Examining Similarities and Differences

THE MARZANO COMPENDIUM OF INSTRUCTIONAL STRATEGIES
Examining Similarities and Differences

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555 North Morton Street
Bloomington, IN 47404

888.849.0851
FAX: 866.801.1447

email: info@marzanoresearch.com
marzanoresearch.com

Visit marzanoresearch.com/compendium to access the Marzano Compendium of Instructional Strategies to view additional resources related to this element and others.

Director of Content and Resources: Julia A. Simms
Editorial Manager: Laurel Hecker
Production Editor: Ming Lee Newcomb
Editorial Assistants / Staff Writers: Elizabeth A. Bearden & Christopher Dodson
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INTRODUCTION

In 2007, Dr. Robert J. Marzano published *The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction*. The framework, composed of three lesson segments, ten design questions, and forty-one elements, was based on research showing that teacher quality is one of the strongest influences on student achievement—that is, an effective teacher can positively and significantly impact student learning. As such, *The Art and Science of Teaching* sought to identify specific action steps teachers could take to improve their effectiveness.

In 2015, Dr. Marzano updated *The Art and Science of Teaching* framework to reflect new insights and feedback. The Marzano Compendium of Instructional Strategies is based on this updated model, presenting forty-three elements of effective teaching in ten categories. Each folio in the series addresses one element and includes strategies, examples, and reproducible resources. The Compendium and its folios are designed to help teachers increase their effectiveness by focusing on professional growth. To that end, each folio includes a scoring scale teachers can use to determine their proficiency with the element, as well as numerous strategies that teachers can use to enact the element in their classrooms. Indeed, the bulk of each folio consists of these strategies and reproducibles for implementing and monitoring them, making the Compendium a practical, actionable resource for teachers, instructional coaches, teacher mentors, and administrators.
EXAMINING SIMILARITIES AND DIFFERENCES

The teacher helps students deepen their knowledge by examining similarities and differences between items. This rather straight-forward analytic activity helps students discover important distinctions and connections between concepts and processes. Comparing, classifying, finding patterns, and identifying relationships are basic activities that require students to examine similarities and differences.

Monitoring This Element

There are specific student responses that indicate this element is being effectively implemented. Before trying strategies for the element in the classroom, it is important that the teacher knows how to identify the types of student behaviors that indicate the strategy is producing the desired effects. General behaviors a teacher might look for include the following.

- When asked about the activity, student responses indicate they have deepened their understanding.
- When asked, students can explain similarities and differences.
- Student artifacts indicate they can identify similarities and differences.

Desired behaviors such as these are listed for each strategy in this element.

Teachers often wonder how their mastery of specific strategies relates to their mastery of the element as a whole. Successful execution of an element does not depend on the use of every strategy within that element. Rather, multiple strategies are presented within each element to provide teachers with diverse options. Each strategy can be an effective means of implementing the goals of the element. If teachers attain success using a particular strategy, it is not always necessary to master the rest of the strategies within the same element. If a particular strategy proves difficult or ineffective, however, teachers are encouraged to experiment with various strategies to find the method that works best for them.
Scoring Scale

The following scoring scale can help teachers assess and monitor their progress with this element. The scale has five levels, from Not Using (0) to Innovating (4). A teacher at the Not Using (0) level is unaware of the strategies and behaviors associated with the element or is simply not using any of the strategies. At the Beginning (1) level, a teacher attempts to address the element by trying specific strategies, but does so in an incomplete or incorrect way. When a teacher reaches the Developing (2) level, he or she implements strategies for the element correctly and completely, but does not monitor their effects. At the Applying (3) level, a teacher implements strategies for the element correctly and completely, but does not monitor their effects. Finally, a teacher at the Innovating (4) level is fluent with strategies for the element and can adapt them to unique student needs and situations, creating new strategies for the element as necessary.

Scale for Examining Similarities and Differences

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovating</td>
<td>Applying</td>
<td>Developing</td>
<td>Beginning</td>
<td>Not Using</td>
</tr>
<tr>
<td>I adapt behaviors and create new strategies for unique student needs and situations.</td>
<td>I engage students in examining similarities and differences, and I monitor the extent to which students deepen their knowledge.</td>
<td>I engage students in examining similarities and differences, but I do not monitor the effect on students.</td>
<td>I use the strategies and behaviors associated with this element incorrectly or with parts missing.</td>
<td>I am unaware of strategies and behaviors associated with this element.</td>
</tr>
</tbody>
</table>

The following examples describe what each level of the scale might look like in the classroom.

**Not Using (0):** A teacher does not ask her students to classify or describe similarities and differences to deepen their understanding of concepts taught in class. The teacher does ask students to describe concepts in order to refine their understanding of topics, but does not provide opportunities for students to compare these descriptions to descriptions of other concepts.

**Beginning (1):** A teacher asks his students to use a Venn diagram to compare two events they have been discussing in class. However, the teacher fails to describe how a Venn diagram is used and assumes that his students will be able to complete the activity on their own and understand what it means.

**Developing (2):** A teacher instructs her students to use a comparison matrix to compare three characters from a novel they have been reading. After the students have completed their matrices, they discuss what they have found. However, the teacher does not take note if their discussions indicate that their knowledge has developed.

