Lesson Critique Assignments

‘Clinic One’ was a lesson on topographic maps highlighting scale and contour lines; presented independently by myself and Andy Palmer, my partner, on November 6th of 2008 to two small groups of four and three seventh graders respectively. Our intent was to elicit interest in our subject initially by invoking reflection on student prior knowledge of maps and their uses. To this end we asked the students what they themselves had seen, or used and what they had been used for. Building upon these uses we cited any major functions that had been missed, such as: direction, distance, landforms, etc. To segue into our first instructional objective we asked that the students explore estimating distances on a sample map that although drawn to scale, lacked any representation of that scale. After introducing the topic we intended to engage in an activity searching for the features necessary to perfect our interpretations, including: the scale, compass rose, and legend. After finding these the procedure for use was developed via an explanation of ratio and its application to the use of the graphic and numeric scales present on the maps converse side. This explanation was intended to include an active exploration of scale through the use of rulers, paper and pencil which also acted as a formative assessment. When it was apparent that the objective had been sufficiently accomplished the explanation shifted to focus upon the contour lines. These were explained to lines of equal elevation and through guided inquiry students arrived at the conclusion that contour spacing relatively conveyed degree of incline. This was also conveyed via a tactile representation of a mountain made of cardboard shelves. Exploration of the map to find the various extremes in steepness, height, and planar nature ensued. To close we requested that the students draw a profile of Mount Nittany, along a predetermined path, that was to a scale of their own contrivance in both the vertical and horizontal. This was the form of our summative assessment.
My presentation of this lesson varied from the aforementioned plan in some ways as a function of time and necessity in order to better accomplish the instructional objectives. This need was dictated by my own intuitions on the noted formative assessment opportunities and some independent observations of my own in the term of teaching. I began much in congruence with the plan with a conversation about the various maps that they had seen and used as well as their functions. I varied in the intended order as I broached the subject of map parts during the estimation activity and discussed legend. Scale was also introduced as a key term by one of the students even prior to this activity but I did not further explore so as to not lose my time in reorganization. I then got back in line with the intended lesson form with the engagement activity of finding all of the various map parts. This followed into the explanation of scale as a form of ratio; in this I met the diversity of the student body, I had one student at each polar end of the spectrum of prior knowledge and understanding. The unfamiliarity of B. with the use of ratios in dimensional analysis almost extended, seemingly, to difficulty with the basic principles of the mathematics. This required a regression in the speed of the lesson’s development and very detailed development of the method as well as the reasons for its use starting at point at which the student had a firm understanding. This was in basic fraction mathematics, which was a convenient building point. This resulted in two false starts as I attempted to move on and found the point still in contention, noted via expression. After multiple worked examples I got the issues worked out and we successfully developed the method and put it to use on mount Nittany as directed by the plan.

The extra time spent in dimensional analysis entailed a loss of time that precluded leisurely development of contour lines. I rushed the explanation developing it fully but in a far
less interactive and engaging means than originally intended. I wound up more or less spoon-feeding information through guided inquiry via teacher centered questioning. *Not the way I like to do things.* Well, I’m selling myself a bit short. I did get to have the students develop their own understandings of elevation markings and change and I did get to have student involvement in the guided inquiry into steepness being a function of vertical variation over a horizontal distance. I did not, however, get to have students explore the map for the highest, steepest or most level ground. I also had to completely forego the summative assessment, time was just too limited.

