NOAA SANTA MONICA
SHOT LOG AND AUDIO SCRIPT

SHOT/REEL/COPY (clip length)

SEQUENCE 1:

1/1/1: (00:12.00) **KURT/IN CLASS**: All right, how're we doing friends? Give me that thumbs up as soon as you're done, right? We know that as a pacing tool you can help me us moving, which we all really like if you give me your thumbs up as soon as you're done with the task at hand.

2/2/3: (00:14.27) **KURT/INTERVIEW**: So my goals were simply to make sure they understood the different zones in the ocean and as importantly how they got there. You know, the skill of classification is probably the most important goal in all that. But I try to keep clear on the science process skill.

3/11/1: (00:23.26) **KURT/IN CLASS**: You guys, what's biology all about? (answers) Just yell it out, what's biology? (answers) OK, there's two controlling ideas in the study of biology, and they are? (pause) Think back to the evolution work, the predator/prey stuff. (pause) What influenced people? (answers) Food is definitely a big one, right? Biology boils down to food – what else?

4/2/3: (00:22.17) **KURT/INTERVIEW**: The "All That Glitters" lesson is one of about six that have come out of the Ocean Explorer series, and they're phenomenal resources. I don't have to do a lot of thinking, frankly, and teachers don't tend to have time to do that. But I can look at it, I can read it, I can make sure I understand it, which is first – you've got to know what you're talking about. Two, then I can get rid of the parts that don't apply, and I can come up with the goals that fit.

5/11/2: (00:57.16) **KURT/IN CLASS**: Our goal is the same as it was yesterday when I introduced just this daily page, we're going to practice classifying ocean zones by their light characteristics. Now let's back up a step. Who remembers how we classified the beach? What did we classify the beach as? (answers) Yell it out if you know. (more answers) Backshore, foreshore, what's in between? ("berm") OK, so we took the characteristics of that area and we classified it. We're going to do the same thing using light. Who can give me a brief sort of definition of light – which we're about to be turning out here – definition of light – definition of light – Simon, want to try it? You're thinking about it so go for it, take a risk ("something that's bright") Something that's bright, OK, that's part of it. Excellent. Somebody else take a risk … no need to be right, you need to take a risk. ("something that penetrates darkness") Something that penetrates darkness, good! OK, excellent, one more, anything that could be light?

6/2/2: (00:42.11) **KURT/INTERVIEW**: The goals are a little different from what came straight out of the lesson plan. I think most experienced teachers will recognize right off that if you take a gem-like material that NOAA provides … and you render it down, you create real gold out of something that's got a lot of fluff and fat on it, and in that way I took the very best parts out of "All That Glitters" and I got rid of some stuff because if I tried to do everything literally as they put it would have been a long lecture, and I prefer to do inquiry based activities where people get to mess with stuff and figure it out and … the single most important element is that they be engaged, that it be cool.

7/1/2: (00:46.15) **KURT/IN CLASS**: We're going take a look at light. We're going to break it down into its component pieces. Everybody put your right or left hand out in front of your face for a second. Just take a look at it. Would you agree that's a hand? ("yes") OK, somebody yell out, or everybody yell out the component pieces of your hand. What are the parts of it? (class answers) Fingers, right? Bones! What else? (more answers) Muscles. Knuckles. Nails. So can we agree that the parts of a hand, the component pieces of a hand, are what we just described? We're going to take a look at the component pieces of light. As light streams in you see this kind of white light up here, right? Everybody see white light? ("yes") With me on that? Easy, huh?

8/2/4: (00:22.04) **KURT/INTERVIEW**: What's particularly important in your classroom is a very clearly ordered set of concepts that are really valuable and engaging to kids. And I don't need much more planning than that, so material like the Ocean Explorer stuff is great for me because it just gives me the concepts, and I've got this whole bag of tricks that I can just draw on back and forth and deploy.

