Information Processing Analysis

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What is Information Processing Analysis

+ Conducting an Information Processing Analysis is the first step in "decomposing" or breaking down a goal into its constituent parts, identifying what the students need to learn to attain the goal (Smith & Ragan, 1999, p.69)

+ What are the mental and/or physical steps that someone must go through in order to complete this learning task.

Background

+ Scandura (1973) and Merrill (1976) introduced information-processing task analysis

+ IPA arose through the development of behavioral psychology and computer technology

+ Gilbert (1962) , Miller (1962) and Espich and Williams (1967) , others

Conducting an Information Processing Analysis

+ Collect as much information as possible about the task and the content implied by the goal (Smith & Ragan, 1999)

+ Rewrite the goal in the form of a representative test question

+ Ask several individuals who know how to complete the task and do one of the following
    + Observe them complete the task and ask them to talk aloud about their thought process as they complete the task
    + Observe them completing the task and write down, videotape, or otherwise record the steps
    + Have the individuals record the steps in writing as they complete them
    + Ask them to simply write down the steps they would use to complete the task

Conducting an Information Processing Analysis (continue)

+ Review the steps recorded in the earlier step and ask questions about the process of completing the task

+ If more than one expert was used, review the findings and find the common steps and decision points collected from earlier two steps

+ Identify the shortest, simplest way to complete the path

+ Make note of factors that may require more steps or more complex steps

+ Choose the steps and circumstances that best match the intentions of the goal

+ Make a list of the steps and decision points appropriate for the goal

+ Confirm the analysis with other experts

Information Processing Analysis: Boyle's law example (Smith & Ragan, 2005)
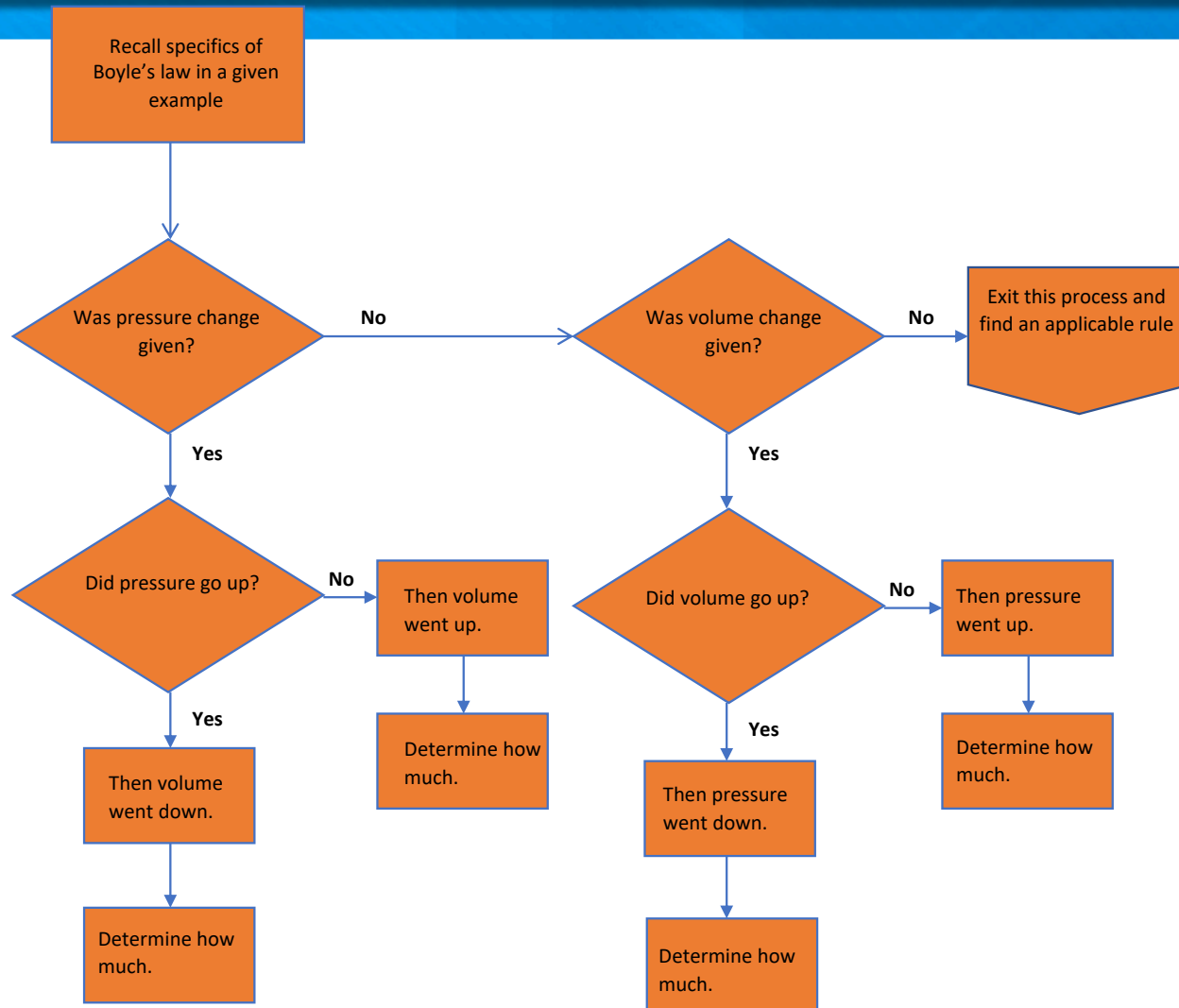
An exercise: IPA Flow-chart of task

