Postdoc Academic Chat #4

Designing Your First New Course

Tuesday, January 19, 2016

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1. How to Prepare New Courses While Keeping Your Sanity

The posting below gives some excellent tips on what to do, and not do, when preparing to teach a course for the first time. It is by Richard M. Felder, North Carolina State University, and Rebecca Brent, Education Designs, Inc. It is from Chem. Engr. Education, 41(2), 121?122 (Spring 2007). Reprinted with permission.

Think of a two-word phrase for a huge time sink that can effectively keep faculty members from doing the things they want to do.

You can probably come up with several phrases that fit. "Proposal deadline" is an obvious one, as are "curriculum revision," "safety inspection," "accreditation visit," and "No Parking." (The last one is on the sign posted by the one open space you find on campus minutes before you're supposed to teach a class, with the small print that says "Reserved for the Deputy Associate Vice Provost for Dry Erase Marker Procurement.")

But the phrase we have in mind is "new prep"-preparing for and teaching a course you've never taught before. This column describes the usual approach, which makes this challenging task almost completely unmanageable, and then proposes a better alternative.

Three steps to disaster, or, how not to approach a new course preparation

1. Go it alone. Colleagues may have taught the course in the past and done it very well, but it would be embarrassing to ask them if you can use their materials (syllabi, learning objectives, lecture notes, demonstrations, assignments, tests, etc.), so instead create everything yourself from scratch.

2.Try to cover everything known about the subject in your lectures and always be prepared to answer any question any student might ever ask. Assemble all the books and research articles you can find and make your lecture notes a self-contained encyclopedia

on the subject.

3. Don't bother making up learning objectives or a detailed syllabus-just work things out as you go. It's all you can do to stay ahead of the class in your lectures, so just throw together a syllabus that contains only the course name and textbook, your name and office hours, and the catalog description of the course; invent course policies and procedures on a day-by-day basis; and decide what your learning objectives are when you make up the exams.

Here's what's likely to happen if you adopt this plan. You'll spend an outlandish amount of time on the course-ten hours or more of preparation for every lecture hour. You'll start neglecting your research and your personal life just to keep up with the course preparation, and if you're unfortunate enough to have two new preps at once, you may no longer have a personal life to neglect. Your lecture notes will be so long and dense that to cover them you'll have to lecture at a pace no normal human being could possibly follow; you'll have no time for interactivity in class; and you'll end up skimming some important material or skipping it altogether. Your policies regarding late homework, absences, missed tests, grading, and cheating will be fuzzy and inconsistent. Without learning objectives to guide the preparation, the course will be incoherent, with lectures covering one body of material, assignments another, and tests yet another. The students' frustration and complaints will mount, and the final course evaluations will look like nothing you'd want to post on your blog.

There's a better way.

A rational approach to new course preparation.

1. Start preparing as soon as you know you'll be teaching a particular course. Dedicate a paper file folder and a folder on your computer to the course and begin to assemble ideas and instructional materials. While you're teaching the course, continue to file ideas and resources as you come up with them.

2. Don't reinvent the wheel. Identify a colleague who is a good teacher and has taught the course you're preparing to teach, and ask if he/she would be willing to share course materials with you. (Most faculty members would be fine with that request.) In addition, try finding the course on the MIT OpenCourseWare Web site () and download materials from there. Open courseware may contain visuals, simulations, class activities, and assignments that can add considerably to the quality of a course and would take you months or years to construct from scratch. The first time you teach the course, borrow liberally from the shared materials and note after each class what you want to change in future offerings. Also consider asking TA's to come up with good instructional materials and/or inviting students to do it for extra credit.

3. Write detailed learning objectives, give them to the students as study guides, and let the objectives guide the construction of lesson plans, assignments, and tests.

Learning objectives are statements of observable tasks that students should be able to accomplish if they have learned what the instructor wanted them to learn. Felder and Brent recommend giving objectives to students as study guides for tests , and show an illustrative study guide for a midterm exam.