9/1/3: (00:56.09) **KURT/IN CLASS**: OK, so tell me what you see and tell me how it relates to light at all. ("rainbow") Looks like a rainbow – excellent! OK, so there's a whole spectrum, a range of colors ("blurry") and it's blurry, blurry, what colors do you see towards the bottom? (class answers) OK, and all the way toward the top? (class answers) And I'm personally not seeing much green – I think that's a problem with my eyes. But is everybody pretty able to see that well, even in the back? Ayatidi, are you good? ("yes") Boy, you do have some good eyes! I can't even tell who's back there half the time. OK, take a minute and write down on your paper exactly what you see, and you should notice a relationship to our little memory aid right here. I need to know whether this is an order, or whether it's reversed, or what. So, you tell me what you're seeing versus what I wrote on the board. Just yell it out when you have an answer.

10/2/7: (01:13.10) **KURT/INTERVIEW**: The key thing in any lab-type lesson is to do it. … What I learned a long time ago, whether you're a veteran or new is during a study hall or some prep or some odd moment you'd better make absolutely sure you've messed with the prism, you've messed with … you need to know what you're talking about. It's not enough to know the concepts, but you should actually do it. In this lesson, for example, it took me 47 minutes to get the slit cut over the projector – you place a piece of paper with a slit in it – so the light beam is directed into the prism correctly. It took me 47 minutes to figure that out! So, you've got to take the time to do that stuff if you're going to do a lab lesson. There's no substitute for that sort of time on the ground – do the lab. Now most pre-service teachers are going, 'I don't have any time for that,' and that's true, you basically don't, which makes some of the more prepared materials so much more important. You still have to do the activities prep, but you don't have to do all that other prep. So things like Ocean Explorer or Gems from Berkeley … these things really work.

11/1/4: (00:37.23) **KURT/IN CLASS**: ("oh, that's the colors that are there") OK, that is the colors, isn't it? (students comment) OK, so I've got it inverted, don't I? ("YES") But do you see the red there? ("yes") And the orange? ("yes") And the yellow? ("yes") And you guys see the green but I do not, and then we've got blue and violet. A couple of people are saying they've seen indigo in here as well and they are exactly right, especially for high-school-level work. OK, so has everybody had a chance to write down exactly what you see so far? ("yes") Just list it in order.

12/2/5: (00:27.27) **KURT/INTERVIEW**: School is boring often and our job as teachers is to try to prevent that. So I took the most engaging parts – the beautiful visual prism – for example, and I got right to the meat of it with that. I did it in a couple of ways – preparing – but then right away I launched into the activity with the deep-sea glasses. Again, I'll take the risk of not having explained something thoroughly, because I'm asking them to take risks and to explore.

13/1/5: (00:38.22) **KURT/IN CLASS**: OK, I see some folks are figuring it out. Yell out if you think you know what the blue is going to represent. ("twilight") Is it light or is it what? ("twilight") Because what's our goal – what are we practicing classifying, you guys? (class answers) Look at the board for me, friends. What are we classifying? (answers) … by using light, so, yes, we've been talking about light up to now, we looked at the light spectra, as it's called, but now we're going to be talking more about the oceans. So everybody, I'm going to step you through the first part of this procedure. Go ahead if you could and get what I'm calling your deep-sea glasses out. This represents the ocean. Get those in your hand if you've got one.

14/1/6: (00:42.14) **KURT/IN CLASS**: Something else I see that Gingie and her group has done is arranged these little dots in the exact way that the light spectrum works – so the ROYGBV thing works. If this represents the ocean what do you think the little dots are going to represent, friends? (class answers) Just yell it out. ("bioluminescence") Not so, unfortunately. When you saw the prism and it refracted the light, what colors did that change the white light to? (answers) A rainbow? And what colors are

represented by that memory aid on the board, you guys? Let's see if we can figure it out. What does R stand for? (answers) And does that match these little dots? ("yes")