- **Characteristics of a rhombus**
  - Is it a polygon
  - Is it a parallelogram
  - Are the sides equilateral
  - Are the figures angles oblique

- **For operations where the performer completes some mental action- Use rectangle**

- **For decisions, where the performer must choose one of the several alternative options to be done next- Use diamond shape**

Information Processing Analysis for a Concept
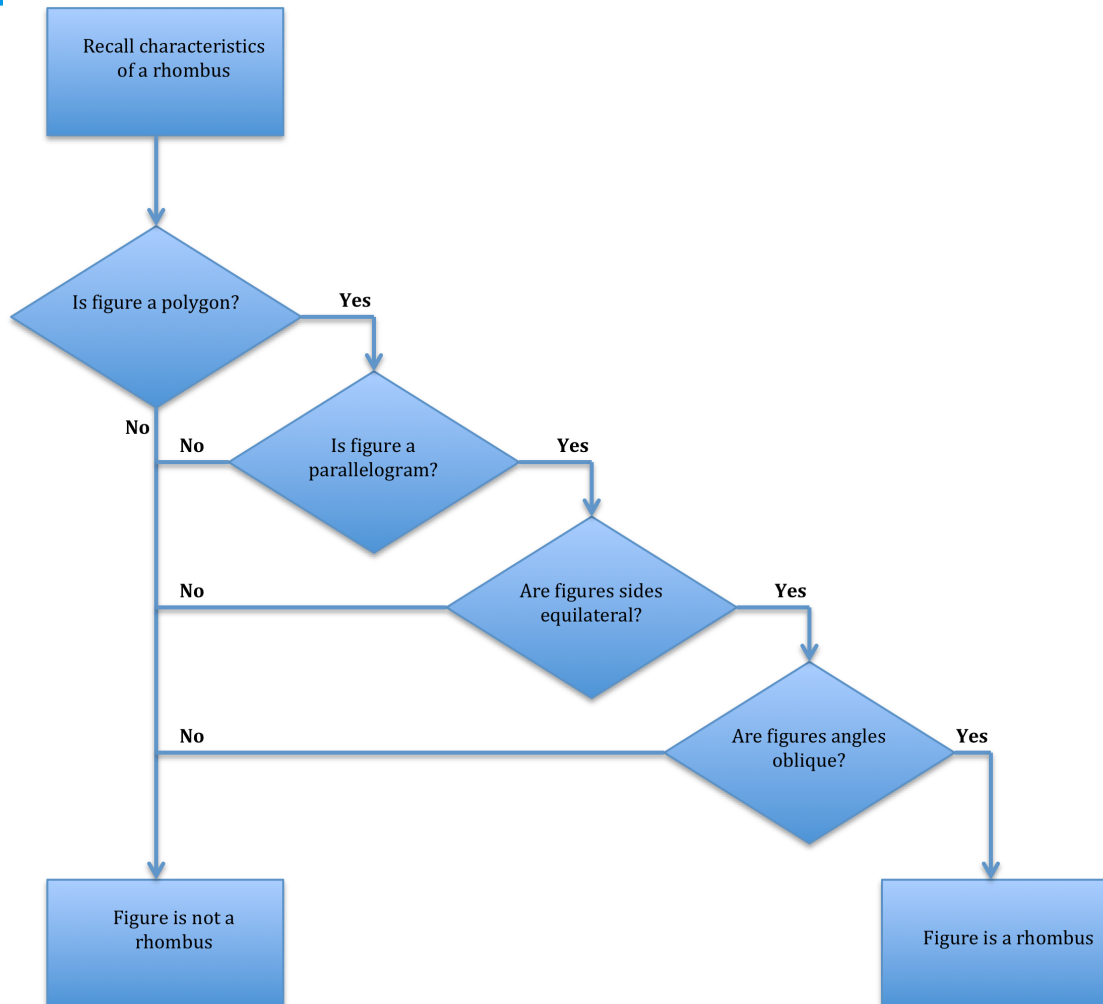
Applications of IPA

+ Analyzing mathematical and geometrical tasks, and also reading and writing skills - Resnick (1976), Anderson (1983)

+ Computer simulation mimicking geometry problem solving- Greeno (1980)

+ Describing the basic operations and decisions for writing sentences with the pronoun "everyone" as a subject- Gagne & Briggs (1979)

+ Outline critical thinking skills for distance education course- Noordink & Naidu (1994)

+ Often used in artificial intelligence field to improve the effectiveness of computer problem solving

Advantages of Information Processing Analysis

+ IPA is one of the few task analysis methods that describes covert thinking process (Jonassen, Tessmer & Hannum, 1998).

+ IPA can be an extensive complement to other task analysis previously conducted on the same task

+ The basic methodology of information processing is relatively easy to learn and apply to simple tasks, and is generalizable to other task analysis procedures

Disadvantages of Information Processing Analysis

+ An IPA is designed to directly reveal how a task is done, not how a task is learned or what needs to be learned.

+ An IPA can reveal the performance sequence of competent task executor, but does not directly reveal how a novice can acquire that performance sequence.

+ For a particular complex cognitive task, an IPA can be laborious to describe and difficult to depict.

+ It is difficult to detail one cognitive performance sequence that all competent executors uniformly follow, particularly because IPA can involve complex problem-solving or decision-making sequences.

References

Jonassen, D.H., Tessmer, M., Hannum, W.H. (1998). *Task analysis methods for instructional design.* Routledge.

Ragan, T.J., & Smith, P.L. (1999). Instructional Design. *New York: Macmillan Publishing Company.*

Smith, P. L., & Ragan, T. J. (2005). *Instructional design*. John Wiley & Sons.