**Applying (3):** A teacher puts his students into groups of three to complete a classification chart. Once all of the students have completed their charts, he asks them to present their chart to the class and explain their reasoning. As the students present, he encourages the rest of the class to ask clarifying questions and listens to make sure the students’ understanding is more complete as a result of the activity.
Innovating (4): A teacher asks the class to create a visual analogy illustrating a relationship between organisms. When some students appear to be struggling with the activity, she puts them into a small group and asks them to describe the relationships first and then choose a relationship together that they can illustrate. After they choose a relationship, the teacher asks the students if they can think of something they have observed in their lives which behaves similarly. Once the students have completed the assignment, the teacher asks all of the students to hang their visual analogies on the wall and then the class goes through and identifies which relationship is being depicted in each analogy.
STRATEGIES

Each of the following strategies describes specific actions that teachers can take to enact this element in their classrooms. Strategies can be used individually or in combination with each other. Each strategy includes a description, a list of teacher actions, a list of desired student responses, and suggestions for adapting the strategy to provide extra support or extensions. Extra support and extensions relate directly to the Innovating (4) level of the scale. Extra support involves steps teachers can take to ensure they are implementing the strategy effectively for all students, including English learners, special education students, students from low socioeconomic backgrounds, and reluctant learners. Extensions are ways that teachers can adapt the strategy for advanced students. In addition, some strategies include technology tips that detail ways teachers can use classroom technology to implement or enhance the strategy. Finally, each strategy includes further information, practical examples, or a reproducible designed to aid teachers’ implementation of the strategy.
**Sentence Stem Comparisons**

Students complete sentence stems that ask them to compare and contrast various people, places, events, concepts, or processes. These comparisons can be general or specific, as shown by the following examples.

- **General:** House cats are similar to lions because _________________. House cats are different from lions because _________________.
- **Specific:** Sherlock Holmes and Miss Marple are both characters who enjoy solving mysteries, but they are different because _________________.

**Teacher Actions**

- Creating sentence stems that require students to compare and contrast aspects of the content
- Asking students to complete sentence stem comparisons
- Discussing students’ responses to sentence stem comparisons

**Desired Student Responses**

- Comparing and contrasting aspects of the content to complete sentence stems
- Explaining the thinking and reasoning behind their sentence stem comparisons

**Extra Support**

- Asking students to create a list of what they know about each element of a sentence stem comparison before completing it

**Extension**

- Asking students to create and complete sentence stems related to the content

**Example Sentence Stem Formats**

- ____________ and ____________ are similar because they both ________________.
- ____________ and ____________ are different because ________________ is ________________, but ________________ is ________________.
- ____________ and ____________ are both ________________, but different because ________________.
- ____________ is similar to ____________ because ________________. They are different from each other because ________________.
- ____________ is similar to ____________ but different from ____________ because ________________.
Summarizers

A summarizer is a simple graphic organizer that students can use to examine the similarities and differences between two items. A summarizer generally has three columns: the left column explicates features that are only found in the first item; the far right column lists features that are only found in the second item; the middle column should list characteristics that are similar between the two items and include a sentence that summarizes the items’ similarities. Teachers can use this graphic organizer to help students clearly articulate similarities and differences and practice summarizing.

Teacher Actions

- Explaining summarizers to students
- Asking students to use summarizers to compare or contrast two things
- Discussing students’ summarizers in class

Desired Student Responses

- Using summarizers to compare or contrast two things
- Explaining the thinking and reasoning behind their summarizer
- Accurately summarizing content

Extra Support

- Filling in some of the similarities and differences for students and then asking them to fill in the remaining space in charts

Extension

- Asking students to create a visual presentation that illustrates the summary sentence

Example of a Completed Summarizer

<table>
<thead>
<tr>
<th>Summary Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thousands of years ago, cotton and corn were grown as domesticated crops in distant regions of the world, but today both are staple crops of the United States because of their diverse uses. Corn, which grows on tall stalks, is largely seen throughout the Midwest, while cotton, which grows on bushy shrubs, is a prominent crop of the American Southwest.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic 1: Corn</th>
<th>Topic 2: Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Differences</strong></td>
<td><strong>Similarities</strong></td>
</tr>
<tr>
<td>Grows on vertical stalks</td>
<td>Used to produce a wide array of food, chemical, and household products</td>
</tr>
<tr>
<td>Primarily grown throughout the Corn Belt in the Midwest</td>
<td>Grown in the United States</td>
</tr>
<tr>
<td>Originated as a crop in Central America</td>
<td>Existed as domestic crops for thousands of years</td>
</tr>
</tbody>
</table>
Examining Similarities and Differences

**Constructed Response Comparisons**

A constructed response comparison is a student-generated written response that describes the similarities and differences between two items or ideas. This strategy begins with a simple request by the teacher: “How is ____________ similar to and different from ____________?” Students must decide which similarities and differences to include in their responses and how to best frame their analysis. More advanced constructed responses can ask students to draw conclusions and indicate why it is important to understand the similarities and differences between the two items.

