Using class exercises to actively engage students in Structural Geology and Tectonics courses

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The Structural Geology and Tectonics (SGT) course I teach at Utrecht University is a 3rd year bachelor's degree course with typically 20–40 participants. The course consists of 4 hours of lectures and 4 hours of practical (labs) per week, for a total of 8 consecutive weeks. It is well known that conventional lectures do not form the most effective way of teaching students in terms of learning outcomes, but constraints on classroom availability and (financial) limitations on the number of hours a lecturer is allowed to spend on a course make that we still schedule classical lectures. Interactive lecturing is the way out.

In order to improve student learning during lectures, I actively engage students in the classroom by regularly interrupting my lectures by giving short class-exercises. This is certainly not a new idea, as for example shown by the quick start-up guides for interactive lectures presented at https://serc.carleton.edu/onramps/index.html (NSF funded project). However, in my experience, class exercises are not widely used yet as a useful teaching strategy, which is a regrettable since it is easy to implement.

I typically give two class exercises per lecture hour. They always have a well-defined aim and task, and take about 3–10 minutes each. The exercises bring back the attention of students, re-emphasize a topic that I've just talked about, and give the students a chance to directly apply a concept, equation or technique. The exercises may include a quick calculation, making a measurement, reading a graph, or interpreting a (seismic) section or rock (micro)structure. Discussion with the neighbours is encouraged and the answers are reviewed plenary. There is no formal assessment of individual answers.

Course evaluations show that students very much appreciate the interactive nature of the lectures induced by the class exercises. They feel engaged and later revisit the exercises in preparation for exams. Although hard to quantify, in my experience the exercises improve learning. In this presentation, I'll show examples of the class exercises I designed, and will put forward the suggestion to come to a shared database of class exercises from which we all can easily draw.
