Three Types of Learning Cycles

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Types of Learning cycles

• There are three types of learning cycles: descriptive, empirical-abductive, and hypothetical-deductive.

• The main difference among the three is the degree to which students merely attempt to describe nature or explicitly generate and test alternative hypotheses.
Descriptive Learning cycles

- Descriptive learning cycles generally require only empirical-inductive patterns (example: seriation, classification and conservation)
- In descriptive learning cycles students discover and describe an empirical pattern with a specific context (exploration). The teacher gives it name (term introduction), and the pattern is then identified in additional contexts (concept application). This type of learning cycle is called descriptive because the student and teacher are describing what they observe without attempting to explain their observations. Descriptive learning cycles answers the question “what?” but do not rise the causal question “why?”
The strength and weakness of Descriptive learning cycle

- The strong side of descriptive learning cycles is easy for most students to conduct it. Because in this case, students are not use higher order thinking pattern.

- The weakness are:-
  - It does not enables students to examine alternative conceptions or misconceptions. Because it just depends on students’ observation.
  - Most of the time it does not answer the question “why?”. 
In emperical abductive learning cycles, students again discover and describe an empirical pattern in a specific context (exploration) but go further by creating possible **causes** of that pattern. This requir the use of abduction to transfer terms and concepts learned in other context to this new context (term introduction). With the teacher’s guidance, the students shift through the data gathered during the exploration phase to see if the hypothesized causes are consistet with those data and other known phenomena (concept application).
The strength and weakness of Empirical abductive learning cycle

The strength

• students discover and describe an empirical pattern in a specific context and go further by creating possible causes of that pattern.

• Science abductive learning cycle is less complicated as compared to hypothetical deductive learning cycle, students use it to find the cause of a phenomena.
Weakness of abductive learning cycle

- Let us consider the following statements

**Abduction:**
- rule: All balls in the box are black
- observation: These balls are black
- explanation: These balls are from the box

- The explanation may or may not be true. Because there is no guarantee of black balls being out of the box. This is one of the weaknesses.
Hypothetical-Deductive Learning Cycle

• Hypothetical-deductive learning cycle demands use of higher order patterns. (example: controlling variables, correlation thinking and hypothetical-deductive thinking).

• This type of learning cycles requires the explicit creation and testing of alternative hypotheses through a comparison of logical deductions with empirical results, hence the name hypothetical-deductive.
This involves the statement of a causal question to which the students are asked to create alternative explanations. Student time is then devoted to deducing the logical consequences of these explanations and extremely designing and conducting experiments to test the hypotheses (exploration). The analysis of experimental results allows for some to be rejected, some to be retained, and for terms to be introduced (term introduction). Finally the relevant concepts and thinking patterns that are involved and discussed may be applied in other situations at a later time (concept application).
example, “what caused the water to rise?”

To start, students invert a cylinder over a candle burning in a pan of water. They observe that the flame soon goes out and water rise into the cylinder. Two causal questions are posed.

1. Why did the flame go out?
2. Why did the water rise?
Students typically explain that the flame used up the oxygen in the cylinder and left a partial vacuum that sucked water in from below. This explanation reveals two misconceptions:

1. Flame destroys matter, producing a partial vacuum
2. Water rises because of a nonexistant force is called suction.

Testing these ideas requires use of hypothetical-deductive pattern of thinking and the isolation and control variables. Let us see the figure below.
Causal Question
Why did the water rise in the cylinder?

If...
Hypothesis
The water rise because oxygen was burned up and a vacuum was created.

And
Experiment
We measure the level of water rise with one and four candles (all other things being constant.)

Then
Prediction
Water should rise the same in both cylinder because the same amount of oxygen is consumed.

Therefore
Conclusion
The hypothesis is probably wrong. We need new hypothesis to be tested.

Results
Water rose much more with four candles than with one candle.
The strength and weaknesses of hypothetical deductive learning cycle

The strength of hypothetical deductive learning cycle.
• Hypothetical-deductive cycles enables students for the creation and explicit testing of alternative hypotheses to explain a phenomenon.

Weakness of Deductive hypotheses learning Cycle
• The process of creation alternative hypotheses, explicit testing of these hypotheses to explain a phenomenon through the deduction of predicted impose a heavy burden on students initiative and thinking skills. It is time consuming to test alternative hypotheses.
Thank you