**Teacher Actions**

- Providing examples of responses that compare two things
- Asking students to use constructed responses to compare two things
- Providing comparison questions students can use to generate constructed responses

**Desired Student Responses**

- Outlining details to compare in the constructed response
- Explaining the thinking and reasoning behind the information in the constructed response
- Writing a constructed response that clearly articulates important similarities and differences between two things

**Extra Support**

- Helping students generate an outline for their constructed response, including which similarities and differences will be discussed

**Extension**

- Asking students to draw a conclusion or create a generalization in their constructed response
# Comparison Words and Phrases

Look for these words and phrases to identify when a text or speaker is referring to similarities and differences. Use these words and phrases yourself when talking or writing about similarities and differences.

<table>
<thead>
<tr>
<th>Words and Phrases That Indicate Similarities</th>
<th>Words and Phrases That Indicate Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Similarly</td>
<td>• In comparison</td>
</tr>
<tr>
<td>• Both</td>
<td>• In contrast</td>
</tr>
<tr>
<td>• In a similar manner</td>
<td>• On the contrary</td>
</tr>
<tr>
<td>• Just like</td>
<td>• On the other hand</td>
</tr>
<tr>
<td>• In the same way</td>
<td>• Conversely</td>
</tr>
<tr>
<td>• Likewise</td>
<td>• Whereas</td>
</tr>
<tr>
<td>• Just as</td>
<td>• While</td>
</tr>
<tr>
<td>• Also</td>
<td>• Unlike</td>
</tr>
<tr>
<td>• Furthermore</td>
<td>• However</td>
</tr>
<tr>
<td>• As well as</td>
<td>• Yet</td>
</tr>
<tr>
<td>• Alike</td>
<td>• Instead of</td>
</tr>
<tr>
<td>• Have in common</td>
<td>• Although</td>
</tr>
<tr>
<td>• Share the same</td>
<td>• Rather</td>
</tr>
<tr>
<td></td>
<td>• The antithesis of</td>
</tr>
</tbody>
</table>
Examining Similarities and Differences

Venn Diagrams

Students use these visual tools to compare and contrast two or three people, places, events, concepts, or processes. Students write similarities where circles intersect, and they write characteristics unique to the comparison items where the circles do not intersect. Venn diagrams can be used for specific, general, abstract, or concrete comparisons.

Teacher Actions

• Explaining Venn diagrams to students
• Asking students to use Venn diagrams to compare or contrast two or three things
• Discussing students’ Venn diagrams in class

Desired Student Responses

• Using Venn diagrams to compare or contrast two or three things
• Explaining the thinking and reasoning behind their Venn diagrams

Extra Support

• Asking students to create a list of what they know about each item or concept being compared before completing a Venn diagram

Extension

• Asking students to make generalizations about each item or concept being compared based on their Venn diagrams

Technology Tips

• Use IWB software to design interactive Venn diagrams. Students can use a Venn diagram to arrange blocks of text, images, or sounds into categories based on their attributes.
Venn Diagram

Name: ___________________________ Date: ___________________

Class: __________________________

Venn Diagrams are an easy way to visualize the differences and similarities between objects, ideas, people, places, or events. First, choose two things to compare. Write the first comparison item in the Topic 1 space and the second in the Topic 2 space. Then, write words and short phrases that describe only Topic 1 on the left side and words and phrases that describe only Topic 2 on the right side. The intersection of the two circles illustrates what the two topics share or have in common. Fill in the middle section with words and short phrases that describe common traits or how the two things are similar.
Examining Similarities and Differences

**T Charts**

Students can use T charts to compare two objects, ideas, events, or people. Students fill in a T-shaped graphic organizer by writing two topics across the top and details that describe each on either side of a dividing line. Then, once students have gathered several characteristics for each item, they look for similarities and differences between the two items. In several short sentences, students should explain the similarities and differences they see in their T chart. Additionally, after completing their explanation, students can draw conclusions about the essential similarities and differences between the two things. The conclusion should not list all of the similarities and differences, but simply sum up what the student recognizes as the fundamental similarities and differences between the two items. It can be helpful if students write parallel characteristics on each side of the T chart. For example, when comparing Australia and the United States, students might write the continent each country is found on as the first characteristic. By writing the characteristics in parallel, students will easily be able to identify the similarities and differences between the two items after filling in the T chart.

**Teacher Actions**

- Explaining T charts to students
- Asking students to use T charts to compare and contrast two or three things
- Discussing students’ T charts in class

**Desired Student Responses**

- Using T charts to compare or contrast two things
- Explaining the similarities and differences between the two contrasted things
- Drawing conclusions from the content in the T chart

**Extra Support**

- Assisting students with generating initial details for each topic being examined

**Extension**

- Asking students to make generalizations about each item or concept being compared based on their T chart
# T Chart

Name: ___________________________   Date: ______________

Class: ___________________________

<table>
<thead>
<tr>
<th>Topic 1:</th>
<th>Topic 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How they’re alike:

How they’re different:

Conclusions:
Double-Bubble Diagrams

Students use this type of diagram to compare the attributes of two people, places, events, concepts, or processes. They write the two things being compared in large circles on the left and right sides of a page. They list common attributes in smaller circles in the center of the page that connect to both large circles. They write unique attributes in smaller circles at the left and right edges of the page that connect only to the larger circle to which they apply.

