BCECSA data, May 9th

1. Name one concept that your students have trouble with every year. (E.g., you think they are getting it, but they do poorly when tested on it or asked to explain it later = this drives you crazy!)
2. Describe how you teach this topic in your course (e.g., lecture, lecture demo, class discussion, lab activity, lecture activity, field trip, field activity, other). Describe all that apply.
3. Do students see explicit learning goals covering this concept prior to assessment? (If so, list here.)

	1.	2.	3.
1	Students seem to find it difficult to understand that the lithosphere includes the crust and the upper mantle. They also have difficulty contemplating that there can be different properties within the mantle. The idea that part of the mantle could be melting and liquid, while other parts are rigid, and other parts are plastic.	Primary by lecture.	No.
2	Mantle is mostly solid and plastic rheologically not molten. Crystalline metamorphic rocks to not originate from the crystallization of melts.	1-5 for mantle 1-7 for meta rocks	What is a learning goal?
3	We study the variation in volcanic products that are associated with composite volcanoes - lava flows, pyroclastic flows, air fall tephra, lahars, domes, etc., and discuss the relative volume, extent, and energy of these products. As a class we discuss and come to an agreement that Mt Baker is the closest potentially hazardous volcano that could impact Vancouver. However, when asked the in-class participation question "My friends should know that _____ is the most likely volcanic hazard [from Mt Baker] that might affect us at UBC. This is because _____." and simultaneously shown a map of the entire area, many students answer that lahars would most likely affect UBC. Arrgh! *Correctly transfer hazard to situation*	Lecture PPT on volcanism including photo of Mt Baker seen from Vancouver, online PPT notes, assigned textbook reading chapter on volcanism, class discussion about which is the closest potentially active volcano to Vancouver, plus an in-class 3X5 participation exercise (I will send it to you via email)that asks "My friends should know that _____ is the most likely volcanic hazard [from Mt Baker] that might affect us at UBC. This is because _____."	2 lecture-level learning goals are relevant: Students should be able to: recognize and describe different volcanic products and associated hazards; compare and contrast the physical and chemical characteristics of different types of volcanoes Here are the course-level learning goals, of which #1 and #3 are most relevant: Earth is a dynamic planet, and the processes that have shaped it and continue to shape it before our very eyes are the focus of this course. As a citizen of Planet Earth, you make environmental, political, and socio-economic decisions about your life for which knowledge of the solid earth is relevant. By the end of this course, you should be able to: 1. Describe the dynamic processes that form Earths materials, produce its internal structure, and shape its surface features. 2. Appreciate the influence of geologic time on the processes that shape our planet. 3. Apply your knowledge of geoscience to environmental, socio-economic, and political concerns.
4	Understanding what cleavage is and how to distinguish cleavage from fracture, and mineral cleavage/fracture from rock fracture.	The concepts are introduced in lecture, and then there are lots of hands-on opportunities in the lab.	Not so explicit, but they are made aware that understanding and recognizing cleavage is critical to identifying minerals.
5	Kettle-hole lakes and the source of the water in the lake. Every year I'm convinced there are students who believe that the water in a kettle-hole lake must be the actual same water from the chunk of ice that melted to cause the hole to begin with.	Lecture and also possibly in lab. By now I try to explicitly point out that the current level in the lake is all due to whether or not the current water table is above the lowest level of the kettle hole and has nothing to due with the melting glacier ice from thousands of years before.	Only in the form of a review sheet that suggests it might show up on the final exam...
6	Texture of IG rocks	Lecture with samples handed out, then lab component.	Yes students should be able to identify different textures of IG rocks in samples and pictures
7	How the presence of geo-magnetic reversals on the seafloor verifies the seafloor spreading hypothesis.	In lecture this is discussed first as the topic is introduced in the powerpoint lecture, then the overhead is turned on and I restate the concept while drawing a block diagram of a mid-ocean ridge, showing the symmetry of magnetic 'stripes' on either side of the ridge. Then back to the powerpoint with diagrams showing this in a number of examples (the Atlantic, the Explorer Ridge).	No - I assume that they should learn all material covered in lecture
8	The difference between greenhouse gas warming and stratospheric ozone depletion as two separate (though related) phenomena.	Lecture, class discussion	Explain the differences between greenhouse gas warming and stratospgeric ozone depletion

4. Outline an existing in-class activity (if you have one) that you use to assess the concept or misconception that you describe in question #1 above:

A. Please complete the following sentence: *After working through this activity, students will be better able to …*

B. Do students see an explicit learning goal or objective targeting this activity, like the previous sentence? Yes No

C. What do students PRODUCE (e.g., worksheet, map, decision, opinion, class poll, other) at the end of this activity?

D. Explain what student do DURING this activity in order to arrive at the product you just described.

E. Do you assess the results, either to provide feedback, or to contribute to grades, or both? If yes, how is that assessment done and feedback provided?