Before you start to prepare a section of a course that will be covered on a test, draft a study guide and use it to design lessons (lectures and in-class activities) and assignments that provide instruction and practice in the tasks specified in the objectives. As you get new ideas for things you want to teach, add them to the study guide. One to two weeks before the test, finalize the guide and give it to the students, and then draw on it to design the test. The course will then be coherent, with mutually compatible lessons, assignments, and assessments. Instead of having to guess what you think is important, the students will clearly understand your expectations, and those with the ability to complete the tasks specified in the objectives will be much more likely to do so on the test. In other words, more of your students will have learned what you wanted them to learn. The objectives will also help you avoid trying to cram everything known about the subject into your lecture notes. If you can't think of anything students might do with content besides memorize and repeat it, consider either dropping that content or cutting down on it in lectures, giving yourself more time to spend on higher-level material.

4. Get feedback during the course. It's always a good idea to monitor how things are going in a class so you can make mid-course corrections, particularly when the course is new. Every so often collect "minute papers," in which the students anonymously hand in brief statements of what they consider to be the main points and muddiest points of the class they just sat through. In addition, have them complete a survey four or five weeks into the semester in which they list the things you're doing that are helping their learning and the things that are hindering it. Look for patterns in the responses to these assessments and make adjustments you consider appropriate, or make a note to do so next time you teach the course.

5. Do everything you can to minimize new preps early in your career, and especially try to avoid having to deal with several of them at a time. Some department heads inconsiderately burden their newest faculty members with one new prep after another. If you find yourself in this position, politely ask your head to consider letting you teach the same course several times before you move on to a new one so that you have adequate time to work on your research. Most department heads want their new faculty to start turning out proposals and papers in their first few years and will be sympathetic to such requests. It might not work, but as Rich's grandmother said when told that chicken soup doesn't cure cancer, it couldn't hurt.

2. Course Design
Stanford Teaching Commons

COURSE DESIGN OVERVIEW

Whether designing a new course or preparing to adopt a standardized curriculum, you

will find it helpful to begin your course preparation by clearly defining what you expect your students to have learned by the end of your course or section. You can then put together course materials, or select new ways of presenting course materials, that serve the learning outcomes you have chosen.

Consider the topic and level of your course, and ask yourself:
• What is the most important information students should learn and remember from this course (facts and other kinds of core knowledge)?
• What are the most important ideas that students should understand after taking this course (theories, approaches, perspectives, and other broad themes in your field)?
• What are the most important skills that students should develop in this course (laboratory skills, problem-solving skills, creative skills, writing skills, etc.)?

(Some faculty also ask what attitudes they want students to develop as a result of their course, such as love of the field; a critical, questioning stance toward texts; or an appreciation of cultural differences.) See also Thinking about Your Course Goals.
Be as specific as possible. For example, an instructor of modern Chinese history might identify the timeline of key historical events and periods as important Course Preparation information, competing theories about the causes of the Chinese Revolution as important ideas, and the ability to compare modern Chinese history to other significant historical trends as an important skill. An instructor of product design might identify fundamentals of descriptive geometry as important information, the relationship between form and function as an important idea, and the use of a design software program as an important skill. Different courses may emphasize one type of learning outcome more than others; you may have an enormous amount of facts to cover in an introductory course or you may find yourself teaching a highly skills-specific course for advanced students.

However, most courses will have a combination of all three kinds of outcomes.
If you get lost in a sea of possible learning outcomes and find yourself overwhelmed, consider dividing the outcomes into those that are essential (students must reach these goals in order to continue successfully in their program) and those that are desirable. To decide which outcomes are essential, you can talk to upper-division students and to faculty members whose courses follow yours in a major. If the curriculum is already established, use previous syllabi or talk to previous instructors to find out what has historically been considered essential in the course.

Desirable outcomes, on the other hand, reflect your idealistic side: What are your dream learning outcomes for a student taking this course? Do you care more about breadth of knowledge, imagining your students fielding a broad variety of questions on your field (as an instructor of an introductory course might)? Or do you care more about depth of knowledge, imagining your students deep in the trenches of a specific research problem or creative project (as an instructor of a seminar might)? What kinds of intellectual and practical challenges would your students ideally be able to face headon and conquer? For a professor of any science, a desirable learning outcome might be the ability to design, run, and analyze an innovative study; for a professor of business, it might be the ability to put together a business plan that a potential investor would get excited about.

You will, of course, need to take into account such practical considerations as what you can realistically fit into a quarter, what your department expects from your course, whether or not it is part of a sequence, how prepared and committed your students are, what resources are available for the classroom and students, and your own strengths and experience as a teacher. For these reasons, it may take several rounds of teaching and revising a course before you feel confident about your ability to achieve all of your desirable goals. Give yourself room to grow. Emphasize the essential learning outcomes first, with an eye to facilitating desired learning whenever possible.

