How to Use Examples Effectively: 
Inductive vs. Deductive Approaches

You have prepared several good, concrete examples that you think will really help students understand the concepts you are trying to teach. Now, how are you going to use these examples in class so they are maximally effective?

- Should you go over the general concept first, then show examples to illustrate what you just talked about?
- Or would it be more effective to go over the examples first, then guide students toward the general concept or principle?
- Do you make sure they understand the components before moving on to the big picture, or do you start with the big picture and then go over the specific components?

It’s important to think about HOW and WHEN you are going to present examples. This handout offers some research-based suggestions about how to use your examples more effectively.

**Deductive vs. Inductive Approaches – A Concrete Example:**

With an **inductive approach**, you show your students a series of examples and non-examples, then guide them toward noticing a pattern and coming up with the generalization or concept rule.

For example: If I want to teach you what a “Bem” is, I might show you a series of slides like these:

- This is a bem
- This is not a bem
- This is a bem
- This is a bem
- This is not a bem
- This is not a bem
- This is not a bem
- What is a “bem”? *

If you use a **deductive approach**, you tell your students the rule, then give them examples and ask them when it applies and when it doesn’t.

For example: If I want to teach you what a “Flib” is, I would tell you “A ‘flib’ is a shape with at least one curved side, and no breaks. Look at the following shapes and identify which are flibs.”

- Is this a Flib?
- Is this a Flib?
- Is this a Flib?

*In the first example, the nonsense figure, “bem” is a right triangle with a piece missing from one side. For the second example, responses should be “yes, no, no.”*
How might this apply to what you teach? Some possible scenarios:

**Math, Sciences, Engineering, Economics:**
- You have a formula or model involving several different components
- You want students to learn how to apply the formula or model in a variety of situations
  - Deductive: Present the formula in symbolic notation, then gradually show how the component variables figure in using the formula.
  - Inductive: Present the underlying concepts, then gradually put the parts together into a formula.

In one controlled study, (Mayer & Greeno, 1972), college students were taught the concept of binomial probability. Some students were taught using the inductive method described above, while others were taught using the deductive method. Both groups received the same basic information and same computational examples -- only the sequence varied. Both groups were then given a test that contained four types of problems: 1) ones that were just like those given in the examples; 2) ones that were slightly modified from the example problems; 3) ones that were unanswerable; 4) ones that asked questions about how and when to use the formula. Results of the study indicated that while the deductive group did better on problems that were just like the examples, students in the inductive group did better on the other three types of questions. They were able to apply their knowledge to new situations.

**Humanities, Social Sciences, Music:**
To use an example from music (though it could also apply for art, writings, architecture, illustrations, etc.):
- You have several examples of short pieces of music that illustrate different genres or styles, etc.
- You want students to know the characteristics of each style, and to be able to recognize them.
  - Inductive: Tell students you are going to play a series of music samples and you want them to listen to see if they can figure out what characterizes the style/genre. Play the pieces and after each one, say, “This IS an example of X”, or “This ISN’T an example of X” Ask if they need to hear the examples again. Then ask: “So, what characterizes this type of music?” or “What’s the main difference between X kind of music and Y kind of music?”
  - Deductive: Discuss what characterizes Music X. Or discuss the differences between Music X and Music Y. Then play each piece and ask students to identify if it falls into the X or the Y category.

**Caveats:**
- Students need some guidance. Pure discovery (just showing the examples and hoping that students will figure out the concept or strategy on their own) does not work. They may need specific hints about what to focus on, etc.
- When you complete the exercise, be sure to summarize the main points.
What method works best depends on your goals. According to research:

Deductive methods (telling the principle, then having them apply it) seem to work best if you want students to be able to quickly and accurately solve problems like those worked out in class or in the book.

Inductive methods (giving students examples, then guiding them toward developing the rule) often take more time, but usually work best if you want students:

• to learn how to figure out the main themes or key principles on their own.
• to be able to apply these concepts to solve problems they haven’t seen before.
• to know when and how to use the formula.
• to be curious about the material; to ask critical questions.
• to understand the structure underlying a problem so they can recognize, for example, when a problem is unanswerable.