	A.	B.	C.	D.	E.
1	I do not have an in-class activity, but would love to have one!	Y	In the lab, I have one question that asks students to describe how magma is formed in the mantle. They are asked to produce a figure/diagram that shows where and how magma is produced in the mantle.	The students read a description of magma production in the mantle. They are then asked to produce an annotated diagram.	Yes, both. I read the answers and then discuss with them.
2	… 1) describe how convection relates to partial melting in the mantle and to plate motions. 2) explain the genesis of coarse grained skarns and regional metamorphic rocks	N	lab exercises and field trips	labelled drawings, essays, fill in the blank questions, calculations	I have no idea what this sentence means.
3	… recognize specific volcanic hazards that (in the future) may affect where they live and study	N	written answer on a 3X5 card (and my answer to B. above is yes, sort of, AND no, not so specific as what I wrote in A. above)	They look at the question and accompanying map projected in the lecture hall, and they are allowed to discuss the question with their neighbours (or sometimes I do not allow them to discuss with their neighbours. I vary this and I cannot remember exactly what I said in fall 2010, but it was probably OK to discuss with neighbours first). They have about 5 minutes to write their answers which are then collected by TAs.	Yes, I read them to provide feedback in he next class, AND turning in a 3X5 card with any answer counts as a participation point for the day but is not assigned a grade per se. In the NEXT class after this participation exercise, I show a histogram of their answers..... or maybe just verbally state their results. Then I show a map and discuss the distance to UBC from Mt Baker, Fraser and Nooksack river drainages, volume of lahars, how far lahars travel (could see this on Mt Rainier map in text and Mt Baker map, online USGS website)and hopefully they come to see that ash fall is the most likely hazard to affect UBC, and that it is very unlikely that a lahar from Mt Baker would be to UBC (Abbotsford/Fraser Valley near Sumas may not be so lucky however!) I have the 3X5 cards from fall 2010 if you want to tabulate their answers, or I might get to it before this workshop.
4	… understand what cleavage is and how to distinguish cleavage from fracture, and mineral cleavage/fracture from rock fracture.	N	worksheet	Working in groups they examine lots of mineral and rock samples and identify cleavage and fracture.	The worksheets are self-assessed.
5	After working through this …	N			
6	… identify different IG textures	Y	worksheet/lab then a lab quiz later on.	Work with hand samples and compare and describe them.	Yes lab is reviewed in class and credit given. Material tested on a lab quiz.
7	After working through this …	N			
8	After working through this …	N			

5. Is there another question, concept, or misconception relevant to your first year course for which you WISH you had an in-class activity?

1	
2	already listed
3	Fear of having to understand or recognize or be asked to write out chemical formulae, for example how water and CO2 combine to form carbonic acid, then disassociate to form HCO3- and H+; how CaCO3 + H+ + HCO3- = Ca++ + 2HCO3- (solution of calcite). Also reaction of K feldspar with H+ and HCO3- to form clay. The sight of these equations scares science-phobes in my first-year course. But understanding these equations/reactions is important for understanding the concept of chemical weathering of rocks (and man-made materials/structures) at/near Earth's surface.
4	no
5	Although I will not be able to attend the workshop, I'd be interested in having access to to any tips discussed...
6	Plate tectonics. I usually show a video or two, but having an interesting activity in-class is tough to find.
7	This summer I am revamping my first year intro geology course and plan to add some activities to either the lecture, or post them online. The problem at SFU is that there is only two 50-minute lectures for the first year course (where some institutions have three). Additional activities replace lecture time to cover other information so a balance has to be struck. I am moving away from powerpoint as much as possible and returning to the old-school 'students take notes and draw diagrams' style which I find works much better. It is unfortunate that most lecture theatre rooms at SFU are not set up well enough to have both powerpoint running (for photos and text figures) while old-school lecturing on the overhead.
8	The difference between heat and temperature.

	Challenging concepts	**How you teach this topic**	**Goals?**	**Activity**	**feedback**
1	lithosphere includes the crust and upper mantle.	lecture	No	Sketch based on reading	yes
2	mantle includes both melted and liquid, rigid, and plastic.	lecture, lecture demo, class discussion, lab activity, lecture activity	?	sketches, essays, fill in blank questions, calculations	?
2	Crystalline metamorphic rocks to not originate from the crystallization of melts	lecture, lecture demo, class discussion, lab activity, lecture activity, field trip, field activity	?	sketches, essays, fill in blank questions, calculations	?
3	Identify relevant hazard for a given setting and geography.	Lecture, reading, 3x5 inclass	Yes	peer disc'n, minute paper (3x5 card)	Yes
4	Cleavage vs fracture, and mineral cleavage/fracture versus rock fracture	lecture, lab	implicit	worksheet using samples in groups	self assessed
5	Kettle-hole lakes and the source of the water	lecture (lab)	implicit	-	-
6	texture of igneous rocks	lecture, demo, lab	Yes	worksheet using samples & quiz	Yes
7	Geo-mag reversals relating to seafloor spreading	lecture, discussion	No	-	-
8	greenhouse gas warming versus stratospheric ozone depletion	lecture, discussion	Yes	-	-