

Design Tactics for Using Examples:

A Reader Participation Article

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Analysis, design, development, implementation, and evaluation are generally accepted as the major phases of successful training programs. Strategies for completing each of these phases have been the topic of many a *Performance & Instruction* article and NSPI conference presentation. For example, some attention has been given to the "rule-example-practice" design strategy. However, significantly less attention has been given to tactics for completing each component of this strategy. This article will discuss various tactics that can be used to complete the "example" component of the "rule-example-practice" design strategy.

The "rule-example-practice" design strategy has long been recognized as an appropriate and effective means of designing instruction (Englemann & Carnine, 1981; Tiemann & Markle, 1978; Merrill & Tennyson, 1977). This strategy involves presenting a rule about the concept, examples that illustrate the concept, and practice in concept

application. Both the "rule" and "practice" components benefit from a careful analysis and selection of examples. For this reason, we have focused this article on the "example" portion of the design strategy. We will review various tactics for using, selecting, and sequencing examples and non-examples when teaching concepts. Let's quickly review some of the literature that examines the issues relevant to examples and non-examples.

One basic issue that has been investigated is the benefits of using multiple examples as well as non-examples to increase instructional effectiveness. A number of researchers have found that designs which include multiple examples and non-examples result in quicker knowledge acquisition and less confusion on the part of the learner (Englemann, 1969; Markle, 1969; Tennyson, 1973; Williams & Carnine, 1981). Reduced potential for learner confusion is necessary in order to best approximate an errorless learning paradigm (Terrace, 1966).

Once it has been determined that examples and non-examples will be included in the presentation, the instructional designer needs to select those that allow demon-

stration of the range and boundaries of the concept, in addition to the relevant or defining characteristics (Carnine, 1980; Englemann & Carnine, 1981; Markle, 1978; Tennyson, Woolley, & Merrill, 1972; Tiemann & Markle, 1978).

The instructional designer next identifies the order in which the examples and non-examples will be sequenced. The sequence that an instructional designer uses to present examples and non-examples will add to the effectiveness and efficiency of a training program. This sequence should begin with example/non-example pairs which are easily discriminated. Over the course of the program, the discriminations should gradually increase in difficulty so that example/non-example pairs become minimally different (Granzin & Carnine, 1977; Markle, 1978; Merrill & Tennyson, 1977; Tennyson, Woolley, & Merrill, 1972; Tiemann & Markle, 1978).

From the review and analysis of the literature discussed, we have identified a set of four tactics regarding the selection and sequencing of examples and non-examples. These tactics should help you make your training designs more effective and efficient. These tactics are:

1. Use multiple examples
2. Use non-examples
3. Select examples and non-examples carefully
4. Sequence examples and non-examples carefully

Although each tactic, independent of the others, will help increase the effectiveness of instructional presentations, all tactics must be utilized to establish the basis of a true errorless learning paradigm. In other words, a learner will progress through your presentations free from frustration and errors if your example and non-example sequences follow the stated tactics.

The remainder of this article will discuss each tactic in more detail, and illustrate why each is critical to the success of the "example" portion of the "rule-example-practice" design strategy. Since we have always felt that a good demonstration is better than a dull discussion for convincing people of the validity of a theoretical point, we've developed a scenario to demonstrate each of our four tactics.

Scenario Introduction

Much of the literature on this subject makes use of nonsense concepts or nonsense words as demonstration aids. In keeping with this tradition, we have developed a bit of nonsense ourselves.

Our story begins with the discovery of intelligent life on the planet Uranus. As part of a cultural exchange program, we have been enlisted to teach a Uranian some earthly instructional design tactics. In exchange, a Uranian, "Errlot," will teach us the meaning of the Uranian concept, "bungor." Unfortunately, we can't speak any Uranian, and Errlot can't speak any English. Therefore, Errlot will not be able to make use of the "rule" part of the rule-example-practice design strategy. This places extreme importance on the "example" portion of the strategy. An additional hindrance is Errlot's lack of sound

instructional design tactics. Let's take a look at Errlot's first attempt to teach "bungor", given these constraints.

