Understanding Validity for Teachers Activity: What is Content-Related Validity?

This activity will help you answer the essential question:

- **What is Content-Related Validity?**

Activity 2: What is Content-Related Validity?
You may complete this activity individually or in groups.

Part 1

Read the following excerpt adapted from *How to Write Better Tests: A Handbook for Improving Test Construction Skills* by Lucy C. Jacobs, Ph.D. Answer the following questions:

1. Why is content validity the type of validity most important to classroom teachers?
2. How can Bloom's Cognitive Levels help address content validity in classroom assessments?

PLANNING THE TEST (Lucy C. Jacobs)

Coordinating test content with instruction content ensures content validity of the test. Using a table of specifications also helps an instructor avoid one of the most common mistakes in classroom tests, namely writing all the items at the knowledge level.

A taxonomy of teaching objectives (Bloom, 1956) lists several cognitive outcomes typically sought in college instruction. These outcomes are listed hierarchically in Table1 and include Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. If these are desired outcomes of instruction, then classroom tests must include assessment of these objectives.

Table 1. Examples of Bloom's Cognitive Levels

Bloom's Cognitive Level	**Student Activity**	**Words to Use in Item Stems**
Knowledge	Remembering facts, terms, concepts, definitions, principles	Define, list, state, identify, label, name, who? when? where? what?
Understanding (Comprehension)	Explaining/interpreting the meaning of material	Explain, predict, interpret, infer, summarize, convert, translate, give example, account for, paraphrase
Application	Using a concept or principle to solve a problem	Apply, solve, show, make use of, modify, demonstrate, compute
Analysis	Breaking material down into its component parts to see inter relationships/hierarchy of ideas	Differentiate, compare/contrast, distinguish ____ from ____, now does ____, relate ____?, why does ___ work?
Synthesis	Producing something new or original from component parts	Design, construct, develop, formulate, imagine, create, change, write a poem or short story

Evaluation	Making a judgment based on a pre-established set of criteria	Appraise, evaluate, justify, judge, critique, recommend, which would be better?

The easiest way to ensure a representative sample of content and cognitive objectives on the test is to prepare a table of specifications. This table is simply a two-way chart listing the content topics on one dimension and the cognitive skills on the other. We want to include content and skills in the same proportion as they were stressed during instruction. Table 2 shows a simple table of specifications; it is intended to be illustrative, not comprehensive.

Table 2. Table of Specifications for a Chemistry Unit Test on Oxygen

Content (%)	**Knowledge**	**Comprehension**	**Application**	**Total (%)**
Physical Properties	8	6	6	20
Chemical Properties	12	9	9	30
Preparation	4	3	3	10
Uses	16	12	12	40
Total	40	30	30	100

This table indicates the content topics, the objectives to be covered and the proportion of the test that will be devoted to each. Evidently, more class time was spent on the uses of oxygen because 40% of the test questions deal with uses compared with only 10% on preparation. The column totals indicate that 40% of the items will be written at the knowledge level with the remaining divided equally between comprehension and application. Using the percentages assigned to each cell, one writes the appropriate number of items. For example, because 20% of the test is to cover physical properties and 30% is to be application, then 6% of the total test would measure the ability to apply knowledge about oxygen's physical properties to new situations.

Part 2

1. Review the following *Table of Specifications* designed for a Unit Test for a 3rd Grade Language Arts lesson and answer the following questions:

    a. What level of Bloom's Taxonomy is described in the Standard?
    b. How does the lesson, *Sink It* help students attain this level?
    c. How does the *Table of Specifications* illustrate that the assessment is assessing what is required of students by the Standard?

3rd Grade Science Standard:
Physical Science: The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties.

- The student describes and classifies objects by more than one property

Lesson *Sink It* available from Thinkfinity (AAAS)
Purpose
To develop students' understanding of sinking and floating. These experiments can serve as a precursor

to further exploration of density of solids and liquids. The experiments are also designed to encourage student skills in experimental design, testing simple hypotheses, and grouping objects by common characteristics.

Context

This activity provides an opportunity for students in Grades 3-5 to develop experimental design skills in the context of a familiar event (floating and sinking) while furthering their understanding of the concepts of density and buoyancy.

Development

This activity uses a phenomenon that is already familiar to most students to help them think about how and why some items float and others sink, and to help them gain skills in gathering data in systematic ways, using a consistent experimental method. These skills can be applied for other inquiry-based activities, as well.