In regards to inquiry I found the guided method of inquiry most easy to use and it fit with my own personal, long-standing, style. I believe I would be able to employ, with conscious effort, a more open variety of inquiry but the application of such would require more time in order to ensure the development of ideas to or beyond the criteria of the instructional objectives. In reference though to this clinic I believe guided served well, as many of the subjects are so wrapped up in arbitrary definition that open inquiry would fail without outrageous amounts of time lost in research. The form of formative assessments goes far beyond intentional inclusion of contrived activity, expressions, tone of voice and even body posture are great ‘tells’ of a student in distress. These sign give an observant and intuitive teacher the employing a guided inquiry to slow things up or contrive new means to get clarification to that student. Unfortunately, at least in the case of a teacher of my inexperience, this can result in an inordinate amount of time put to inefficient use in the case of all students that are on track at that point. I’m sure there are means by which such loss can be minimized but at this point I would still be required to rely on catching up, which would most likely result in the need to stop again due to
the accelerated pace. This is a failing related most closely with guided inquiry but also in some degree with coupled as well. Open inquiry however may not feel this fault as the students not requiring aid are more capable of self-development of the lesson, therefore the only one needing to catch up would be the formerly lost student and the teacher when the dissonance were resolved.
SCIED 411 Clinic 1 Lesson Plan
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Presenters
Andrew Palmer  arp5069@psu.edu
Lance Cunningham  lac273@psu.edu

Grade Level and Topic
7th Grade
Topographic Maps – Understanding Scale and Contour Lines

Standards
PA Academic Standards for Science and Technology (7th Grade)
3.1.7-D. Explain scale as a way of relating concepts and ideas to one another by some measure.
  • Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications.
  • Describe scale as a form of ratio and apply to a life situation.

Instructional Objectives
- Understand the abstract concept of a scale as a ratio and recognize it on a map
- Understand contour lines as a ratio indicating slope and recognize them on a topographic map
- Use the ratios of scale and contour lines to draw a profile of Mount Nittany

Content Explanation
Ratios are a difficult concept to initially learn, yet becomes an integral part of thinking throughout schooling. We will present ratios to the students through a topographic map’s scale and contour lines. After locating the scale on topographic maps of the State College area, the students will use rulers to measure the scale and relate it to various places around their school’s location on the map. Once this horizontal ratio is understood, the students will be introduced to a vertical ratio through contour lines. On the maps used, one contour line represents twenty feet (20 ft.) in elevation. Every one hundred feet (100 ft.) in elevation is indicated by a contour index line, which is bolder than the common contour lines. Students will identify on the provided maps steep areas, flat areas, valleys and hills. The lesson will end with the students using their understanding of both scale and contour lines to draw the profile of Mount Nittany.

Administrative Considerations
- Students not understanding how to use a ruler
- Maps may not photocopy well
- Broken rulers

Materials and Equipment
- Photocopies of maps so that students can write on paper
- 7 rulers with millimeter markings
- 2 original topographic quadrangle maps of State College area
- Paper for students to draw Mount Nittany profile
Lesson

Elicit (1 minute)
- Ask students if they’ve seen a map before – what kind?

Explore (1-2 minutes)
- Have students estimate distances on map without scale
- Water tower & reservoir, two town halls
- How much further is one distance greater than another?

Engage (1 minute)
- Have students identify parts of map by pointing to it
  - Scale
  - Legend

Explain (2-4 minutes)
- Confirm that map is accurate representation of real world
- Introduce scale with rulers (mm side is more accurate)
  “In order to keep the smaller map proportional, a ratio of scale must be used.”

Explore (1-2 minutes)
- Have students measure distances using rulers and scale
- Compare distances and confirm observation made without scale
- Now that we understand the horizontal scale, let’s learn the vertical scale
  (Where is the highest point on the map? Lowest? Steepest? Flattest?)

Explain (3-4 minutes)
- Identify map showing that contour lines represent ratio of slope
- Lines close together show steepness while farther apart indicates flat
- Introduce contour index lines for very steep slopes – bolder, less frequent

Explore (1-2 minutes)
- Have students identify the highest, lowest, steepest and flattest parts of map
- How steep/flat/high/low?
- Are these the same areas pointed to before understanding contour lines?

Evaluate (3-5 minutes)
- Have students draw a profile of Mount Nittany to show understanding in both scale and contour lines

Extend (1-2 minutes)
- Invite students to apply lesson on ride home and around school
- Let them take home their copies of the maps of their school’s quadrangle

**Elaborate (SPONGE)**
- Have students minimize error by correcting scale on their profile
  one cm equaling fifty feet is more accurate than one cm equaling 100 ft