# Using Concrete Examples to Teach Abstract Concepts

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## Why make connections between abstract concepts and concrete situations?

In every content area there are specific concepts that will predictably cause students to struggle: natural selection, ratio and proportion, justice, or literary theme, for example. Making connections between abstract concepts and concrete examples can help students understand difficult concepts, develop problem-solving skills, transfer knowledge to new situations, and increase their motivation to learn.

## Implementing Abstract-Concrete Connections

Becoming an independent, lifelong learner depends, in part, on the ability to transfer knowledge, concepts, and strategies to new situations. Seeing the same ideas in multiple contexts enables students to use the material more flexibly in a variety of circumstances.

Multiple IES practice guides and DWW topics address the following key actions:

1. *Use multiple representations of concepts to explain challenging content and make connections between abstract and concrete representations including: visual representations, graphics with descriptions, manipulatives, and concrete models.*[[1]](#footnote-1)
2. *Anchor new ideas in familiar stories; provide real-world situations or interesting problem scenarios to build on prior knowledge and engage students*.[[2]](#footnote-2)

Connecting abstract and concrete representations, clearly highlighting the similarities and differences between them, helps students master content and develop a wider range of problem-solving strategies. There are many ways teachers can make connections, including using stories, simulations, hands-on activities, visual representations, and authentic problem solving in real contexts.

## Resources on the Doing What Works Media Library

The guide below gives an overview of DWW media and sample materials that demonstrate abstract-concrete connections across subject areas and grade levels. Part 1 lists media that demonstrate how to teach using multiple representations, and Part 2 includes media where teachers incorporate real-world situations or scenarios. Grade-level and/or subject-area teachers can view the media and sample materials as a basis for discussions about incorporating this teaching approach into their daily practice.