Teacher Actions

• Explaining double-bubble diagrams to students

• Asking students to use double-bubble diagrams to compare the attributes of different elements of the content

• Asking students to show relationships between different elements of the content by drawing lines between the bubbles on their diagrams

Desired Student Responses

• Using double-bubble diagrams to compare attributes of different elements of the content

• Showing relationships between different elements of the content by drawing lines between the bubbles on the diagrams

• Explaining the thinking and reasoning behind their double-bubble diagrams

Extra Support

• Asking students to create a list of the attributes of each item or concept being compared before completing a double-bubble diagram

Extension

• Asking students to create double-bubble diagrams that compare three or four items or concepts
Double-Bubble Diagram

Choose two topics to compare. Write each topic’s name in the Topic A and Topic B circles. In the surrounding circles, list the similar and different features of both topics. Write the features that the two topics share as words or short phrases in the four middle circles that are linked to both Topic A and Topic B. Write the features that are different for each topic in the circles that only connect to one topic.

Name: ___________________________ Date: ______________

Class: ___________________________

Topic 1

Different Features

Similar Features

Topic 2

Different Features
### Comparison Matrices

Students identify elements they wish to compare and write them at the top of each column in a grid. Next, using a matrix like the one following, students identify attributes they wish to compare and write them in the rows. Then, in each cell, students record information related to each attribute for each element. Finally, students summarize what they learned by comparing the elements.

In the following matrix, the similarities and differences between three literary movements are compared. As shown, the student synthesized the information from the matrix and described each movement's similarities and differences in the summary at the bottom of the matrix.

<table>
<thead>
<tr>
<th>How the literary movement came to be</th>
<th>Realism</th>
<th>Naturalism</th>
<th>Romanticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reaction to Romanticism and Idealism</td>
<td>• Reaction to Romanticism and Idealism</td>
<td>• Reaction against Formalism and Realism</td>
<td></td>
</tr>
<tr>
<td>• Societal changes due to the end of the Civil War and changes in scientific and philosophical thought, such as pragmatism, inspired a logical, scientific approach to literature</td>
<td>• Developed out of Realism</td>
<td>• Reaction against industrialism and urban growth resulted in looking back to “simpler times” such as the Medieval era</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Scientific advancements, especially theories of evolution, were highly influential</td>
<td>• In the U.S., promise of the new frontier inspired optimism and individualism</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How texts from this movement represent the setting and characters</th>
<th>Realism</th>
<th>Naturalism</th>
<th>Romanticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very detailed, realistic descriptions</td>
<td>• Detailed descriptions of environment</td>
<td>• Nature is idealized</td>
<td></td>
</tr>
<tr>
<td>• Society and societal conditions are central to novel</td>
<td>• Nature is depicted as powerful, uncontrollable force</td>
<td>• Individual is emphasized rather than society</td>
<td></td>
</tr>
<tr>
<td>• Characters were in control of their own destiny</td>
<td>• Characters often have no or little free will</td>
<td>• Characters may demonstrate strong, sometimes irrational, emotion</td>
<td></td>
</tr>
<tr>
<td>• Characters are often from the middle class</td>
<td>• Characters may be from lower socioeconomic classes</td>
<td>• Characters may question and challenge rules and conventions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Common themes in the texts of this movement</th>
<th>Realism</th>
<th>Naturalism</th>
<th>Romanticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Democracy and the devaluing of the author</td>
<td>• Survival of the fittest</td>
<td>• Importance of the individual and of the artist or author as creator</td>
<td></td>
</tr>
<tr>
<td>• Truth is linked to objectively describing and examining society, characters, and events</td>
<td>• Nature or society is indifferent to the individual</td>
<td>• Nature as source of inspiration or spirituality</td>
<td></td>
</tr>
<tr>
<td>• Important of the ordinary</td>
<td>• Everyone has a dark side or an inherently violent nature</td>
<td>• The supernatural, mysticism, and the occult</td>
<td></td>
</tr>
<tr>
<td>• Issues of morality explored through the character's relationship to society</td>
<td>• The individual cannot overcome natural or societal circumstances</td>
<td>• The individual overcomes the limitations of society and tradition</td>
<td></td>
</tr>
</tbody>
</table>

Summary: The literary movements of Realism, Naturalism, and Romanticism were all reactions to previous literary movements and changes in society. Naturalism and Realism seemed to embrace scientific advancements, while Romanticism tried to escape modern urbanization and technology by focusing on nature and the supernatural. Both Realism and Naturalism focused on characters from lower or middle classes and the problems these people faced in their day-to-day lives; however, the characters' ability to control their own destinies was quite different. Naturalist texts often contained characters who could not overcome their circumstances and were controlled by society, unlike Romanticist texts which praised the power of the individual and frequently contained characters who overcame societal circumstances.
Examining Similarities and Differences

**Teacher Actions**
- Asking students to identify elements of the content to compare and writing them at the top of each matrix column
- Asking students to identify attributes of each content element that they want to compare and writing one in each matrix row
- Asking students to identify information related to each content element and attribute
- Asking students to summarize what they learned while completing the comparison matrix

**Desired Student Responses**
- Identifying elements of the content to compare and writing them in each matrix column
- Identifying attributes on which they wish to compare the elements and writing them in each matrix row
- Identifying information related to each content element and attribute
- Summarizing what they learned while completing a comparison matrix

**Extra Support**
- Providing the elements and attributes that students should use in their comparison matrices and providing a review of each element and attribute

