

Teaching Folded Lists and Minute Sketches

(first read my 'Short Instructions' page)

1. Create minute sketches for one or more critical concepts. Which concepts? Start with the ones that students MUST recall instantly and correctly in order to understand later content. For example, in my classes, structure and function of a gene are fundamental. Therefore, at the moment I say “mutation”, any student who does not have a clear image of a gene and gene function is lost and behind.

If you close your eyes and think about how YOU think of a key concept or process, you are likely find that you have a picture in mind. Still, if you're new to minute sketching, you'll find creating sketches takes time and practice at first. *(Time: 5-60 minutes per sketch. Beware: it is easy to get surface structure into a sketch, much harder to get meaningful deep content. Much less time is needed if you can find or share sketches with others.)*

2. Make one or more pages of folded lists for your students *(see the Folded List and Minute Sketch short instructions; Time to copy out a folded list: ~ 10 minutes for a one-page folded list with ~ 5-6 sketches.)*

3. Draw each sketch on the board while giving an explanation of each sketch. Pre-prepared minute sketches are not a comprehension tool, but rather a chunking and (later) problem-solving tool for a concept that is already understood. Similarly, a folded list is not a comprehension tool, but rather a fluent recall tool that actively incorporates multiple modalities. *(Time: 2-3 minutes for each sketch if presented in class and drawn on the board. Potentially more time for student questions or discussion of a sketch.)*

4. Immediately, have your students recopy (i) the sketch, (ii) the terms, and then (iii) the sketch again, thinking of the sketch as they write the terms, and thinking through each sketch as they recopy it. Remind them never to guess. It is normal to look back at the terms or the sketches often. *(Time: ~ 2-3 minutes in class for each topic in a folded list; or ~10-15 minutes for two run-throughs of a 1-page folded list. More if you have students explain sketches to each other in pair activity. There are many ways to incorporate these into class time.)*

5. Assign as homework (or in-class work the next class day) two more times through their folded list: four more columns in total. *(Student time: ~ 2-3 minutes for each concept on a folded-list. Grading time: ~ 5 seconds per sketch; less than a minute per page, as all you're doing is checking for complete sketches and lists of terms.)* My grading rubric is: *not done, completed with many errors, completed with few errors, or completed with no significant errors.* Later, you might encourage students to simplify sketches and abbreviate terms as much as they can, but not now when they're learning.

6. Assign again, after one or more days, the same folded list as homework, twice through both columns. In-class exercises might help when students do not reliably do homework. With practice two or three times, students are likely to have these concepts fairly fluently in memory, including (1) ability to draw each chunked sketch associated with (2) an image in their mind, (3) the terms they write and (4) the spoken terms to explain the sketch.

7. Quiz students on their folded list concepts. In a quiz, (i) require students to reproduce terms and associated sketches for some/all concepts/procedures. Then, (ii) have students use some/all content to solve a problem as follows: what might happen if you removed/changed any one element of the concept (or sketch). From my 'water cycle' sample sketch, for example, I might ask what would be different if land surface was impervious (such as in much of a city), or what might be different in winter versus summer (reduced evaporation rate or runoff), or if humans made wells near an ocean shore and removed a large amount of water. Ask them to redraw their sketch including the change and then to explain the change using the correct terms. I find it helpful to do this as an in-class exercise 2-3 times in order to train the class in this skill before their first quiz. *(Class time: about 5 minutes for a two-question quiz; Grading time: as little as 30 seconds per student. The sketches and use of key terms makes it easy to tell when a student clearly does or does not remember and understand. You might be able to grade quizzes in the time it takes a class to practice a new folded list.)*

8. Choose folded list topics carefully. This is not a method to cover everything! This is a method to develop fluent recall and problem solving on selected critical concepts, while also teaching students a new way to learn.

9. TO START

Pick ONE concept that your students always struggle to remember and to apply. Create a minute sketch and folded list for that one concept. Try out these exercises with that one concept and see what happens.

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For More Advanced Use (to develop synthesis skills, transfer, and problem solving):

10. Train students to make their own minute sketches and folded lists. Give students a paragraph from a text book and/or a figure. Then ask students to use the text or figure to create a useful minute sketch and list of key terms. Remind them and show them how to be sure the sketch contains the explanation. You might encourage them to share sketches and to talk about which sketches are especially good, and why that is so. This exercise and the one following take a 'constructivist' learning approach to internalize content, while also developing student skills in chunking. (My fellow teachers feel that these are the most powerful use of minute sketches.)

11. Develop student chunking and problem-solving skills in class and in quizzes. Give students a paragraph with or without an image. Have students make a list of key terms and a minute sketch. Once students know how to make their own minute sketches and lists of terms, give students quizzes in which they have a text passage of novel content, along with a problem to solve using that new content. Grade them on their (1) list of key terms, (2) usable minute sketch (or set of sketches, for more complex topics), and (3) a correct solution. This kind of exercise/quiz develops skill at rapid creation of chunks from new content, plus use of that chunk as a sketch to solve a problem. (For this exercise, students have to use the content as a sketch because they do not yet have the content in a form that is fluently recalled and easily held in working memory.) Initially, consider having the list of key terms and usable minute sketch be full credit, while the correct solution is extra credit. Gradually, a correct solution might become 1/3 or more of the total credit.

Don't be surprised when this is very difficult for many students. This takes college freshmen many months to master. Students who do not like to sketch (and their parents) can be particularly resistant to this. It might help to remind them that (1) humans need to remember, understand, and be able to communicate about knowledge on paper and with speech, and (2) the more parts of their brain they use to learn something and practice it, the easier it will be to remember, and the longer they will remember it. **Don't try to rush the process.** Do allow your students slow and steady weeks and months of gradual improvement.

12. To develop transfer, give students a novel aspect of a chunked concept. Ask them to sketch the most closely related minute sketch and terms, and then to solve a problem and/or explain how the sketch applies.

13. To develop organized structure of deep knowledge, ask students to create 'mind maps' or 'concept maps' using minute sketches. The maps should interconnect many minute sketches via shared elements and relationships. Students find it faster and easier to create these maps with minute sketches than with terms, because a good minute sketch is faster to draw than it is to write out the associated terms.

14. Consider how best to use these tools with your students. I developed these methods with two goals: (i) to improve student learning and (ii) **to save time for me and my students**. I think that works for me: my students claim they understand content better and retain it longer, they are better at solving novel problems on exams, and I have fast ways to teach and grade. Research supports the importance of chunking skills, integration, and active learning with multiple sensory modalities. Therefore, the tools ought to develop strong learning skills. But, lacking formal controlled studies, you will need to develop your own classroom evidence for what works with these. Classes, content, students, and teachers differ. Your own insights will matter.

Want help? As long as I have the time (and as of June 2010 I do!), you can contact me (pdheid@wm.edu), to see if I might have time to help in creating minute sketches, perhaps critiquing your sketches for you, or to post your hand-drawn folded lists on my web site (with your name as the source!) as pdf files for sharing. Finally, one potentially useful insight: many times, when I've been creating minute sketches for my classes, I discover that if I can NOT easily create a minute sketch, it is because I don't fully understand the concept. I have been surprised at how often a standard explanation has been badly incomplete or misleading.

-- Our suggestions here come from teachers/student teachers Kevin Goff, Melissa MacIntyre, Matthew Wester, John Savage, and Tiffany Bryant working with me on ideas for teaching and learning with these tools.

More at: http://pdheid.people.wm.edu/PDHWeb_7_Rules_Learning.html