15/1/7: (01:14.16) **KURT/IN CLASS**: Ladies and gentlemen, what does this represent? ("water") Hold that up to your eyes. Can you perceive that that is sort of like looking through some shallow water? ("yes") Hold all eight up to your eyes. You should see basically nada. (answers) Little bit, but you guys got so much better eyes than I do, I can't see anything. … That's the whole ocean you're looking down through. If you're looking down through many layers and it is very, very dark out there, what layer of the ocean do you think you are in? It's dark now – very dark. (answers) It's the deep part, and if you were to use the key concepts (answers) … If you were to use these ideas up here, what do you think, everybody? (answers) … Is it going to be lightless down there? Is it going to be dark, like midnight, right? And how about up on top? (answers) Photic/photic, call it whatever you like, it's fine, we'll get to the real definition later.

16/2/8: (00:24/20) **KURT/INTERVIEW**: A week ago I handed them some vocabulary words and I said "look these up, write a sentence using them properly – you know, paraphrase. That's a standard vocabulary assignment if you will. They tend to precede any given lesson by about a week. And that's all the preparation they had. Otherwise, they walked into that pretty cold, other than the general oceanographic background that they have, which is considerable …

SEQUENCE 2:

17/1/8: (00:38.15) You're going to take these and you're going to place them in ROYGBV order down on your black piece of paper. You're going to pretend you're up in the very shallow water looking down. What does the black represent, what zone does the black represent? (answers) Aphotic zone, right? And if you were on your back on the bottom of the ocean looking straight up, what would be at the top? ("photic") OK, the photic zone is on top, isn't it? All right! So your job, and I'm just going to step you through this piece by piece, is put everything in ROYGBV order right down on your black paper. Give me the thumbs-up when you've got that done, friends.

18/1/9 (00:14.00) OK, next, one member of your group go ahead and put the deep sea glasses to your face – just one strip – and I want you to note what stays visible and what disappears first.

19/1/10 (00:06.23) OK, second step, you're going to do two of these; third, three. Does that make sense so far? (answers)

20/1/11 (00:13.13) OK, I see that people are figuring this out. Excellent work, you guys. Now, start using your data table and write down what disappears first, what disappears second, what disappears third, etc., etc. etc.

21/1/12 (00:14.22) OK you guys, you can start. I want to see at least two or three columns of the data table filled out, and that data table is about the order in which they disappeared. And we know that we have to do multiple trials, multiple tests every time.

22/11/8 (00:16.25) (Three girls looking through deep-sea glasses)

23/11/9 (00:10.05) (Two girls looking with glasses at ROYGBV dots)

24/11/10 (00:12.23) (Two boys and girl looking with glasses at dots)

25/11/11 (00:15.21) (Girl and boy beginning second trial with glasses)

26/1/13 (02:58.13) OK, ladies and gentlemen, let's take a quick look and then I want to put you to work working on those thinking questions, for which you'll get about 3 minutes. You've now seen that certain things happen pretty consistently and there's some inconsistencies as well, and that's about how we designed the experiment. What would you say was consistent? Just kind of yell out what you thought