**Extension**
- Asking students to identify the elements and attributes to use in their comparison matrices

**Technology Tips**
- Use interactive whiteboard software to create interactive comparison matrices. Work as a whole class to fill in each cell by using clickers with text input or mobile devices with polling software.
- Use a random group generator like Team Maker to organize students into groups before a comparison matrix activity. Then, ask each group to collaborate on a comparison matrix using online word processing software such as Google Drive.
## Comparison Matrix

Name: ___________________________ Date: ___________________

Class: ___________________________

<table>
<thead>
<tr>
<th>Element:</th>
<th>Element:</th>
<th>Element:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute:</td>
<td>Attribute:</td>
<td>Attribute:</td>
</tr>
</tbody>
</table>

**Summary:**
Classification Charts

The teacher creates a chart with several categories listed across the top and asks students to fill in examples that fit in each category. Students can pair up or form groups to share their charts with their peers, discuss and explain why they classified items as they did, and modify their charts after hearing others’ perspectives. In the example chart below, scientific elements are organized into three categories: metals, nonmetals, and metalloids. During a classification activity, students should fill in examples for each category and then discuss with peers or describe in a short paragraph the characteristics that unite each column of elements.

Classification Chart of Scientific Elements

<table>
<thead>
<tr>
<th>Nonmetals</th>
<th>Metals</th>
<th>Metalloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>Manganese</td>
<td>Boron</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Sodium</td>
<td>Silicon</td>
</tr>
<tr>
<td>Carbon</td>
<td>Potassium</td>
<td>Arsenic</td>
</tr>
<tr>
<td>Iodine</td>
<td>Mercury</td>
<td>Tellurium</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Iron</td>
<td>Antimony</td>
</tr>
</tbody>
</table>

Teacher Actions

- Creating a chart with several categories across the top
- Asking students to fill in examples that fit in each category
- Asking students to discuss their charts in pairs or groups and revise them as necessary

Desired Student Responses

- Filling in examples for various teacher-generated categories
- Conferring with peers and revising their charts as necessary
- Explaining what they learned as a result of the activity

Extra Support

- Listing attributes associated with each category on a comparison chart and providing a review of each attribute

Extension

- Asking students to generate lists of attributes associated with each category on a comparison chart
# Classification Chart

Name: ___________________________ Date: ________________

Class: ___________________________

<table>
<thead>
<tr>
<th>Category:</th>
<th>Category:</th>
<th>Category:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

In a few sentences, explain why you classified your examples into each of the three categories.
Dichotomous Keys

A dichotomous key is a graphic organizer that refines students’ understanding of two or more concepts or objects by delineating different characteristics of each. Generally, the dichotomous key moves from broad characteristics that apply to multiple objects to more detailed characteristics as a way to clearly define the item being examined. Students can create dichotomous keys as either flow charts or simple tables. This strategy is particularly useful when comparing multiple items that fit within the same category and might appear very similar on the surface. This strategy is frequently used to distinguish between similar organisms in science, but it can be adapted for any subject that requires students to distinguish among items in the same category. Students can practice using this strategy with familiar items before moving on to more complex concepts and topics.

Below is a dichotomous key that is designed to help students identify parallelograms. In this example, students read the description on the left, and if it matches, then the information on the right side applies to their shape. If the description does not match their shape, then students should move on to the next description on the list. Effective use of this dichotomous key should help students identify types of parallelograms: rectangles, squares, and rhombuses.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>If Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Has two sets of parallel sides</td>
<td>Is classified as a parallelogram, go to step 2a</td>
</tr>
<tr>
<td>1b</td>
<td>Does not have two sets of parallel sides</td>
<td>Is not classified a parallelogram, do not continue</td>
</tr>
<tr>
<td>2a</td>
<td>Has four congruent sides</td>
<td>Go to step 3a</td>
</tr>
<tr>
<td>2b</td>
<td>Does not have four congruent sides</td>
<td>Is classified as a rectangle</td>
</tr>
<tr>
<td>3a</td>
<td>Has four right angles</td>
<td>Is classified as a square</td>
</tr>
<tr>
<td>3b</td>
<td>Does not have four right angles</td>
<td>Is classified as a rhombus</td>
</tr>
</tbody>
</table>

Teacher Actions

- Providing example dichotomous keys to use in class
- Choosing a category or items for students to examine
- Asking students to list characteristics of each item
- Asking students to complete a dichotomous key that clearly shows specific characteristics of each item

Desired Student Responses

- Researching characteristics that could describe each item
- Classifying each item into different categories
- Creating a dichotomous key that logically shows how multiple items in the same category differ
Extra Support
• Partially filling in a dichotomous key and asking students to provide possible details that would complete the organizer

Extension
• Asking students to independently research and create a dichotomous key that they could use as a study aid for that unit

Example Dichotomous Key Flow Chart

```
Snakes of North America

Poisonous to humans
  Red, yellow, and black bands on body
    Coral snake
  Brown-colored with rattler
    Rattle snake

Not poisonous to humans
  Red, white, and black bands on body
    Milk snake
  Thin with longitudinal stripes
    Garter snake
```
Examining Similarities and Differences

**Sorting, Matching, and Categorizing**

The teacher asks students to participate in activities that require them to sort, match, and categorize content. When sorting, students should place items into specific, predetermined categories. When matching, students should match two things that are equivalent to one another. For example, they might match a picture or symbol with a word, a definition with a term, two mathematical equations with the same solution, or a synonym with a word. When categorizing, students should group elements into two or more categories and explain the reasoning behind their categorization. Teachers can ask students to complete these kinds of activities individually, in groups, or as a class. Sorting, matching, and categorizing activities can also be structured through the use of graphic organizers, worksheets, or other visual representations.

