points and focusing on the "why" and/or "how" of the issue, concept or idea.

Reporting
Organizing and presenting information in a written or oral format.

Writing
Conveying information (e.g., questions, observations, experimental report) by graphical means.

Reflecting
The activity of either an individual or group that involves analyzing, judging the importance of, and making connections to the learning experience.

Defending
Supporting any and all aspects of inquiry using logical arguments backed up with evidence.

Teaching
Making meaning of concepts or processes by organizing them into key facts and ideas and clearly conveying them to others.

EXTEND

BEGINNING · EXPLORING · EMERGING · COMPETENT · PROFICIENT

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