1. Use multiple representations: Models, manipulatives, and visual representations

| Activity | Resource | Subject Area |
| --- | --- | --- |
| Manipulatives: Open number line  | In this multimedia presentation, elementary school teachers demonstrate the use of an open number line with two scales for adding and subtracting fractions and explain how it can be used to help students manipulate and convert whole numbers and fractions. Download *Frank's Fresh Farm Produce* to see the problem assignment for this lesson. Topic: National Math Panel: Critical Foundations for AlgebraPractice: Mathematics Preparation for AlgebramultiMedia: [Using a Number Line to Teach Fractions (presentation, 6:01 min)](https://wested.app.box.com/dww/1/553292004)  | Grades 3–6Math |
| **Game: Fraction strips**  | In this video, watch how a third-grade teacher introduces unit fractions through a game that involves “covering up” a unit with fractional parts. Directions for two variations of the game are included in *Fraction Strip Game: Cover Up.* Topic: Developing Effective Fractions Instruction for K-8Practice: Fractions as NumbersmultiMedia: [Making and Using Fraction Strips (video, 5:47 min)](http://dwwlibrary.wested.org/media/making-and-using-fraction-strips) | Grade 3Math  |
| **Real-life example: Measuring cups**  | In this video, a fourth-grade teacher asks students to help solve his problem of measuring 1-1/2 cups without either a 1-cup or a 1/2-cup measuring cup, and instead use many other sized measuring cups. Students write number sentences to describe the results of their measurement exploration. Topic: Developing Effective Fractions Instruction for K-8Practice: Operations With FractionsmultiMedia: [Ways to Measure 1½ Cups (video, 6:02 min)](http://dwwlibrary.wested.org/media/ways-to-measure-1-12-cups) | Grade 4Math  |
| **Hands-on models** | In this multimedia presentation, a fifth-grade teacher describes how she uses models and hands-on activities to help elementary students understand complex earth science concepts. See the related sample material, *Lesson Plan: Cupcake Geology.* Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Cupcake Geology: Using Models to Explain Abstract Concepts (presentation, 5:02 min)](http://dwwlibrary.wested.org/media/cupcake-geology-using-models-to-explain-abstract-c) | Grade 5Science |
| **Model and demonstration**  | Using an aquarium and food coloring, a fifth-grade science teacher re-creates the layers of warm and cool water in a summer lake to help her students visualize the effects of thermal layering in this video. Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Demonstrating Thermal Layering (video, 7:53 min)](http://dwwlibrary.wested.org/media/demonstrating-thermal-layering) | Grade 5Science |
| **Manipulatives: Cups and integer chips**  | In this multimedia presentation, a middle-school special education teacher demonstrates a lesson on solving two-step equations. She shows how to begin with concrete materials and then represents the same concepts on the SMART Board before moving to abstract problem solving. The lesson includes a review of one-step equations and practice using an equation scavenger hunt. Topic: Response to Intervention in Elementary-Middle Math Practice: Intentional TeachingmultiMedia: [Concrete to Abstract Sequence (presentation, 6:40 min)](http://dwwlibrary.wested.org/media/concrete-to-abstract-sequence) | Middle SchoolSpecial EducationMath  |
| **Manipulatives, visual representations, and technology**  | This slideshow, with audio interviews with elementary and middle school teachers, shows different ways to use multiple representations, including manipulatives, visual representations, and technology, to provide numerous learning situations to help students develop a conceptual understanding of and fluency with fractions. Topic: National Math Panel: Critical Foundations for Algebra (note: also in Developing Effective Fractions Instruction for K-8)Practice: Mathematics Preparation for AlgebramultiMedia: [Using Multiple Representations to Teach Fractions (slideshow w/audio)](https://wested.app.box.com/dww/1/553321486/5296327062/1) | Middle SchoolMath |
| **Concrete-Representational-Abstract teaching sequence**  | In this expert interview, Dr. Bradley Witzel provides examples of each stage of the concrete-representational-abstract teaching sequence, with special attention to visual representation. He shows several types of representation, including number lines and strip diagrams. Topic: Response to Intervention in Elementary-Middle MathPractice: Intentional TeachingmultiMedia: [Visual Representations (video, 4:03 min)](http://dwwlibrary.wested.org/media/visual-representations) | Elementary SchoolMiddle School  |
| **Visual metaphors** | In this video, a social studies teacher explains how to help students understand abstract ideas by using visual techniques, including graphic organizers and visual metaphors. Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Making History Come Alive (video, 4:13 min)](http://dwwlibrary.wested.org/media/making-history-come-alive) | Middle SchoolSocial Studies  |
| **Effective graphics and illustrations** | This slideshow shows how combining well-chosen graphs and illustrations with discussions of abstract concepts like processes or systems can help students better understand complex ideas. Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Using Graphics to Support Learning (slideshow)](http://wested.mediacore.tv/api2/media/2470536/files/5223946/content) | All subjects and grade levels |

1. Real-world situations or scenarios

| Activity | Resource | Subject Area |
| --- | --- | --- |
| Simulations, field trips, and exhibits | In this video, elementary school teachers explain how they use learning expeditions to make abstract concepts from textbooks into more memorable and understandable concrete experiences for their elementary students. Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Connecting Classrooms to the World (video, 6:13 min)](http://dwwlibrary.wested.org/media/connecting-classrooms-to-the-world) | Elementary SchoolSocial StudiesScience |
| **Problem-based learning** | This slideshow describes how a middle school math teacher uses a hovercraft activity to embed instruction of important concepts in a motivating problem-solving scenario. Topic: How to Organize Your TeachingPractice: Abstract-Concrete ConnectionsmultiMedia: [Designing Hovercrafts: Anchoring Instruction in Real-Life Problems (slideshow)](https://wested.app.box.com/dww/1/447589681/3659910565/1) | Middle SchoolMath |
| **Hands-on experiments** | This video shows a physics lab lesson about conservation of momentum. This lab connects this law to car accidents and provides practice opportunities with different types of collisions. See the related sample material*, Lab Lesson Plan: Conservation of Momentum.*Topic: Encouraging Girls in Math and SciencePractice: Sparking CuriositymultiMedia: [Science in Motion (video, 6:10 min)](http://dwwlibrary.wested.org/media/science-in-motion) | High SchoolPhysics |

1. DWW topics: How to Organize Your Teaching, Response to Intervention in Elementary-Middle Math, National Math Panel: Critical Foundations for Algebra, Developing Effective Fractions Instruction for K-8 [↑](#footnote-ref-1)
2. DWW topics: How to Organize Your Teaching, Encouraging Girls in Math and Science, Developing Effective Fractions Instruction for K-8 [↑](#footnote-ref-2)