**Teacher Actions**
- Explaining how to complete the sorting, matching, or categorizing activity
- Choosing categories for students to sort content into
- Selecting options that students should match
- Asking students to describe the reasoning behind their categorizations

**Desired Student Responses**
- Sorting items into several categories
- Matching two or more items that are the same or equivalent
- Creating categories based on items they are given
- Explaining the similarities between items in a category

**Extra Support**
- Presenting simple examples of sorting, matching, and categorizing with common objects

**Extension**
- Asking students to create subcategories within categories they already created

**Example Sorting, Matching, and Categorizing Activities**
- **Defining vocabulary or terms**: This strategy works well when instructing students on important vocabulary or terms for a unit. When students are beginning to learn the definition of the term, teachers can have them match the word to its written definition, to an illustration of the term, or to a synonym. As students’ understanding deepens, they should be able to sort the terms into categories. For example, in an ELA class the teacher might ask students to sort words under the appropriate part of speech, and in a science class a teacher could have students sort terms under the type of animal or process they describe.

- **Understanding symbols**: A number of subject areas use symbols to represent ideas or processes. Students can use this strategy to familiarize themselves with the use, purpose, and definition of important symbols. For example, in a music class, students could match differ-
ent musical symbols to their use, or they could categorize different instruments by which
clef music for the instrument uses.

- **Classifying objects that could belong to the same category:** Sorting and categorizing
  objects into more specific categories helps students understand which features define a par-
ticular set of objects. For example, for a unit on the Solar System, a teacher could ask stu-
dents to sort planets as gas giants, dwarf planets, or ice giants and have them explain which
features of each planet cause them to belong to that category. Through this kind of activity,
students learn that even objects within the same category, such as “planets,” can have a
diverse range of features.
Student-Generated Classification Patterns

The teacher asks students to find representative examples of different concepts and sort them into categories based on what they have learned in class. Students then present their conclusions to the class and explain why they selected the examples they did and why they sorted them as they did. For example, students might read about the animals that live in the temperate rainforests of the American Pacific Northwest and sort them into categories such as mammals, fish, birds, reptiles, and so on.

Teacher Actions
- Asking students to find representative examples of various concepts
- Asking students to sort their examples into categories
- Asking students to present their examples and categories to the class

Desired Student Responses
- Finding representative examples of a concept
- Sorting examples of a concept into categories
- Explaining the thinking and reasoning behind their examples and categories

Extra Support
- Creating a concept wall with pictures of different concepts; allowing students to use examples from the concept wall when generating classification patterns

Extension
- Asking students to make generalizations about a concept based on their classification patterns

Organizing Student-Generated Classification Activities
- At the beginning of a classification activity, ask students to choose potential categories they will sort their concepts under. These categories should relate to the vocabulary and content discussed in class. Have students write down some of the characteristics of these categories to help them find matching concepts from their notes, texts, or other sources.
- Encourage students to notate which items might belong in their categories. For example, ask them to highlight words in a text that belong to different categories in different colors of ink.
- Instruct students to organize their classifications visually. Suggest that they use several shapes to separate one category from another or divide one shape into parts to organize information.
- After completing their classifications, ask students to generate a poster representing their categories that they can present to the class. Students may draw or use the computer to create their presentations.
Similes

Students state comparisons using \textit{like} or \textit{as}. Students can generate similes to help them understand how new knowledge relates to previous knowledge. They might include an explanation of why one object is like the other and can revise their similes after discussing them with their peers. Teachers can introduce similes by comparing new knowledge to something students are already familiar with. For example, when teaching a lesson on adding fractions, a teacher might state, “Adding fractions with different denominators is like trying to add apples and oranges,” in order to show students that the denominators must be the same when adding fractions.

Teacher Actions

• Asking students to state comparisons using \textit{like} or \textit{as}

• Asking students to explain their similes

Desired Student Responses

• Stating comparisons using \textit{like} or \textit{as}

• Explaining the thinking and reasoning behind their similes

Extra Support

• Providing one element of a simile; asking students to provide the other and explain how the two are alike—for example, real numbers are like \underline{___________} because \underline{___________}

Extension

• Asking students to create similes using abstract concepts or ideas
Similes

Name: ___________________________________________ Date: __________________
Class: ___________________________________________

Simile Stems

Complete each simile with a word or phrase and explain your reasoning for each section.

He shuffled down the street like ____________________________.
Explanation: ____________________________

The ballerina was given the part because she danced like _____________.
Explanation: ____________________________

Everyone told Jim that he had a great attitude. You could say he was cheerful as _____________.
Explanation: ____________________________

The sound of the wind in the trees was as loud as _____________.
Explanation: ____________________________

Write Your Own Similes

Remember, similes compare two objects using the words like or as. Write similes that give the reader a clear picture of the subject or show how the two objects being compared are related.