Do not provide definitions and explanations for terms such as "buoyancy" and "density" before the hands-on activity. Rather, allow students to explore the phenomenon first; then these terms become tools to help explain what they have already observed.

Begin by discussing the different ways that students separated their pile of materials into two groups in the introductory activity. Point out that different objects can be described by a number of characteristics, including the type of material from which they are made, their size, their shape, their color, and their weight. Some objects can be characterized by their purpose; for example, buttons and paper clips are both designed to hold things together.

Follow this by discussing another characteristic that students may not have considered - whether the objects will float or sink in water. As a group, generate a list of descriptive words for objects that float and one for objects that sink. Using the list allow the class to predict whether several demonstration objects (apple, potato, paper clip or penny, and wood piece) will float or sink.

Students may have said that objects that are "heavy" will sink while those that are "light" will float. A pan balance can be used to compare, for example, a paper clip and an apple. Students may predict that, because the apple is heavier, it should sink. Demonstrate that the apple floats and the paperclip sinks. You can show several discrepant events of this type to both generate student interest and point out that there is something more to floating and sinking than just weight. Tell students that you will be exploring this idea further in this activity.

Students should continue to work in their original groups of 2-3. Each group should re-sort their pile of objects based on their predictions about whether each object will float or sink.

Distribute the data table Sink It. Students should prepare the data table by writing the name of each object on the table in the first column, with their prediction about whether the object will float or sink in the second column.

Then, using the 3" x 5" cards, they should write a procedure for testing each object, writing one step on each card. If preferred, students can use diagrams. Each card should be numbered in order of the steps. Steps should include the recording of data and preparation of the testing tank (bucket) for the next

experiment. Students should do a "dry" run, following the steps exactly as they are written, then modify their procedure, if needed.

When the students have a procedure developed, review the steps and make suggestions for steps that have been omitted or need to be edited. The object is to guide students to develop a fairly detailed procedure for this experiment. This will help build skills for future, multi-step controlled experiments.

Guiding questions could include:
How full will your bucket be for each object tested? Do you need a certain amount of water to be able to fairly test whether something floats? Should it be the same amount of water for each item?
How will you place the object in the bucket? Will you drop it in? If so, from what height? Will you place it halfway down into the water and then let it go? Will you place it on the bottom of the bucket and then let it go? Will you put the object in the bucket and then add water?
How will you define floating? Is anything off of the bottom floating? Does the item have to rise all the way to the top of the water?

Once their procedure has been approved, students should put the cards in order, run the string through the holes, and tie it loosely. Students can begin their data collection, testing one item at a time, using the steps written on the flip-stack of cards. The cards should guide the procedure. For purposes of cooperative grouping, one student can serve as the card reader, a second as the equipment handler, and a third as the recorder.

After the initial data has been collected, students in the group should confer to decide whether any items should be re-tested. Some items may seem to float, then sink as they become wet. Others may have densities similar to water and may float in the middle of the bucket rather than on top of the water. Students should retest these items and should add written comments about them on the data table in the "Notes" column.

Students should analyze their data by which of their predictions (hypotheses) were confirmed and which were proven incorrect. They may or may not be able to draw conclusions about why objects did and did not float.

Blooms Taxonomy	Assessment Items	% of Weight
Remembering		
Understanding (Comprehension)	Students present their findings to the class as a poster or an oral presentation. They should include reading their step-by-step procedure, show the items that did and did not float, and tell what conclusions they drew about what types of items do and do not float in water.	**50**
Applying	Where there are differences in their findings, students answer: Why this could be? How could they explore this further? Did the difference have to do with different procedures?	**25**
Analyzing	Refer back to the words the students originally used to describe items that float or sink. Ask the students to look for commonalities among the items that float and those that sink. Which descriptive words would they change? Are there words they would add?	**25**

Evaluating		
Creating		
Total		**100**

Part 3

Use the following template to create your own *Table of Specifications* for an assessment you will use in your own classroom. You may want to review the information provided on the Website *Understanding and Using Bloom's Taxonomy to Improve Instructional Practice*, http://farr-integratingit.net/Theory/CriticalThinking/index.htm. (Farr)

Standard:		
Lesson:		
Blooms Taxonomy	**Assessment Items**	**% of Weight**
Remembering		
Understanding		
Applying		
Analyzing		

Evaluating		
Creating		
Total		