Random Thoughts . . .

WHY JOHNNY AND JANIE CAN'T (OR WON'T) READ

Richard M. Felder and Rebecca Brent

A question we routinely hear in our workshops is, "How can we get students to read before class?" The questioners have a perfectly natural desire not to waste class time on material they think students can just as easily get for themselves, and when later most of their students seem to have no clue about the readings, they conclude that the students must be lazy or illiterate. Some may be, but that's not generally the problem.

Assignments intended to introduce new material can be effective or worthless or anything in-between. The best ones are interactive multimedia tutorials that provide affirmation or corrective feedback in response to students' inputs. Less effective but still acceptable are videos of well-delivered lectures with lots of visual content, demonstrations, and examples. Such resources can equip most students to come to class ready to work, and if the tutorials and videos are particularly well designed the instructor may *flip the classroom*, abandoning lecturing completely and devoting the entire class time to problem-solving and project work.

On the other hand, simply assigning textbook readings to introduce new material is generally futile. STEM texts tend to be dense, dry, and almost indecipherable to anyone without superior reading skills, which relatively few people have. To get anything but vague general ideas from them, students would have to read them painstakingly, making sure they understand definitions, explanations, steps in derivations, and meanings of diagrams and plots before moving on, and it would normally take several passes to get a reasonable level of understanding. Most of our students don't know how to read that way—it's not self-evident and no one ever taught them to do it. Being rational, once they find their text incomprehensible they ignore it. Hobson[1] cites studies showing that over 70% of students in classes in all subjects ignore reading assignments, and the percentage is undoubtedly higher in STEM courses.

Instead of introducing challenging new material in reading assignments, consider doing it in class using a blend of lecturing and active learning,[2] focusing the activities on the more difficult concepts and methods being presented; *then* give assignments that clarify, expand on, and require application of the material introduced in class. You will cover the same content that you would if you gave the readings first, but with the initial guidance they get in class, the students will be much more likely to understand it.

This is not to say, however, that we should abandon the idea of asking students to read because many of them are unwilling or unable to do it. As professionals, they will have to get information from written documents, and they won't have classes or online tutorials to help them get started.

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Here are several tips for getting students to read assignments and helping them learn how to do it, some of which are adapted from Hobson.[1]

- ***Trim assignments down to what is really essential.***

Your reading assignments should be clearly linked to your learning objectives, problem sets, and tests. If you assign 50 pages of reading of which only five are directly relevant to what the students will be asked to do because you think the other 45 contain "useful things for them to know," don't be surprised if they ignore the assignment. Instead, assign the five pages and suggest but don't require the rest.

- ***Consider giving in-class quizzes on readings, and also consider not giving them.***

The most common strategy for getting students to read before class is to give short in-class quizzes on the readings that count toward the final course grade. This technique may accomplish its objective but it has several drawbacks. It can take a lot of out-of-class time to prepare and mark all those quizzes and substantial in-class time to hand out, administer, and collect them, especially if the class is large. Since short quizzes generally test primarily low-level factual information, the additional learning they produce may not be worth their cost in time and effort. You should also keep in mind that your students have many things on their plates besides your course: some of them are juggling full course loads, jobs, and extracurricular activities, and anything you do that pressures them to keep up with your readings on a daily basis may just force them to neglect other equally important responsibilities in their lives. In short, the benefits of in-class quizzes are probably not enough to compensate for their disadvantages. Some better options follow.

- ***Include self-tests in reading assignments that address the most important concepts and methods in the readings.***

It can help students to know what you think they should be getting from assigned readings rather than making them guess. In at least your first few assignments, include one or two questions for each important idea in the readings and post the answers so the students can check themselves. If you use classroom management software like *Blackboard* or *Moodle*, administer the self-tests online; provide corrective feedback and chances to try again following incorrect responses; and don't consider the assignment complete until a full set of correct responses has been submitted.

- ***Use guided reciprocal peer questioning.***[3]

When you assign a reading with substantial conceptual content (as opposed to mostly mathematical derivations and examples), have the students make up and answer several questions about it, filling in the blanks in stems such as "What is the main idea of ___?" "What's the difference between ___ and ___?" "What if___?" "What assumptions were made in ___?" and "What is a real-world application of ___?" (More stems are given by King.[3]) The students try to answer each others' questions in small groups at the beginning of the next class, and the whole class then discusses particularly interesting or controversial questions. You can either collect the questions and answers and grade them as part of the assignment or just use them to stimulate deep reading and discussion. This technique promotes critical thinking as well as reading skills.

- ***Have students draw concept maps for assigned readings.***

A concept map is a block diagram or flow chart that shows interrelations among the key ideas in a body of knowledge. Getting students to prepare them either completely or from an instructor-created skeleton promotes a deep understanding of information structures. Ellis *et al*.[4] review the use of concept maps in engineering education and illustrate their construction and application in a second-year course in mechanics.

- ***Use active learning to teach reading skills.***

Early in the semester, put a reading on a class handout or have the students bring their texts to class and give them a minute or two to read a short passage. If the passage is straightforward, ask a few questions about it to make sure everyone understands it; if it is more challenging, have the students individually formulate brief explanations of what they read and then work in pairs to synthesize better ones. After a short time, call on several of them to share their explanations, give your own unless you hear one as good as any you could come up with, and move on to the next passage. Once the students have gone through several such activities in class, most should be prepared to work through out-of-class reading assignments on their own. That ability will almost certainly be more important throughout their careers than any technical knowledge or skill they might acquire in your course.

REFERENCES

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