TRANSLATING GOALS INTO COURSE CONTENT

Once you have identified the most important learning outcomes for your course, you are ready to assemble the means that will best support your goals. In doing so, you will want to focus on three questions:
• What materials (textbooks, articles, lecture content) do students need access to in order to achieve your learning outcomes? Choose your reading and resource list based on the quality of the information, ideas, and training provided, and use classroom time to fill in the gaps between your goals and the content of those readings/resources.
• What assignments (papers, problem sets, projects) and experiences (discussions, labs, field trips, collaborative activities) will give students the opportunity to reinforce the information and ideas of the course, as well as practice key skills?
• What should students be able to do to demonstrate that they have met these key learning goals? The answer(s) to this question will be the basis for your grading structure, as well as the format and content of graded exams, homework, and projects. For example, if one of your essential learning outcomes is improved analytical thinking, make sure that your exams and assignments require it.

The next step is to select the specific readings, lecture and discussion content, class activities, practice assignments, and graded assignments that will make up your course. You can weed through the course materials already prepared by previous instructors of similar courses, with an eye for those materials that best meet your goals. If you are lucky (and brave!) enough to be embarking on a new course, you have the freedom and challenge of building your course materials from scratch. The next section provides some practical advice on meeting this particular challenge.

COURSE OUTLINE

The next step is to develop your course outline.Your previous work, defining your teaching goals and the most important learning outcomes for your course, will serve as a guide as you make specific decisions about course materials and content.

Choose the Readings
A major decision will be whether or not to adopt a general text. If you are like most teachers, it is unlikely that any one book will meet all your needs.However, most students prefer some textbook that integrates the course for them, as long as it is reasonably well-

written. One solution is to make the students responsible for mastering the text, and then use your lectures to present alternative points of view or to fill in the textbook's gaps. Since students are often confused by contradiction between textbook and lecture, be sure to explain to them what you will be doing, why it is useful, and how they can best integrate lecture and textbook when studying. If you don't choose a general textbook, it's even more important to consider how your readings relate to each other and your lectures. Again, make sure your students understand how to integrate multiple readings and lecture content. From the student's perspective, it is also considerate to minimize the expense of using several books or the inconvenience of placing a large amount of material on reserve. Such seemingly trivial factors can influence whether or not a student takes your course.

Beyond the required books, readings can include articles that further illustrate applications or offer alternative points of view. Your own handouts are another valuable resource. They can be especially helpful to supplement or summarize your lectures, as long as you keep the number of pages to a minimum. Students will also make use of recommended readings if you provide structure for that use. When you give a list of additional readings, indicate which books students can consult for help in doing projects or solving problems, which works you suggest they refer to when writing a paper, and which resources can benefit students who lack certain background knowledge or who wish to pursue a favorite subject further.

Create an Order for Your Course Topics
You probably have a good sense of the major topics that you need to cover. However, to be thorough, you can check the major textbooks in your field, the concerns of the leading journals, and the syllabi of your colleagues teaching similar courses or courses that precede or follow yours in a sequence. How to best order these topics? A system may immediately suggest itself— such as proceeding chronologically or using the order of the textbook you adopt. You may also consider a meaningful order of course topics that builds from the abstract to the specific, or that alternates between theory and application, or that groups course topics by the kinds of approaches, skills, or methods they require. Whatever order you choose, be sure that student learning builds on itself. For example, you would not expect students to synthesize alternative viewpoints until they were first able to compare viewpoints and you would not expect them to compare viewpoints until they had first learned how to analyze an argument.Nor would you expect students to design experiments that test complex hypotheses before they had first developed basic inquiry skills on more simple problems. For this reason, the order of your topics should complement and support the development of the key ideas and skills that students are working to master.

