Interactive Activities

Constructing Effective Assignments, Problem Sets, and Exam Questions
Best Practices for Teaching and Learning

Let's have a discussion on the pre-session readings that you completed prior to viewing this session. The pre-session readings were-- first, chapter 10 on creating an effective assignment, from a book called, Assessing Student Learning-- a Common Sense Guide, by Linda Suskie; and second, an article titled, "Ersatz Learning, Inauthentic Testing," by John McClymer and Lucy Knoles. What were your reactions to the readings? Do you have any questions or comments about the readings?

Do you have any experience with a course that did not have meaningful assessments? How can we develop more meaningful problems or authentic testing situations to prepare our students? Pause the video here while you first, post your responses on the online course discussion forums; and second, respond to your peers' reactions and questions.

Now we will go through an example of developing questions that address each level of Bloom's Taxonomy. Let's say that I am teaching elementary school children the math concept of addition. During this exercise, we will create one problem for each cognitive level of Bloom's Taxonomy. And by the end, we will have developed six new questions.

Let's start with the remember level of Bloom's Taxonomy. What question would you write for the remember level of Bloom's Taxonomy? Pause the video now while you think of a question.

The question that we came up with is: "Match the following simple addition problems with their correct solutions." Now, what question would you write for the understand level of Bloom's Taxonomy? Pause the video now while you think of a question.

Our understand level question is: "Explain the concept of addition in a sentence using an example that uses fruit." What question would you write for the apply level of Bloom's Taxonomy? Pause the video now while you think of a question.

Our example apply level question is: "Using your knowledge of addition, solve the following problem." And the instructor would need to provide the problem. Now, what question would you write for the analyze level of Bloom's Taxonomy? Pause the video now while you think of a question. .

An example analyze level question is: "What would happen to the solution of the following problem if one of the numbers becomes equal to 0? Explain." Now what question would you write for the evaluate level of Bloom's Taxonomy? Pause the video now while you think of a question.

Our example evaluate question is: "Find the mistakes in the following problem. Justify your answer." And the instructor would need to provide the actual problem in this case. Now what question would you write for the create level of Bloom's Taxonomy? Pause the video now while you think of a question.

Our example create level question is: "Develop your own addition problem using odd numbers. Be sure to provide the solution to your problem." I hope that this exercise of creating example questions that address each cognitive level of Bloom's Taxonomy has been helpful to you. This exercise illustrates how well designed questions can help you determine whether students have attained the specific cognitive level of each of your learning objectives.

Now you will have the opportunity to evaluate the cognitive level of a problem, and then develop new problems that are at higher and lower cognitive levels of Bloom's Taxonomy. In this pair-share activity, work with one other person from a similar discipline. First, select one problem from the handout of sample problems. Identify the problem's core concept, and determine the current cognitive level of Bloom's Taxonomy that characterizes the problem.

Then, work together to develop two new questions that address the same underlying concept. One of your new questions should address a lower cognitive level and the other question should address a higher cognitive level of Bloom's Taxonomy. If the problem that you selected is already at the highest or lowest cognitive level of Bloom's Taxonomy, then create two new problems that are at different cognitive levels. If you have the opportunity, we recommend that you share your findings and one of your problems with a larger group through the online forums. Pause the video now while you complete this activity.

Now that you have had a chance to review the example questions on the handout, and move one of the problems up and down Bloom's Taxonomy, let's go through one of the examples together. For this exercise, I have chosen question two. This question reads: "A motorcycle police officer starts from rest at point A 2 seconds after a car, speeding at the constant rate of 120 kilometers per hour, passes point A. If the officer accelerates at the rate of 6 meters per second squared until he reaches his maximum permissible speed of 150 kilometers per hour, which he maintains, calculate the distance x from point A to the point where he overtakes the car."

The main concepts of this question are velocity and acceleration, and the current cognitive level of this question is apply. This question is an apply level question because it is asking the student to plug the numbers provided in the question into an equation to solve for distance. I think it is important to point out that even though this question is a level three question, it is simply requiring students to plug numbers into an equation and solve it, which is not very cognitively demanding. This fact is important to keep in mind as you develop questions for your own course.

Now I'll go through a example questions, moving down and up Bloom's Taxonomy. I'll provide two example questions that are at a lower cognitive level and two that are at a higher cognitive level. I am going to first provide examples of the lower cognitive level questions. An example remember question is: "Define velocity in a sentence using words, and not equations." An example understand question is: "Explain a real world situation in which an object has changing velocity."

Now I'll provide two example questions of higher cognitive level questions. An example evaluate question is: "What happens if, in the provided question, constant acceleration does not apply?" An example create question is: "Create a problem in which students will have to make an assumption about constant acceleration."

Now that you have worked with one other person to evaluate the cognitive level of problems, and moved the problem up and down Bloom's Taxonomy, you will have the opportunity to do the same activity with a problem that is directly related to a course that you teach, or would like to teach. First, select one problem from your textbook. Identify the concept that the problem is addressing, and determine the current cognitive level of Bloom's Taxonomy of the problem.

Then, write two new questions that address the same underlying concept. One of the problems should address a higher cognitive level and the other problem should addresses a lower cognitive level. If the problem that you selected is already at the highest or lowest cognitive level of Bloom's Taxonomy, then create two new problems that are at different cognitive levels.

After you have developed two new problems, share your work with one other person, and work together to refine your questions. If you have the opportunity, we recommend that you share your work with a larger group. Pause now while you complete this activity.

In this session on the construction of effective assessment questions, we first discussed the logistics of incorporating assessments in your course, and the development of effective questions that incorporate real world, authentic situations to engage your students in the learning process. At the end of the session, you had the opportunity to evaluate the cognitive level of example problems using Bloom's Taxonomy, and develop your own problems to determine whether your students have attained your course learning objectives. Any questions or comments? Take a moment to write any lingering questions or comments that you may have on the discussion forum now.

The post-session assignment for this session is to use Bloom's Taxonomy to develop a set of questions or problems that address the students' cognitive development at each level of Bloom's Taxonomy for one of the concepts for which you created a learning objective previously. At the end of this assignment, you will have developed six new questions, one for each level of Bloom's Taxonomy. On your assignment, be sure to include the concept that you are teaching, and the appropriate learning objective or learning objectives that you wrote previously. Please see the instructions on the course website for information regarding the submission of your assignment. Immediately following your viewing of this session, please follow the link to the online survey for the mud card.