disappeared first. (“red”) Is that pretty consistent? (“yes”) Everybody got the same result. Why do we care how many times we tried something? (answers) … Let me ask the question again, and then I just need to see hands. Why do we want multiple trials in an experiment? (answer) … All right, we want to come to an accurate and a quality result, right? If I do something once and it turns out a particular way, could that just be an accident? (“yes”) Sure it could. We do that all the time, right? But 20 people in this room tried it and red disappeared first, agreed? (“yes”) So thinking about the thinking question now, if you’re an animal and you want to live in the twilight zone or the aphotic zone, what color do you think you might want to be? (“red”) Why? What’s the advantage of that? (answers) OK, I hear the word “camouflage,” what else? (answers) Things can’t see you. Is that a neat thing if you’re looking for some food? (answers) Sneak up. What if you’re looking for a mate? (answers) OK, so you want to be a color that could be seen. What else could you do? Let’s say you’re a red fish because you don’t want to be eaten, but you would really like to find … a mate. What can you do? (answers) … Would it be nice to be able to turn this off and on? (“yes”) OK, so now you’re down in what zone? In what zone am I in? (“twilight zone”) You’re in the twilight zone, you’re below, so you’re in the deeper mid-ocean, right? And you’re looking for a date, what do you do? (answers) You have a chemical reaction, right? (setting up demo of angler fish) So the angler fish, who remembers Dr. Love? Milton Love? Anybody here from that group two years ago? What’s an angler fish? (answers) A fish that’s got something sticking out of his forehead … and what’s his purpose in doing that, do you suppose? (answers) Bingo! You got it! So now I’m going to give you about three minutes to work and reflect on those questions – seventh grade, eighth grade, sixth grade leaders, make sure this happens. Talk to each other. You have demonstrated great quality scientific minds, you’ve done observations, now seek to answer something using that knowledge. … yeah, write it down for us, but mostly talk about it so you get some really good quality answers.

27/2/9 (00:43.29) During the lesson itself you’ll see that I’m circulating constantly and frankly that’s the real evaluation, that’s the real assessment, because I’m watching to see what patterns are showing up in their data – are they using metric measures, for example. Are they developing … support for whatever conclusion they’ve come to? And I’m constantly talking about that. And the thinking questions are my second concrete way to do a check for comprehension. The questions are in there, they answer them, and they’re fact-based, they’re not conjecture, they’re not speculative, they are about real, fact-oriented things. So, there’s both the inquiry/let’s just explore thing happening. There’s also the “Hey, there is some stuff you gotta know.” And that I get from the comprehension questions or the thinking questions.

28/11/16 (00:54.22) (Kurt discussing bioluminescence with two boys)

29/2/10 (00:37.16) I find the ocean THE best way to enter all sorts of subjects, so I use it constantly, and this is true even when I lived in Middle America, because the ocean’s connected to everything else, rivers and streams, by watersheds, so you could constantly come back to that. The point is they’ve got lots of … background that wasn’t focused on this particular lesson, but they’re used to talking about the ocean, they’re used to talking about classification, and they’re used to Socratic approaches when they’re in my classroom … the sixth graders are much less so and the eighth graders are much more so, and that’s just a matter of exposure to me.

30/1/14 (00:40.20) Ladies and gentlemen, your attention. I just want to briefly hear a couple of your ideas, what you think is going on here, what can we use bioluminescence for. And this is going to lead us into a much more full discussion in the next couple days of animal adaptations and how they adapt to being in either the photic zone or the aphotic zone. But what are your ideas at this stage? I need a couple of volunteers who are willing to share – Alex? (answer) OK, so you could use it to actually attract food to come up to you and then you could bite it, and a have a great time – if you’re living in the (answer). Exactly right, so you got 10 questions off, Alex. Good job!

31/2/11 (00:33.16) You’ve never seen chaos until you’ve seen a middle school classroom, where every day they’re starting fresh with kind of a different system. … That doesn’t prepare them for success. By having a really good series of routines, and I mean this for experienced teachers or for pre-service teachers – people with just a month of experience – then the kids are automatically having a success right away. Instead of going around and saying ‘Kurt, what are you doing?’ they go

‘Hey, Kurt, I notice you’ve got your page going, you’re working on the words – you rock!’ And right away the atmosphere is positive and encouraging and they feel like they want to be there.

32/2/12 (00:22.22) For pre-service teachers I want to underline the key role of having solid routines, and I think the literature really supports this. Achievement jumps dramatically anywhere there’s – I guess you can think of it as anywhere there are background programs that are running, so that you can concentrate on your relationship with the kids and delivering the content in a way that’s really fun. If you can do those two things you got ‘em.