Design Class Activities
How exactly do you want to spend class time? Will you lecture throughout, or devote considerable time to other activities? Although lecturing might seem to be the natural mode, it can encourage passivity in students. You may want to build in other activities that require interaction with the class. Does it make sense to include short discussion periods in every class, or to schedule occasional days of discussion only? Are there guest

lecturers or field experiences that could provide special insight into a topic? Will role-playing help students understand certain topics? Is there a film that does a particularly good job of covering a topic? (Note that film use is popular with students only when the film is excellent and is not perceived as merely a time-saving tool for a busy instructor.) Also consider delegating a certain amount of content coverage to peer instruction, in which students—through careful group research and presentations— teach their classmates. Studies have shown that students achieve the highest level of information retention and comprehension when they have taught the material themselves. Explain to students the value of such active engagement with the course content; you may also want to devote some class time and office hours to guiding students in their explorations and preparing them for peer instruction, so that they do not perceive peer instruction as an avoidance of your own teaching duties.

Plan the Course Calendar

Finally, of course, you will want to study the academic calendar and actually decide on a week-by-week sequencing of topics, readings, assignments, and exams. Check carefully for school holidays or other events (like "Big Game") that might affect student attendance or ability to complete assignments. Consider leaving some flexibility in your outline for student feedback (e.g., on course topics, reading load, and coursework difficulty), as well as unforeseen complications (e.g., having to reschedule an exam if the majority of your students have another exam that day).

Get Feedback

Once you have your course outline, check it over carefully. Even better, have a colleague look it over and react. Is it meaty—is there enough material to challenge the students intellectually and sustain their interest? Is it flexible—if students make suggestions, do you have room to incorporate them? Is it coherent—is there a recognizable connection between the lectures, readings, and assignments? Do the major themes of the course stand out? Is there a sense of intellectual movement— will students emerge with not only more information, but also new skills and capabilities?

Syllabus

Once your course outline is finished, you can prepare a version of it for your students. Your syllabus is both an invitation to students interested in your course and a contract between you and the student. For these reasons, your syllabus should contain, at a minimum:

- a course description, including your objectives for the course;
- course prerequisites;
- a list of assignments and due dates;
- a description of exams (exam format and topics covered) and their dates;
- statements on your grading, attendance, and other policies, including the University Honor Code and information about the Office of Accessible Education, including their recommended Syllabus Statement about how students with disabilities can arrange accommodations;
- office hours and location, your telephone number and/or your email address, and the

address for the course website, if you have developed one. Similar information should be provided for any TAs assisting in the course. The more you make the TAs full members of your teaching team, the more likely they will make significant contributions to the class, the students, and you.

In addition, you can attract or retain interested students by listing more specific details of the course, including the titles or topics of each lecture. Consider framing each lecture in terms of questions that the lecture will answer, for example: "What does it take to win a Nobel Prize these days?" (a lecture on the modern history of science) or "Why does tap water taste different at Stanford than in the Bronx?" (a lecture on water quality). Also consider leaving one or two days untitled, to invite students to choose a supplemental lecture topic or to allow for catch-up if necessary. Some instructors go further and include short summaries of the major themes or debates for each unit in the course. If you are interested in going beyond the minimum requirements for your syllabus, consider the "learning-centered" model for syllabus design. A learning-centered syllabus not only outlines the instructor's goals and objectives for the course, but also guides students to take responsibility for their own learning (Grunert, 1997). For example, a learning-centered syllabus invites students to:
• Identify their own goals for the course: What are they hoping to learn? How does this course fit into their academic plan of study, their professional goals, or their personal goals?
• Contribute to decisions about course content and activities. You might do this by offering a choice of reading materials for some topics, a vote on supplemental lecture topics, or options for final project topics. • Take responsibility for their own learning. You can facilitate this by providing students with information about university resources (e.g., academic coaching and tutoring services) as well as general study tips, a list of supplemental resources for the course, and suggestions for excelling in your particular course.

In these ways, the learning-centered syllabus becomes a guide for students, rather than just a summary of course details.

3. Teaching Your First Course
American Physiological Society

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<u>Where Do I Start?</u>

This is usually the thought that comes to mind when faced with that first course. The best place to start is with your colleagues. Sit down with them and ask a few questions. Find out if the course has been taught before or if it is a new course. If it has been taught before, talk to the other course instructors and ask them how the course was designed and managed in the past. Find out if you are supposed to teach "as it has always been taught" or if there some issues with previous courses necessitating a change in format. Either way, make your job easier and tap the experience and expertise of your colleagues. If it is a team taught course, meet with the other members of the teaching team ASAP and discuss content, format, course management etc.