1. ____________________________

2. ____________________________

3. ____________________________
Metaphors

Students state comparisons using metaphors. In a metaphor, comparisons are stated as direct relationships—one thing is another—for example, life is a journey. Metaphors are sometimes abstract and can be extended to include more than one comparison. Students should explain why their metaphors are appropriate. When deepening students’ knowledge of a subject, the teacher can instruct students to create metaphors that relate the new content to something they understand well. For example, when discussing the Silk Road and the Mongol Empire, students could state that “the Silk Road was a bridge between Eastern and Western cultures.”

Teacher Actions

• Asking students to state comparisons as direct relationships
• Asking students to extend their metaphors to include multiple comparisons
• Asking students to explain their metaphors

Desired Student Responses

• Stating comparisons as direct relationships
• Creating metaphors that express multiple comparisons
• Explaining the thinking and reasoning behind their metaphors

Extra Support

• Providing one element of a metaphor; asking students to provide the other and explain the connection between the two—for example, the British Empire was a(n) ________________ because ________________

Extension

• Asking students to create metaphors using abstract concepts or ideas
Metaphors

Name: ________________________________ Date: _________________
Class: __________________________________________

Metaphor Stems

Complete each metaphor with a word or phrase and explain your reasoning for each section.

At sunrise, the streets are _________________________________.
Explanation: ____________________________________________

The coach’s temper was a _________________________________.
Explanation: ____________________________________________

The ________________________________ of time moves faster than we think.
Explanation: ____________________________________________

The people who make us happy are _________________________________.
Explanation: ____________________________________________

Write Your Own Metaphors

Metaphors compare two unlike objects to give the reader a clearer picture of the author’s meaning. Metaphors like “life is a journey” use “to be” verbs, such as “is,” “was,” and “were,” to make a comparison.” Write unique metaphors using these verbs.

1. ________________________________
   ______________________________________

2. ________________________________
   ______________________________________

3. ________________________________
   ______________________________________
Sentence Stem Analogies

Students use sentence stems to create comparisons that describe specific relationships between two items or concepts. Analogies always take this form: “Item 1 is to item 2 as item 3 is to item 4.” For example, when presented with the stem: “Quarterback is to __________ as pitcher is to __________,” a student might create the following analogy:

Quarterback is to receiver as pitcher is to catcher, because the quarterback throws the ball to the receiver, and the pitcher throws the ball to the catcher.

The student might extend this analogy to further analyze the relationship between football and baseball:

An interception is to football as a hit is to baseball, because in both cases, the ball’s course is altered before it reaches its intended target.

The teacher might also present students with the first two terms of an analogy and ask them to fill in the second two terms, for example: “A coach is to an athlete as __________ is to __________.”

Teacher Actions
• Asking students to complete sentence stems such as: Item 1 is to __________ as item 2 is to __________
• Asking students to complete sentence stems such as: Item 1 is to item 2 as __________
is to __________

Desired Student Responses
• Completing sentence stems that compare relationships
• Explaining the thinking and reasoning behind their sentence stem analogies

Extra Support
• Creating sentence stem analogies that only require students to fill in one term

Extension
• Asking students to create sentence stem analogies for abstract concepts or ideas

Technology Tips
• Create a sentence stem analogy, and display it in interactive whiteboard or presentation software. Then ask students to complete the sentence stem analogy using clickers with text input or mobile devices with polling software.
Sentence Stem Analogies

Fill in the missing blanks for each analogy and explain your reasoning for each selection.

Chapter is to book as scene is to _________________________________.
Explanation: _________________________________.

Apples are to trees as grapes are to _________________________________.
Explanation: _________________________________.

Candy is to sweet as ________________________________ is to _________________________________.
Explanation: _________________________________.

Soldiers are to army as ________________________________ are to _________________________________.
Explanation: _________________________________.

Write Your Own Analogies

1. _________________________________.

2. _________________________________.

3. _________________________________.
Visual Analogies

Students use visual organizers to help them make analogies. The graphic organizer shown below helps students create an analogy and specify the type of relationship being expressed by the analogy.

```
  blue
  as
orange
  as
violet
  as
yellow
```

complementary colors

Teacher Actions
• Helping students express their analogies using a visual organizer
• Helping students label the types of relationships expressed by their analogies

Desired Student Responses
• Expressing analogies visually
• Identifying and labeling the type of relationship expressed by an analogy
• Explaining the thinking and reasoning behind their visual analogies

Extra Support
• Using pictures and words to demonstrate visual analogies

Extension
• Asking students to create alternative ways to express analogies visually

Technology Tips
• Use multimedia software to enhance the application of visual analogies by adding images, sound, and interactivity to visual analogy activities.
• Create an interactive graphic organizer for visual analogies that includes images or sound, and display it in interactive whiteboard or presentation software. Students collaborate in small groups to complete the organizer and submit responses using clickers with text input or mobile devices with polling software.
• Use a random name generator to organize students into pairs to create their own visual analogies using photos taken via smartphone or tablet.
Visual Analogies

Name: ___________________________ Date: ______________

Class: __________________________

Complete the visual analogy by drawing an object in the empty space. Explain what kind of relationship is represented in this analogy and how your image completes the analogy.