Presentation 1: "What is Bungor?"

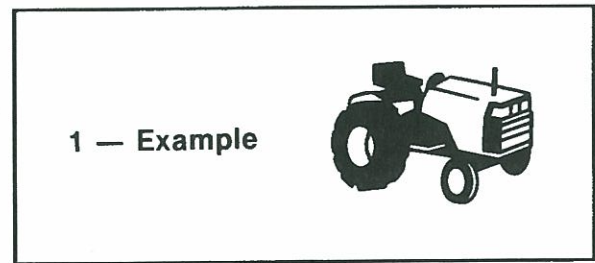
Errlot presented us with this single example (see Figure 1).

Oh, yes, remember the word "participation" from the title? Well now is your opportunity! If you think you know what the concept is, write your answer here:

Tactic 1: Use Multiple Examples

Regardless of the concept you are trying to teach, it is impossible to be sure of accurate concept learning if you present only one example. In fact, we're confident that most of you have not yet correctly identified "bungor." Nearly any concept you can think of will have dozens, maybe hundreds, of relevant characteristics which contribute to the definition of the concept. This fact makes it unlikely that any single example will contain all relevant or defining characteristics. In addition, many irrelevant characteristics will be embedded in your example. Therefore, by using only one example, the designer has (perhaps unknowingly) made two assumptions. Primarily, the designer has assumed that the learner will "automatically" recognize those

Figure 1.
"What is Bungor?": Presentation 1



features of the example that are defining characteristics of the concept. Secondly, the designer assumes that the learner will not mistake any of the irrelevant features of the example as defining characteristics of the concept. By using multiple examples you will begin to improve the accuracy of concept learning by showing the "range" of the concept. A graphic may help illustrate this point.

Many concepts can be graphically represented as a portion of a continuum or spectrum of similar concepts. For example, the color red can be depicted as the portion of the color spectrum between orange and violet. Figure 2 shows the concept "red" represented on the color spectrum. The thick vertical lines represent the boundaries of the concept "red" with the concept "orange" on one end and the concept "violet" on the other.

The concept "bungor" can also be depicted on a continuum such as that represented in Figure 3.

The concept of "bungor" is depicted twice in the graphic above. Presentation A shows the location of a single example (E) within the

