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Analogies

Overview and Background

An analogy is a way of stating a comparative relationship between two sets of terms. A and B (of the first set) are related to each other in the same way that C and D (of the second set) are related to each other. An analogy is often represented as follows: $A : B :: C : D$. For example, the governor is the elected head of a state in the same way that the mayor is the elected head of a city. This comparison can be represented in this analogy: $\text{governor} : \text{state} :: \text{mayor} : \text{city}$.

When one set of words is more familiar than the other, the meaning of the unfamiliar is illuminated by what is known about the familiar. For example, when students are learning about the functioning of the human heart, they can be taught that the heart moves blood through the body somewhat as a water pump moves water from a reservoir: $\text{heart} : \text{blood} :: \text{pump} : \text{water}$.

Incomplete analogies are often included in standardized tests because completing them correctly is considered evidence of high-level thinking. Studying and creating analogies helps students develop comprehension of vocabulary and concepts as they improve their reasoning ability and their critical thinking skills. Understanding analogies can be challenging for students because the nature of the relationship may not be immediately obvious. For this reason, it's important for teacher and students to state the nature of the

relationship explicitly when discussing an analogy. Also, the convention of single and double colons can be difficult for some students to grasp, so using a different format, such as a Bridge Map, can help students more easily understand this kind of comparison (Hyerle, 1996, 2000).

Analogies are useful in subject areas to enhance learning of key concepts. For example, the concept of inverse operations in mathematics can be represented in an analogy (division : multiplication :: subtraction : addition), as can equivalence between fractions and decimals ($1/2 : .50 :: 3/4 : .75$). In an American History class, the roles of historical figures can be learned by means of analogy (Union Army : Ulysses S. Grant :: Confederate Army : Robert E. Lee).

For more information about using analogies in the classroom, see Huff-Benkoski and Greenwood (1995) and Venville and Dawson (2004).

Instructional Benefits of This Strategy

- develops understanding of the nature of various kinds of relationships
- helps students identify and analyze relationships
- develops and refines students' understanding of the specific vocabulary and concepts that are used in analogies
- develops critical thinking abilities in students

Step by Step

These suggested steps for teaching analogies are best done in the sequence given here. The steps may take several days or more to complete.

1. Give students examples of pairs of words that are related or associated in various ways, for example:

day	night
mother	child
wheel	bicycle
frosting	cake
acorn	oak

2. Have students state the relationship between the items in each pair. For example, the relationships for the pairs in Step 1 are:

day/night	Day is the opposite of night.
mother/child	A mother is a parent of the child.
wheel/bicycle	A wheel is part of a bicycle.
frosting/cake	Frosting is used to decorate a cake.
acorn/oak	An acorn grows into an oak.

3. Have students think of other pairs of words that are related in the same ways as the originals and list those alongside the pairs, being sure to order the words in the same way if order is relevant. For example:

day/night	up/down, cold/hot, front/back
mother/child	female dog/puppy, female cat/kitten
wheel/bicycle	leg/chair, eraser/pencil, bristle/brush
frosting/cake	whipped cream/sundae, embroidery/shirt
acorn/oak	child/adult, pumpkin seed/pumpkin

4. Model for students how to create the analogy using the conventions of a formal statement of analogy. Point out that the ordering of items on each side of the “equation” is important.

frosting : cake :: embroidery : shirt
(NOT frosting : cake :: shirt : embroidery)

wheel : bicycle :: leg : chair
(NOT wheel : bicycle :: chair : leg)

5. To reinforce the kind of thinking that’s required for analogies, show students how to express the comparison in a sentence that clearly gives the nature of the relationship. For example:

frosting : cake :: embroidery : shirt
Frosting is used to decorate a cake just
as embroidery is used to decorate a shirt.

wheel : bicycle :: leg : chair

A wheel is part of a bicycle just as a leg is part of a chair.

6. Give students analogies with one term missing and have them work in pairs or groups to complete the analogy, write a sentence expressing the comparison, and write a sentence stating the nature of the relationship. For example:

convertible : car :: yacht : _____ (boat)

A convertible is a type of car just as a yacht is a type of boat.

Relationship: specific instance within a category

envelope : letter :: backpack : _____ (books or other items)

An envelope is a container for a letter just as a backpack is a container for books or other items.

Relationship: container and contents

7. When students understand how to complete analogies and write corresponding sentences, have them work in teams to generate new analogies to express comparisons within the curriculum content they are learning.

In teaching analogies, it can be useful to concentrate at first on common types of relationships until students become comfortable with the process of analogical thinking. Here are some relationships that form the basis of many analogies:

<i>Nature of the Relationship</i>	<i>Sample Analogy</i>
synonym	happy : joyous :: irritated : cranky
antonym	day : night :: in : out
worker and tool used	gardener : hoe :: carpenter : saw
tool and object it's used upon	hammer : nail :: scissors : cloth
function of a tool	safety pin : fasten :: pencil : write
creator and work created	writer : novel :: composer : symphony
part to whole	petal : flower :: pocket : jacket
masculine and feminine	actor : actress :: bull : cow
symbol and what it stands for	heart : love :: flag : nation
category and instance	cat : Persian :: automobile : convertible
cause and effect	germ : disease :: fertilizer : growth
effect and cause	tidal wave : earthquake :: mudslide : excessive rain

Additional Suggestions

- Have students work in teams to create analogies with information from a completed content-area unit. The teams can present their creations as incomplete analogies for the rest of the class to figure out. Have teams write out each of their analogies fully, along with the expression of the analogy in a sentence and a statement about the nature of the relationship. Check their work to make sure they have analogies that accurately express the target relationship. Then have teams present the first three terms, inviting the rest of the class to guess the fourth term and state the nature of the relationship.
- Analogies can also be used to assess students' knowledge. When designing a content-area test, include several incomplete analogies as test items. To be sure students understand the relationship, have them complete the analogy and explain the meaning in a sentence. Alternatively, you may want to use multiple-choice items. For example:

find : found :: mind : _____

minded, mind, mound, brain

Nature of the relationship:

Answer:

find : found :: mind : *minded*

Nature of the relationship: present and past tense of a verb

- Challenge students to generate analogies about the topics they are studying. These may involve types of relationships that are less common than the ones given in the table above. Here are some examples in mathematics:

square : perimeter :: circle : circumference

The term for the measured distance around a square is "perimeter" just as the term for the measured distance around a circle is "circumference."

triangle : three :: pentagon : five

A triangle has three sides just as a pentagon has five sides.

- Invite students to generate analogies based on their daily experiences. These may involve types of relationships that are less common than the ones given in the table above. Here are some examples:

McDonald's : hamburger :: KFC : fried chicken

The signature food of McDonald's is the hamburger just as the signature food of KFC is fried chicken.

Harley-Davidson : motorcycles :: Nike : sportswear

Harley-Davidson manufactures motorcycles just as Nike manufactures sportswear.

Most students will enjoy generating analogies about their favorite music and musical groups, actors and films, books and authors, sports and other leisure activities, food, and other such things relating to popular culture.