If you are teaching a new course for the first time - lucky you. Course design, content, and format are in your capable hands. It can be scary at first but it will be a lot of fun. Be sure that you understand the department's expectations for the course, the preparedness of your student population, and the impact that your course will have on subsequent courses that your students will take. If there are prerequisites for your course, review the text to see what students will know when they enter your class. If there are no prerequisites for your course you may want to give a test of basic knowledge during the first week so that you understand the background and preparation of your students. With this information you can pitch your course at a level that will ensure success.

<u>How Do You Prepare a Course?</u>

Everyone has prepared at least one course by opening a textbook chapter, outlining the important points and then turning the outline in a lecture. What many discover at test time is that the students have a superficial knowledge of the material. They know the facts of the topic but primarily in the context of the text or course. They are slow to relate their knowledge to situations outside of the lecture context and may be unable to use it to predict outcomes or assess a problem.

Consequently, one of the first caveats for preparing a course is to clearly identify the course objectives. What do you want your students to know? Should they know content or facts? How should they be able to manipulate the information that they have learned?

Will you expect them to be able to solve clinical problems, calculate results, predict outcomes? Will they need to acquire skills in the course? Think about questions like these and then format them into a list as your course objectives. Once the list is complete, match your objectives to one or more class sessions or topics. For example, if you want your students to acquire content knowledge, identify the class session in which you present the information or the homework reading assignment (textbook chapters, websites, etc.) that addresses the topic. If you want students to learn to apply their knowledge to clinical problems, data analysis etc., identify class sessions where you give them examples in class or provide them with opportunities to practice working them out with their classmates or on their own. If these ideas won't work for you, there are many other ways to build your learning objectives into the course, such as incorporating them

into student projects, homework assignments, study questions, web-based discussion, etc. For more ideas, search the "Life Science Teaching Resource Community" (www.lifescitrc.org/main/ugradsearch.asp) and "Resources for Effective Pedagogy"(www.lifescitrc.org/main/ugradpedagogy.asp) at the APS website.

Plan your course outline and your classroom presentations around these objectives. Some faculty build from small ideas to big concepts and some do the reverse starting with big concepts and working their way down to the small ideas. Do whatever works best for you but be sure to sketch out a logical progression of ideas before writing the presentation. Collect as many resources for your course as time allows. Gather images from your textbook (many publishers supply image libraries and lecture slides), the internet and even create your own images using a drawing program. Search the web for graphs, animations, case studies, and examples that you can use. Again the APS website, www.lifescitrc.org/main/ugradsearch.asp), is a great resource for many of these. Talk to colleagues about how they taught the course and what they did or used that really worked for them. You may not use all of the resources that you collect but they will give you another perspective of the topic and a toolkit for answering those unexpected questions.

Preparing the Syllabus

After you have finalized your course objectives, you are ready to prepare a syllabus. A syllabus is a contract between the student and the instructor and when a student registers for a course, they agree to comply with the terms of this contract. Within the syllabus the instructor lays out the expectations for the course with respect to learning goals, student behavior, and course grading policy. Typically, learning goals explain what the student should be able to do at the end of the course (e.g., identify 3 mechanisms of…, explain the process…, predict the change in…., determine the validity of the statement…). The syllabus section on student behavior deals with a range of instructor expectations, some as mundane as attendance or cell phones in class and others as crucial as class participation or plagiarism. While these may be unpleasant topics, some preemptive thought and action will make your job easier. Decide before class begins whether or not students can talk in class, eat in class, answer cell phones, leave early or walk in late. Refine your vision of class participation and define your idea of plagiarism. Once you have decided on these parameters, clarify them in your syllabus and talk to your students about them on the first day of class. If students understand that these issues influence the classroom environment and that your goal is to provide the best classroom environment possible, the majority of your students will support your efforts. Finally, the syllabus defines what the instructor will use as a grading scale and the assignments, quizzes, and exams that will be associated with the final course score.

It important to invest significant time and effort into your syllabus because you must live with it throughout the course. Often, first-time instructors or instructors teaching a course for the first time prepare the "perfect" syllabus only to discover midway through the course that either the students or the instructor cannot live with perfection. As a result, an instructor may consider altering the syllabus. However – a word of caution - if you must deviate from your syllabus, be judicious about it. Traditionally if an instructor deviates

from the syllabus, it must benefit the student. For example, if you must reschedule an exam, it is appropriate to change the date (usually a later date) so that it provides the student with at least as much study time as the originally scheduled day. Also, if you must drop topics from the schedule and eliminate associated assignments, make sure that the lost points do not penalize student grades.

