

USING “CONCRETE-THEN-ABSTRACT” TO TEACH PROBABILITY

OVERVIEW:
A graphic organizer is used to depict the two major concepts behind the content objective. This demonstration uses flowchart-type structures to depict the “concrete” and the “abstract” aspects of probability. Attached is a copy of the flowchart graphic organizer that may be used to teach the concepts is a complete drawing, identifying how each part of the flowchart is used. The additional flowchart figures provide the means by which concrete concept is part of abstract concept, and additional connections, such as use of manipulatives and broad content framework that governs the concept(s). When used with English language learners (ELLs) it helps focus their language learning on the key terms or facts related content, and provides a visual means of learning the concrete aspect of the content and then the abstract, which is facilitated by how the two are linked. This graphic organizer can also be used to teach the basic concepts behind algebraic thinking/reasoning.

INSTRUCTIONS:
The two rectangles; one of the left, and the other on the right are used to identify the two main concepts. The left identifies the concrete concept and the right identifies the abstract. The dual block arrow is used to depict how the two concepts are linked together. The bottom circle is used to identify the “laws” or rules governing the key concepts and therefore provides the framework for “linking” the two concepts. The top circle identifies manipulatives that are used to visually illustrate the link and/or the characteristics of each key concept.

RESEARCH REFERENCE:
Research in educational theory indicates that visual learning is one of the best methods for teaching students of all ages how to think and how to learn. [Some sources include: Ellis, E.S. & Sabornie, E.J. (1990). Strategy based adaptive instruction in content area classes: Social validity of six options and implications for designing instructional materials. Teacher Education and Special Education. 13(2), 9-15., and Koran, M.L., & Koran, J. (1980). Interaction of learner characteristics with pictorial adjuncts in learning from science text. Journal of Research in Science Teaching, 1, 4-483.]

EFFECTIVENESS:
Use of graphic organizer and “concrete-then-abstract” are effective instructional strategies because learners are more likely to understand and remember the concept (content or language arts) that they are being taught; amount of complex language is decreased and the semantic information processing required is reduced (showing v. telling facilitates understanding), and encourages and fosters strategic learning on the part of the student. A thorough understanding of concrete concepts ensures that ELLs more readily understand both the academic language and concepts that are abstract and much harder to comprehend when taught without a “concrete” foundation.

CONNECTIONS TO STANDARDS:
Strategy may be used to teach benchmarks or performance indicators for either (or both) academic content standards and English language proficiency standards. Examples of benchmarks or performance indicators which would indicate the need for using “concrete-then-abstract” and graphic organizer include the following:

- discover the key concepts of (probability, algebraic reasoning, matrices, etc.)
- describe simple and complex patterns and relationships of (word problems, algebraic techniques, varied solutions)
- compare and contrast (properties of something or characteristics of something/someone)
- analyze functional relationship or identify patterns of (mathematics, science, algebra)
- interpret, infer, and compare similarities and differences in an academic text (any content area).

DEMONSTRATION (Ninth Grade)

Lesson Objective:

Students will develop an understanding of the two types of probability.

Language Objective:

Students use oral skills to explain the characteristics and differences between the two types of probabilities, and will write sentences using the academic content/language to “predict” results based use of manipulatives for each type of probability.

Content/Concept:

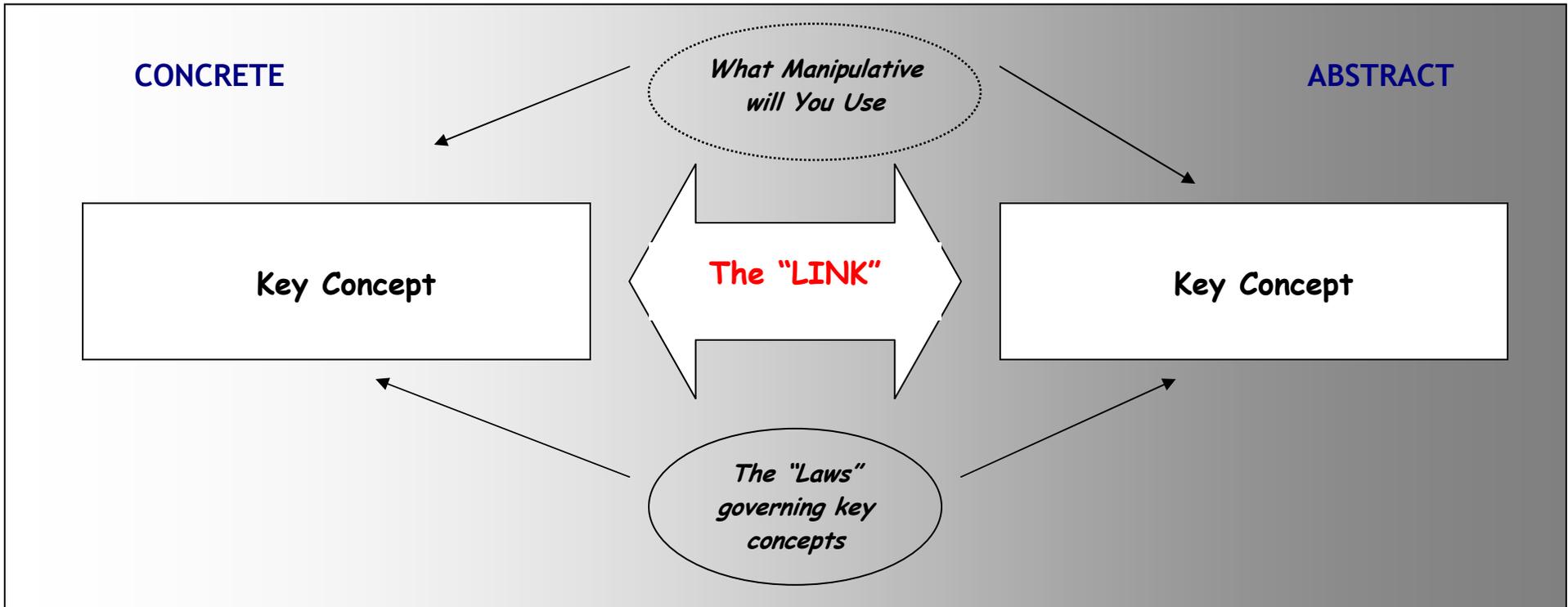
Understanding Experimental and Theoretical Probability

Procedure:

The “concrete-then-abstract” flowchart graphic organizer is used by teacher to discuss and review orally properties of Experimental Probability. At least one simple example of experimental probability is used by the teach in conjunction with a manipulative, such as a spinner, or coin, etc. The teacher then encourages students to identify “rules” or “laws” that governed the probability demonstration that was given. Guiding questions, such as “what happened when we only used two changes/opportunities? Or “what happened when we used more opportunities?” to generate discussion and assist students in using academic vocabulary and increasing their comprehension of the “concrete” aspect of probability. The process is repeated with Theoretical Probability, but with an emphasis on the “law” or rules, such as the “law of large numbers” to assist students in linking the two concepts. The teacher demonstrates or gives at least one example of theoretical probability and encourages students to predict the results. Additional guided questions should be used to prompt the discussion among/between students on predicting results and supporting their predictions, such as “what do you think will happen? “how many times will your prediction come true?” and “how do you justify or support you prediction or theory?” Students are then be grouped; either in pairs or groups of four to practice and discuss the properties of probability, and then assigned to use probability to solve problems presented in word/text form. ELLs at lower levels of English language proficiency should be “mixed” between/and among the small groups.

Note - A blank “concrete-then-abstract” flowchart is provided below to demonstrate the graphic depiction.

CONCRETE-THEN-ABSTRACT FLOWCHART



Definitions and Key Terms:

Identify the definition and key terms for this lesson.

Identify the "laws" or "rules" that may be used to "justify" or "support" predictions or "theories."

Other Strategies:

Identify the manipulatives that may be used to identify functions and purpose and/or may also provide the physical features of the concepts.