Teaching Field Geology is all about Visualization

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I doubt that anyone would dispute the argument that an undergraduate ("capstone") field geology course is of considerable importance in the academic experience of geoscience majors and that a student's success in the course, measured in many ways, is dependent on their ability to accurately describe, portray, understand, and grasp the importance of field geologic relations. In other words, visualization of features in front of their eyes, at a range of scales, is critical to field geology; from a mechanical perspective, visualization is a critical component of the array of processes that, taken together, allow the student to make predictions (sort of a synonym for testable hypothesis) about what she or he should anticipate visualizing around the next hill, across the next valley, in the next drainage, etc. I have had the incredibly fortunate experience of teaching field geology for almost 30 years (this summer will be my 30th), having taken field geology in 1973. I taught the course as a graduate instructor at the University of Michigan, beginning in 1974, as a post-doctoral research scientist at the University of Toronto, and as a faculty member of the Colorado School of Mines, the University of New Mexico, and the University of Michigan.

So with this level of experience, there are several challenges in teaching field geology. A major one is, cognizant that each and every student is different, and each and every student has different levels of "comfort" in the field, how do you "work with" students to get them to develop a strategy for inspecting rock exposures in the field, visualizing the critical features of the exposure, and, close to last but certainly not least, recording this critical information for future use. To a degree, yes, visualization comes with experience, but the speed with which students pick up on essential techniques is highly variable.

What I have done in the field, and will continue to refine this approach (as all of this clearly is not rocket science), is to take a high-quality digital image of an outcrop, or field relation involving several outcrops, and print these out and carry them in the field. When I meet up with students, by chance or arrangement, I place us in the exact position/orientation that the image was taken. Then we describe what we see. In this part of the discussion, I emphasize to them….nothing but the facts…..no interpretation. As this process goes on, I pull out images of the feature we are considering, and have them marked up, with some (usually the most important) of our observations. With further discussion, I then pull out another image, with additional markings/details. The process may repeat itself several times, until the final image is one that focuses on interpretations. We close, at least for the moment, with the general question of whether the discussion made sense, and then talk about predictions.

I have found that the approach works quite well. Probably the very first field geology course taught emphasized the importance of accurate recording of

information, including sketches, in a field notebook. Students should not be expected to be their own good artist, but they should be able to accurately portray field relations, for their own use. Digital imaging helps with the process, step by step. Based on a fair amount of feedback, the very simple exercise I have outlined appears to be of use in facilitating students going through the process of visualization and accurately and neatly recording information, on their own.

I close with a question, based, no joking, on experience. What do you do when, on the last day of the last project in the field course, and you run into a student with that student's partner, and the first thing the student says is, "John, which way is north?". Do you (a) scream?, (b) recite the famous line outside the Vesuvio Bar, on Jack Kerouac alley in San Francisco (When the shadow of the grasshopper falls across the trail of the field mouse on green and slimey grass as a red sun rises above the western horizon silhouetting a gaunt and tautly muscled Indian warrior perched with bow and arrow cocked and aimed straight at you it's time for another martini), or (c) look the students in the eye with a smile and say, "ah, you two are doing such a great job, I am so very proud of how you have matured and grasped fundamental geologic principles and approaches during thiS course……????????