Figure 2.
The Concept of Color

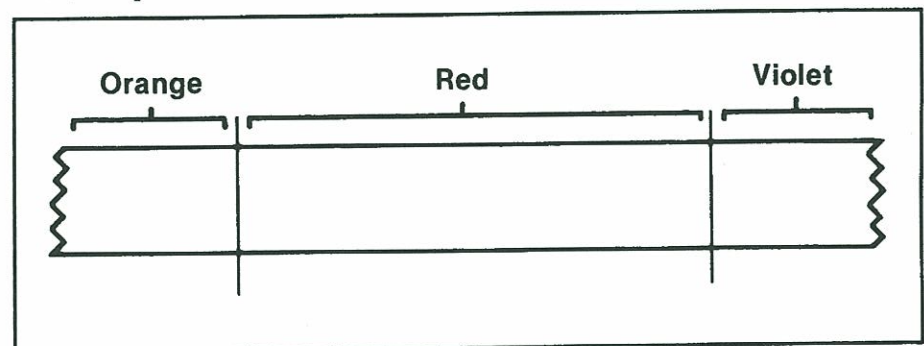
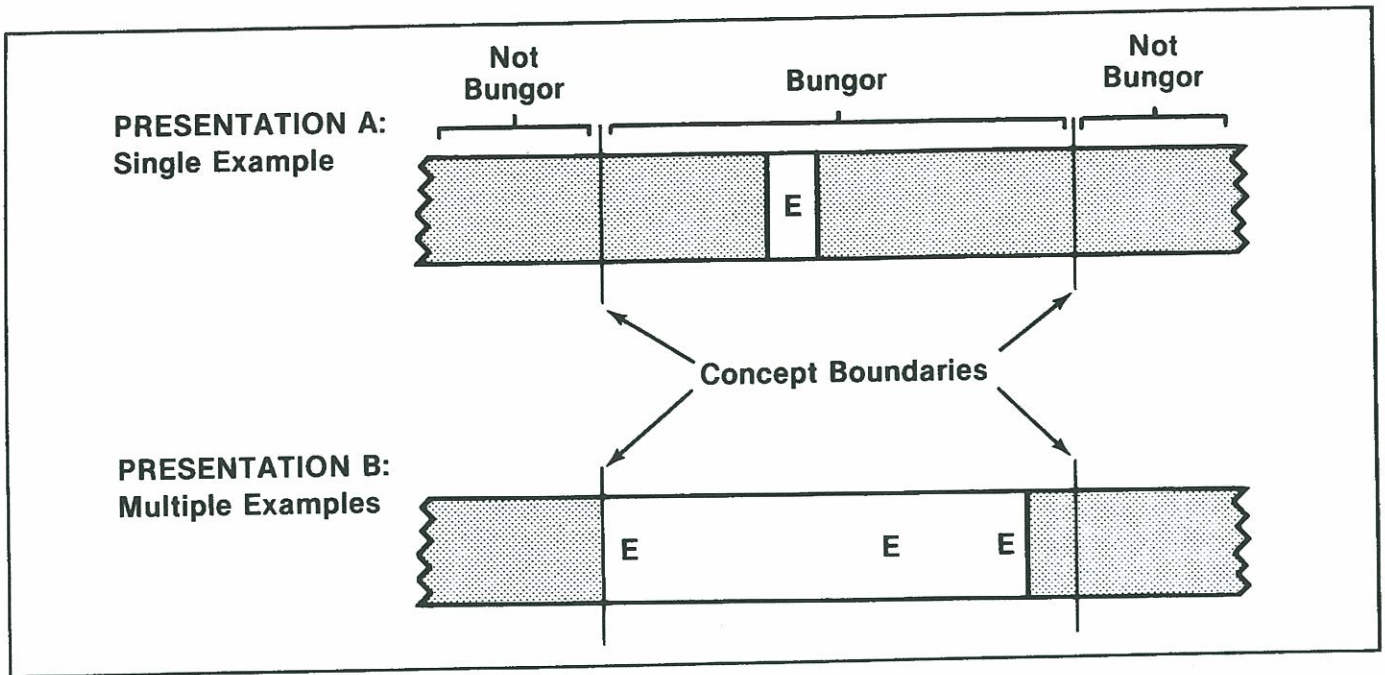


Figure 3.
"The Concept of Bungor": Presentation A & B



concept "bungor." Presentation B shows the locations of three examples from an instructional presentation using multiple examples. The shaded areas on each continuum represent the potential for a naive learner not to recognize the concept "bungor" after being exposed to that type of instructional presentation. The shaded areas inside the boundaries indicate the potential for a learner to fail to identify all relevant characteristics. The shaded areas outside the boundaries depict the potential to mistake irrelevant characteristics as defining features of the concept.

The continuum for presentation A shows the shaded areas beginning immediately to either side of the single example. Presentation B results in a reduction of the shaded area by including examples both to the left and right of the original single example. Learners can logically assume that any future example that lies between any two examples in presentation B would also be "bungor" rather than "not bungor." Therefore, as the size of the shaded areas decreases from presentation A to presentation B, the potential for learner confusion about the location of the concept's boundaries also decreases.

