1. **Briefly describe each lesson in a few sentences, in terms of the content taught.**

Day 1: On day one students are exploring refraction, the bending of light. Students have not yet been introduced to the term. The lesson is very inquiry based.

Day 2: On day two students continue exploring refraction (still not using the actual term), particularly with convex and concave prisms/lenses. The lesson is very inquiry based.

Day 3: The focus of the lesson on day 3 is on color. Through inquiry, students try to determine if white light contains all of the colors of light (ROY G. BIV).

2. **List the apparent (to you) objectives of the lessons and compare your list with Dan's description of his objectives. What might account for differences?**

I thought that Dan's objectives were:

- Students will be able to describe the refraction of light as light passes through a material at an angle.
- Students will be able to identify the color of light that make-up white light.

I was very surprised to hear Dan's version of the objective(s) at the beginning of his interview. Dan described his objective(s) as wanting students to be able to describe how light travels through different media (lenses, cameras, etc.).

I think that differences in our ideas are because Dan knows what lessons have come before the 3 I viewed and he also knows what lessons are coming next. It was interesting to me that Dan never really addressed the difference in the path of light while it was in different media, yet this was his objective for students.

3. **List the major activities that comprise the lesson and the organizational structure of each (e.g., whole class, small group, individual, lab groups, etc.). In order to do this, make use of the Mercedes model as an analytical framework. That is, indicate the day and beginning time codes from the videos, a sentence description for each activity, and identify each activity as "building the knowledge base," "possibly teaching for understanding," or "dealing with applications." Also, indicate the percentage of time you think Dan's classes spent in each part of the model.**

Day 1

00:00:00   Dan reminds the class of their work in class the previous day (Friday) when they were "messing around with the light boxes and lenses/prisms.

00:01:50   Students work in small lab groups to complete an assigned task—students send 3 beams of white light through a triangular shaped prism, drawing/tracing their observations. While groups are working Dan walks from group to group answering and asking questions. *Building a Knowledge Base*

00:19:00   As a whole class discussion/lecture Dan draws what the students see and describes the normal angle to the students. There is opportunity for students to make their ideas public. *Building a Knowledge Base*

00:25:05   Dan instructs students to write rule about how light acts when entering the light and when exiting the block. *Developing Understanding*

00:36:30   Students complete task similar to first, only using a ½ circle shaped prism. Students are checking to make sure their rule still applies. *Developing Understanding*

00:46:50   A whole class discussion occurs to discuss the validity of the rule with the ½ circle prism. *Building a Knowledge Base/Developing Understanding*

Day 2

00:52:40   Dan reviews previous day's work, including the normal angle and the rule.

00:58:25   Students begin exploring how light travels through the triangular prism when the triangle was turned up-side down. *Developing Understanding*

00:10:30   Brief class conversation occurs about observations. *Developing Understanding*

01:11:05   Students are to choose a prism that is shaped like the two triangles that form a convex lens. Students were to draw a diagram of their observations. *Applying Knowledge*

01:23:00   Students use same two triangles, shaped like a concave lens and draw diagrams of their observations. *Applying Knowledge*

01:29:30   Students are to choose a prism that is shaped like the two triangles that form a concave lens. Students were to draw a diagram of their observations. *Applying Knowledge*

01:36:00   Students are instructed to use the triangular prism and mess around until they can separate it into different colors of light. Students record the colors of light they see. *Building a Knowledge Base*

Day 3

00:00:00   Students set up light boxes and re-create the colors they were able to produce on the previous day. A whole class discussion occurs to discuss the colors students are able to see. Dan asks the students where the color comes from and allows for lab group discussions. A bit of whole class discussion occurs as students are working in their lab groups. *Building a Knowledge Base*

00:21:30   A whole class discussion occurs about what students/groups think about the colors. The majority of students seem to think that the colors come from the white light. Dan suggests that white light is a mixture of colors and then asks if there is a possible way to turn the colors back into white. *Building a Knowledge Base*

00:27:30   Students mess around to determine whether or not the colors can be put back together and become white light again. *Building a Knowledge Base*

4.   **Briefly describe at least two instances where Dan monitored students' progress toward his learning goals (objectives). For each one you describe, indicate whether (and, if so, *how*) information about students' progress influenced his subsequent instructional decisions and actions.**

Dan monitored students' progress throughout the lesson—there was a lot of embedded assessment. Dan is assessing student understanding when he asks the students to choose a prism/lens that they think will act similar to the 2 triangular lenses that formed convex and concave shapes. Students seemed to grasp these ideas quite easily and so Dan was able to move one. Dan was also monitoring student understanding when he asked them where all of the colors came from (what their source was). Students seemed to struggle with the idea that white light was composed of all of the colors of the visible spectrum which is why he made the decision to have students use 2 prisms and try to turn all of the colors of light back into white light.

5.   **Identify and briefly describe four examples of Dan teaching for understanding. Again, indicate day and beginning time codes, but also explain why you think this qualifies as teaching for understanding.**

Day 1, 00:36:30   Students use the ½ circle prism/lens to determine if the rule they wrote about light entering and exiting the prism/lens was true for shapes other than a triangle. In this situation, Dan is asking them to apply newly gained knowledge and apply it to another situation/example.

Day 2, 01:10:30 AND 01:29:30   In both of these instances students are asked to choose prisms/lenses that are shaped similar to shapes they have explored and predict how the light will travel through them. Again, Dan is asking them to apply information they have just learned to another situation/example.

6.   **Identify and briefly describe two examples of missed opportunities to teach for understanding. Again, indicate day and beginning time codes, but also briefly describe (a couple of sentences each) what you would have done to foster understanding if you had been Dan.**

Day 1, 00:19:00   Dan's students seem very confused by the normal angle. Dan seems to move on without much concern about whether or not students have a clear understanding. To foster understanding I would have attempted to use an example outside of the light and prisms.

Day 3   From the 3 lessons we saw it is quite difficult to determine whether or not students ever really came to an understanding about white light being composed of all the colors of the visible spectrum. This was alarming to me. To foster student understanding I would demonstrate another instance of white light being separated into all the colors of the visible spectrum.