![Visual analogy diagram]

Complete the analogy by filling in the empty spaces above and below the right line. Beneath the middle of the diagram, write a word or phrase that describes the relationship between the two objects on both sides of the analogy. Explain your reasoning for your choices in a few sentences.

seed as tree

______________________________
Teachers can use the following reproducibles to monitor their implementation of this element. The reproducible titled Tracking Progress Over Time helps teachers set goals related to their proficiency with this element and track their progress toward these goals over the course of a unit, semester, or year. Tracking Teacher Actions and Tracking Student Responses allow observers in classrooms to monitor specific teacher and student behavior related to this element. Teachers themselves can also use the Tracking Student Responses reproducible to document instances of student behaviors during class. The Strategy Reflection Log provides teachers a space to write down their thoughts and reflect on the implementation process for specific strategies related to this element. Finally, this section provides both a student survey and a teacher survey, the results of which provide feedback about teachers’ proficiency with this element.
Tracking Progress Over Time

Use this worksheet to set a goal for your use of this element, make a plan for increasing your mastery, and chart your progress toward your goal.

Element: ________________________________

Initial Score: ________________________________

Goal Score: __________________ by __________________ (date)

Specific things I am going to do to improve:

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

Score on Element

0 1 2 3 4

a b c d e f g h i j

Date

a. ____________________________  f. ____________________________
b. ____________________________  g. ____________________________
c. ____________________________  h. ____________________________
d. ____________________________  i. ____________________________
e. ____________________________  j. ____________________________
Tracking Teacher Actions

During an observation, the observer can use this form to record the teacher’s usage of strategies related to the element of examining similarities and differences.

Observation Date and Time: _______________ Length of Observation: ______

<table>
<thead>
<tr>
<th>Check Strategies You Intend to Use</th>
<th>Strategies</th>
<th>Description of What Was Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence Stem Comparisons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summarizers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constructed Response Comparisons</td>
<td></td>
<td></td>
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<tr>
<td>Venn Diagrams</td>
<td></td>
<td></td>
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<tr>
<td>T Charts</td>
<td></td>
<td></td>
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<tr>
<td>Double-Bubble Diagrams</td>
<td></td>
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<tr>
<td>Comparison Matrices</td>
<td></td>
<td></td>
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<tr>
<td>Classification Charts</td>
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<td>------------------</td>
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<tr>
<td><strong>Dichotomous Keys</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Sorting, Matching, and Categorizing</strong></td>
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<tr>
<td><strong>Student-Generated Classification Patterns</strong></td>
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<tr>
<td><strong>Similes</strong></td>
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<tr>
<td><strong>Metaphors</strong></td>
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<tr>
<td><strong>Sentence Stem Analogies</strong></td>
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<tr>
<td><strong>Visual Analogies</strong></td>
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<tr>
<td><strong>Other:</strong></td>
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<tr>
<td><strong>Other:</strong></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Tracking Student Responses

A teacher or observer can use this worksheet to record instances of student behavior to inform planning and implementation of strategies associated with examining similarities and differences. Any item followed by an asterisk is an example of undesirable behavior related to the element; the teacher should look for a decrease in the number of instances of these items.

Observation Date and Time: ________________________ Length of Observation: ________

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Number of Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describing similarities and differences</td>
<td></td>
</tr>
<tr>
<td>Using graphic organizers to make comparisons</td>
<td></td>
</tr>
<tr>
<td>Classifying concepts</td>
<td></td>
</tr>
<tr>
<td>Using graphic organizers to classify concepts</td>
<td></td>
</tr>
<tr>
<td>Creating metaphors, similes, or analogies</td>
<td></td>
</tr>
<tr>
<td>Explaining the relationship between two concepts</td>
<td></td>
</tr>
<tr>
<td>Explaining their reasoning behind identified similarities and differences</td>
<td></td>
</tr>
<tr>
<td>Explaining the reasoning behind their classification of objects</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>
Strategy Reflection Log

Use this worksheet to select a strategy, set a goal, and reflect on your use of that strategy.

Element: __________________________________________

Strategy: __________________________________________

Goal: ______________________________________________

Date | How did it go?
--- | ---
| |
| |
| |
| |
| |
| |
Student Survey for Examining Similarities and Differences

1. My teacher asks me to think about how things are like each other and different from one another.

2. My teacher often asks me to compare facts, details, objects, or events.

3. My teacher often asks me to put facts, details, objects, events, or vocabulary terms into groups.

4. My teacher often asks me to create analogies, metaphors, or similes.

5. After comparing or classifying, my teacher asks me to summarize what I learned by doing it.

6. After comparing or classifying, my teacher asks me to explain why I organized things the way I did.
Teacher Survey for Examining Similarities and Differences

1. I engage students in comparison activities.
   
   Often  Sometimes  Rarely  Never  I don’t know

2. I ask students to create analogies.
   
   Often  Sometimes  Rarely  Never  I don’t know

3. I ask students to create similes and metaphors.
   
   Often  Sometimes  Rarely  Never  I don’t know

4. I engage students in classification activities.
   
   Often  Sometimes  Rarely  Never  I don’t know

5. I ask students to explain how things are similar and different.
   
   Often  Sometimes  Rarely  Never  I don’t know

6. After comparison or classification activities, I ask students to summarize what they have learned.
   
   Often  Sometimes  Rarely  Never  I don’t know

7. After comparison or classification activities, I ask students to explain what the activity has added to their understanding.
   
   Often  Sometimes  Rarely  Never  I don’t know