SEQUENCE 3:

33/11/19 (00:31.02) You guys, we’ve got to do your summary reflection now because we’re just about out of time. So, pencils poised over paper. Eighth graders, as always you guys can go off on your own direction. Sixth and seventh graders, some reflections, just do it at the end of the last page that you’re on. I know you’ve got a lot of notes, that’s a great thing. I deeply admire how hard you guys work, how thoughtful and respectful you are. And you’re getting much better about taking risks. I know we’ve been working on that, and you guys have been really good about that for the last couple of days, couple of meetings.

34/2/13 (001:03.00)There’s a third a final backup for all this that goes on behind the scenes. You saw them writing daily pages, and … that’s a very organized routine that’s important because 1) of course they have a lot of success with it, but 2) it teaches them how to do notes, but 3) it gives me change-over-time indications. All those data pages go right in their notebooks. Every couple of weeks I look at about 10 of them, so every month I’ve looked at all of them, basically, and I just sit and read them. And my TA will help sometimes and we’ll just compare notes – “Is this person getting it?” “Are they developing arguments using evidence?” “Are they countering things using evidence?” – that being a big point in our class. “Are they talking about the scientific processes – measurement, all the rest of that – mathematical communication?” All that shows up right there on that page. So it’s duck-soup easy, and it’s not worksheets, which is something I really like for a couple reasons: the copiers are always broken, they cost money, and it’s boring.

35/2/14 (01:39.29) I’d forego everything except the ocean in my soul to teach kids to actually think scientifically because, boy, we need it … it’s so critical. So, as much as wanting to know about photic zones and phytoplankton, I really just want them to be some critical thinkers. So, that’s why the focus – it’s embedded in every single thing. We began the first part of the year with six weeks of activities just around increased skills. So, I’m talking about measuring, I’m talking about investigation skills, the whole bit about asking testable questions, etc. And they did everything from coloring to creating high-level questions. So … I began by laying a great foundation. I said, “This is what we’re doing.” We defined what science is as that whole group of NSTA inquiry skills that’s used widely by NSTA staff, people like that. The way we phrased it is, “Hey, if math is … adding, subtracting, division and multiplication, then science is these six things over here, and we’re going to be working on them all the time.” So, when I make my goals statements they’re linked to that. “We’re working on classification today.” We might be doing that using the light spectrum, but we’re working on classing. That’s what’s happening. So, that coherence in terms of the broad goals is critical. They … get that, because they’ve heard that stuff, they know that’s where we’re coming from. That’s what their evaluations are based on, it’s our common language.

36/2/15 (01:36.18) I have talked to hundreds of adults, and one of the things I do with them is I say, well, “How was your middle school experience?” And every one of them says it was boring. So, the reason why I am wedded – and … I choose that word carefully – why I am absolutely wedded to doing things, to the inquiry method, if you will – to experiencing and then talking – is that it’s just more interesting. Classroom management problems disappear if you have an engaging curriculum. If you do stuff that they’re interested in doing – and I’m not talking about pandering to 12 year-old tastes – I’m talking about making sure that real substantive information is done in a fun way, then what you have is serious fun. The subject matter’s serious but they’re having a good time with it and you never have a management problem. And that’s key for pre-service teachers, because you’ll

start and you'll talk and they'll get bored, and what a boy like me is going to do when I'm 12 years old is I'm going to find a way to make things a little more exciting. So you've got to keep it fun – seriously fun. I can summarize it very easily by saying … there's all kinds of maxims and clichés, but if you do something and have an experience, then you've got something to talk about. If you talk about it then do something, you're setting up this expectation that, "OK, well, there's this right way to do it." And then you've got cookbook science, where, "Kurt wanted it to be that way." Whereas, I want the opposite, I want them to just mess around, to embrace failure, to crash and burn, and to push through it all and learn how to be real scientists, which is a bit of a messy process.

[END CREDITS/CLIPS OF INTERVIEWS WITH KIDS]