<u>What Should I Teach in My Course?   What Should I Cover in Class?</u>

These are actually 2 separate questions. You may expect students to know the material in 1000 pages of the text but it is unreasonable to expect that you will discuss all of this during class time. Decide what students need to know at the end of the course and then divide it up between what you can present in class and what you expect students to learn on their own. Don't allow your students become "dependent" learners (Weimer, Maryellen. 2002. Learner-Centered Teaching, Five Key Changes to Practice. Jossey-Bass, San Francisco, CA) where they look upon their instructor as the source of all knowledge. Prod them into learning for themselves with challenging and relevant questions (Why don't birds have teeth?) that make them delve into their learning resources (texts, internet, etc.) for answers. Also encourage them to be selective about their learning. Help them recognize that learning everything in the 1000 pages of their textbook is unrealistic for the course and that they might be more successful if they were selective about their learning. Guide them to ask questions and make decisions about their studying. Help them ask themselves questions like, "Does this concept have broad applications outside of this chapter? If, so maybe I should focus on it rather that detailed content knowledge." Encourage them to learn information that will help derive other information by asking questions like "If I learn how the Na/K pump works, will I need to memorize the events associated with hyperkalemia or hypernatremia."

<u>How Do Students Learn?</u>

Many of us attended courses that were taught in a traditional lecture format. By and large that worked. After all, we are successful scientists today. There is some question about the value of this technique. Studies show that classroom lectures are not the most effective way to teach or the most effective way for students to learn. Because of our own experience in the classroom however, most of us feel comfortable with this form of teaching, and might naturally want to use it for the first time in our own courses. If this works for you, use it but take some part of your first course and experiment with alternative teaching strategies like problems-based learning, think-pair-share exercises, etc. For examples of quick and easy ways to teach without lecture, look at the "Life Science Teaching Resource Community" at the APS website (www.lifescitrc.org/main/ugradsearch.asp).

Large class sizes can be intimidating and often instructors feel that lecture is the only option in this situation. However, there are several effective alternative strategies that you could consider. One example is class discussion. While it is difficult to run a single discussion section in a large class, it is quite reasonable to generate productive discussion if you break up the class into groups of 3-5 neighboring students . These students can

work as a team for 5 minutes answering a question that you pose. At the end of this time you can poll the groups for their responses to assess student understanding and misconceptions.

It is important to recognize that all students do not learn the same way; hence it might be wise to try multiple presentation formats in your class session. Some students learn better with pictures, some with written words, some with stories/lectures and some by talking about the topic. Vary your course presentation so that it incorporates all of these formats. You might try introducing a topic with a combination of verbal and written format by lecturing with slides and then follow this up with a discussion of a flow chart, diagram, or linkage map. As a summary you might ask students to explain the answer to a question to the person sitting next to them. In this way you can address multiple learning styles and enhance the successful learning in your classroom.

How Do I Know That My Students Are Learning? Testing and Assessment

Many instructors regard testing and assessment as an unpleasant but necessary task that makes some fraction of the class dissatisfied. However, if used appropriately, testing and assessment can provide valuable feedback for students, enabling them to identify their study targets and ultimately improve their learning and grades. Often an instructor relies on test scores only to tell them if students are learning course material. The problem with this method is that exams occur at the end of the curricular unit and by the time the instructor finds out that students have not learned the material, it is too late to remediate. An alternative to this is to quiz student knowledge frequently throughout the course. These assessments don't need to be labor intensive; simple questions with oral or written answers will do. For example, after a difficult topic in class an instructor can put a question up on the screen with 3-4 answers, one of which is correct and the others which address common confusions or misconceptions associated with the topic. Ask the question and have students raise their hand or write their answers on a card. Their replies should give you a sense of their understanding. If you want to know about their deep understanding of the topic, you could pose a question and ask them to write a short paragraph in response. Share these results with the class and ask students to explain why they chose right or wrong answers. This discussion will allow you to dispel the misconceptions that students might have. Also, use this time as an opportunity to guide students to study targets that promote depth understanding rather than superficial learning or memorization. Finally, evaluate student understanding early and often. It will promote learning and prevent those frustrated, confused students that appear in your office just before the exam.