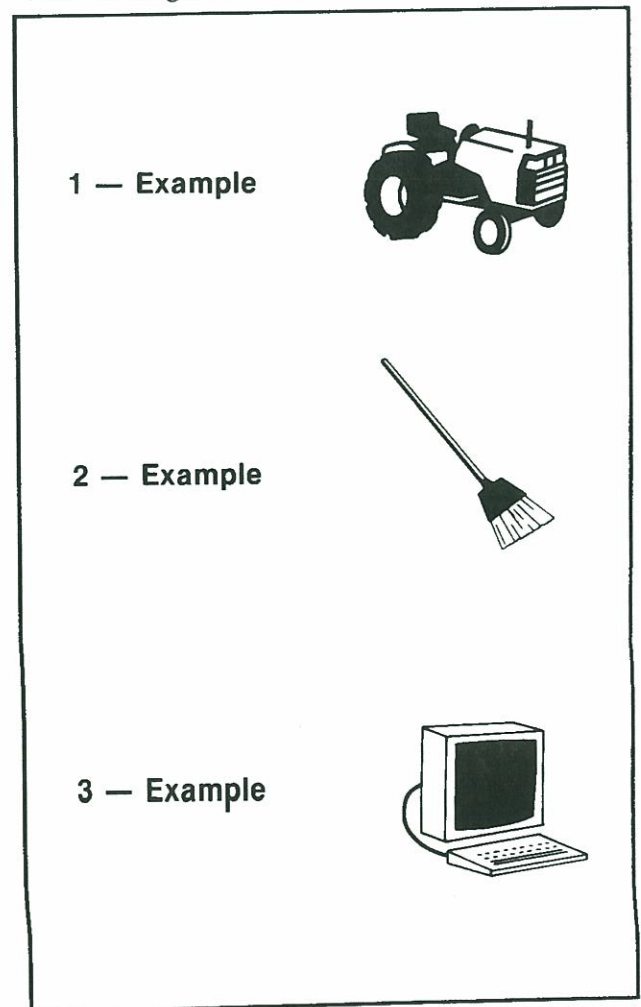
Now, remember our friend, Errlot? He has taken Tactic 1 to heart, and is ready to present another instructional sequence.

Presentation 2: "What is Bungor?"

After learning the tactic regarding multiple examples, Errlot presented us with this sequence of examples (see Figure 4).

Again, if you believe you know what the concept is, enter your answer here:

Figure 4.
"What Is Bungor?": Presentation 2



Tactic 2: Use Non-examples

Using multiple examples is an improvement over the presentation of a single example. However, after the presentation of multiple (three) examples above, most of you still may not know what "bungor" means. By presenting non-examples, you can reduce the potential for a learner to mistake an irrelevant characteristic as a defining feature. We have provided a graphic representation of this in Figure 5.

Presentation B shows the same multiple examples presentation shown earlier for Tactic 1. Presentation C depicts an instructional sequence that includes non-examples (N) as well as examples (E). The size of the shaded areas in presentation C have been reduced from those in presentation B. This has been accomplished by using the innermost non-examples to create outside limits to the potential concept boundary locations. This reduces the potential for a learner to

erroneously label a non-example as an example of "bungor."

Based on this new information, Errlot is ready to take another stab at teaching us the meaning of "bungor."

Presentation 3: "What is Bungor?"

Errlot subsequently designed this instructional sequence (see Figure 6).

Errlot is becoming quite the instructional designer. However, he's not yet ready to join NSPI. He has incorporated Tactics 1 and 2, but his instructional sequence to teach "bungor" is not very efficient.

If you were able to muddle your way through those examples, and you think you know what the concept is, enter your answer here:

(By the way, many of you may have guessed what the concept is. We think that's great. Just goes to show you that people can learn, even with less than perfect instruction.)

Tactic 3: Select Examples and Non-examples Carefully

An instructional presentation that includes both examples and non-examples, like the one given in Figure 6, is well on the way to being effective, sound instruction. However, this presentation included examples and non-examples that were haphazardly selected, and this may have confused you. If examples and non-examples are carefully selected so that they are the least different from each other, then the maximum number of irrelevant characteristics can be ruled out. In general, when selecting examples and non-examples, attend to the most critical features of the concept such as shape, spacial orientation, or voice intonation. This will allow you to identify examples and non-examples that are minimally

Figure 5.
"The Concept of Bungor": Presentation B&C

